OECD Health Policy Studies

Beating Cancer Inequalities in the EU

SPOTLIGHT ON CANCER PREVENTION AND EARLY DETECTION

European Cancer Inequalities Registry

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European Commission

OECD Health Policy Studies

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BETTER POLICIES FOR BETTER LIVES

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Foreword

In the wake of the COVID-19 pandemic's global upheaval, longstanding disease threats return to the forefront of the healthcare policy agenda. Foremost among these – and long considered the most daunting – is cancer, which is set to become the leading cause of death in the 27 European Union (EU) Member States, Norway and Iceland (EU+2 countries) by 2035. The cancer context today is multi-faceted. Longstanding behavioural, metabolic and environmental risk factors drive about 40% of cancer cases. In parallel, emerging screening innovations are capitalising on artificial intelligence and genomic advances, while the cost of new cancer pharmaceuticals is skyrocketing. This complex scenario is compounded by challenges in the healthcare workforce and evolving organisational care models. Moreover, large disparities are evident through the entire cancer pathway: from prevalence of cancer risk factors to cancer outcomes. These disparities exist not only across but also within countries, varying by region, gender and socio-economic status.

With Europe home to a quarter of the world's cancer cases, in 2021 the EU launched the ambitious, multi-faceted Europe's Beating Cancer Plan to address the full disease pathway via partnerships, research and innovation. One of the ten flagship initiatives of the Plan, the European Cancer Inequalities Registry, is designed to measure and assess inequalities in cancer. Under this umbrella, the OECD and European Commission have published a series of Country Cancer Profiles for each of the EU+2 countries (www.oecd.org/health/eu-cancer-profiles.htm), and have produced this flagship report.

Beating Cancer Inequalities in the EU: Spotlight on Cancer Prevention and Early Detection provides cross-country comparisons and policy perspectives on major cancer risk factors, screening programmes and early diagnoses. It also addresses issues related to provision of high-quality cancer care, with a focus on disparities by region, socio-economic status and gender. The report uses a mix of quantitative and qualitative analyses, including information collected through a policy survey covering 26 countries, consultations with stakeholders and country-specific experts, and an in-depth literature review. It emphasises the need for comprehensive policy packages aimed at cancer prevention and identifies targeted interventions that have proved effective in reducing disparities among different population groups in terms of cancer risk factors, screening and early diagnosis.

A key aspect of many such initiatives is improving knowledge, awareness and accessibility of healthier lifestyles and cancer screening programmes among vulnerable populations. This requires ensuring that prevention and screening initiatives reach people where they live, work and play. It involves designing health-promoting communities and environments, engaging primary care physicians and local pharmacies, and implementing mobile vaccination and screening units. As with the global response to the COVID-19 pandemic, there is great potential for international collaboration in battling cancer. For EU+2 counties, such partnerships begin with sharing country-specific initiatives and best practices, as described in this report. They continue with alignment of fiscal policies and regulations on a range of cancer risk factors; assessment and prioritisation of new cancer pharmaceuticals; and planning of innovative care systems.

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The project benefited from input from a range of stakeholders, including the Joint Research Centre (JRC), the International Agency Against Cancer (IARC), the CONCORD Programme, the World Cancer Research Fund International and the European Society for Paediatric Oncology. The Swedish Institute for Health Economics, Paris Dauphine University (LEDa-LEGOS) and Amsterdam UMC location University of Amsterdam (Department of Public and Occupational Health) provided input and participated in the policy analysis presented.

This report benefited from comments from and discussions with OECD country representatives and OECD colleagues. The cancer team is grateful for the valuable input received from national experts, and comments provided by the OECD Health Committee and the EU Expert Thematic Group on Cancer Inequalities Registry, as well as various other stakeholders who participated in interviews and provided additional information (including the European Centre for Disease Prevention and Control, the Association Collaborating on Hepatitis to Immunize and Eliminate the Viruses in Europe, the European Cancer Organisation, the Dutch Centre of Expertise on Health Disparities and All.Can). The publication also benefited from comments from DG SANTE, JRC, IARC and the CONCORD Programme. The opinions expressed and arguments employed herein do not necessarily reflect the official views of the OECD member countries or the European Union.

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Acronyms and abbreviations

AI	Artificial Intelligence
ASMR	Age-standardised mortality rate
ASSIST	Alcohol, Smoking and Substance Involvement Screening Test
ATC	Anatomical Therapeutic Chemical
AUDIT-C	WHO Alcohol Use Disorders Identification Test-Concise (AUDIT-C)
BfS	*Bundesamt für Strahlenschutz* (Germany's Federal Office for Radiation Protection)
BMI	Body Mass Index
CCE	Colon capsule endoscopy
CDC	Centers for Disease Control and Prevention (United States)
CNS	Central nervous system
CME	Continuous medical education
CraNE	Joint Action on network of Comprehensive Cancer Centres
CT	Computerised tomography
DM	Digital mammography
DMT	Digital breast tomosynthesis
DNA	Deoxyribonucleic acid
DALYs	Disability-adjusted life years
ECAC	European Code Against Cancer
ECDC	European Centre for Disease Prevention and Control
ECIBC	European Commission Initiative on Breast Cancer
ECIS	The European Cancer Information System
EDI	European Deprivation Index
EHIS	European Health Interview Survey
EMA	European Medicines Agency
EPAAC	European Partnership for Action Against Cancer
ERN	European Reference Networks
ESMO-MCBS	European Society for Medical Oncology – Magnitude of Clinical Benefit Scale
EU	European Union
EUCAIM	EUropean Federation for CAncer Images
EUPAP	European Physical Activity on Prescription (model)
EUR	Euro
EUROHELICAN	Accelerating gastric cancer reduction in Europe through Helicobacter pylori eradication
FoP	Front-of-pack (labelling)
FIT	Faecal immunochemical testing
GBP	Great British Pound
GDPR	General Data Protection Regulation
gFOBT	Guaiac-based faecal occult blood test
GP	General practitioner
HBSC	Health Behaviour in School-aged Children Study
HBV	Hepatitis B virus
HCV	Hepatitis C virus
HLS19	Health Literacy Population Survey 2019-21

HPV	Human papillomavirus
HTA	Health Technology Assessment
HTAR	Regulation (EU) 2021/2 282 on health technology assessment
IARC	International Agency for Research on Cancer
ICD	International Classification of Diseases
IHME	Institute for Health Metrics and Evaluation
ILO	International Labour Organization
IQR	Inter-quartile range
JANE	EU Joint Action on Networks of Expertise
LGBT+	Lesbian, gay, bisexual, and transgender
MDT	Multidisciplinary team
ML	Machine learning
M-POHL	WHO Action Network on Measuring Population and Organisational Health Literacy
MRI	Magnetic resonance imaging
MSM	Men who have sex with men
MUP	Minimum Unit Pricing
OECD	Organisation for Economic Co-operation and Development
OECI	Organisation of European Cancer Institutes
Oncology-SONCOS	Foundation of Co-operation in Oncology
OnkoZert	Voluntary certification programme of the German Cancer Society
PM	Particulate matter
PRAISE-U	PRostate cancer Awareness and Initiative for Screening in the European Union
PREMS	Patient Reported Experience Measures
PROMS	Patient Reported Outcome Measures
PRS	Polygenic risk scores
PSA	Prostate-specific antigen
RARECAREnet	Information Network on Rare Cancers
SIOPE	European Society for Paediatric Oncology
SOLACE	Strengthening the screening of Lung Cancer in Europe
TOGAS	Towards gastric cancer screening implementation in the European Union
SBIs	Screening and brief interventions
SSB	Sugar-sweetened beverage
TCS	Tobacco Control Scale
UNICEF	United Nations Children’s Fund
USD	United States dollar
WCRFI	World Cancer Research Fund International
WHO	World Health Organization

Executive summary

Cancer is a major public health concern in Europe. In 2022, there were an estimated 2.78 million new cancer cases in the 27 European Union Member States (EU27), plus Iceland and Norway (EU+2 countries), which is equivalent to about five new diagnoses every minute. By 2035, it is anticipated that cancer will be the leading cause of death in Europe.

The report builds on the 2023 EU Country Cancer Profiles, www.oecd.org/health/eu-cancer-profiles.htm and the European Cancer Inequalities Registry, https://cancer-inequalities.jrc.ec.europa.eu/. It examines policies and actions to tackle cancer, with a focus on addressing preventable risk factors and improving the reach of screening and early diagnosis to counter concerning cancer trends and inequalities. The examples discussed in the report show that strong political will and targeted actions are needed to make prevention an effective priority.

Cancer mortality rates vary 1.6-fold across countries, and by up to 37% between regions within a country

While estimated cancer incidence increased between 2010 and 2022 in 14 of 24 countries with available data, mortality decreased by 10% in the EU27 during this period, with reductions seen across most cancer sites. However, cancer mortality remains high (representing 22.5% of all deaths) and varies 1.6-fold across EU+2 countries. For many cancers, higher age-standardised cancer mortality rates are found in Central and Eastern European countries (Croatia, Hungary, Latvia, the Slovak Republic and Slovenia), while Western European and Nordic countries (Finland, Luxembourg, Spain and Sweden) have the lowest mortality rates.

Not everyone has the same risk of dying from cancer, even within the same country. Cancer mortality rates differ by up to 37% between regions in Romania, and by at least 30% between regions in France, Germany, Poland and Spain. Men have almost 70% higher mortality rates than women. In addition, men with lower education levels are 2.6 times as likely to die from lung cancer as their counterparts with higher education levels; while for women, that figure stands at 1.7 times.

Unhealthy lifestyles, metabolic risk and poor environment explain over 40% of the cancer burden: A comprehensive set of prevention policies is needed

By far the leading risk factor for cancer death in EU+2 countries is tobacco (with more than a quarter of cancer deaths attributed to smoking), followed by alcohol consumption, unhealthy diet, occupational risk, overweight and obesity, high blood sugar, air pollution, physical inactivity and infection from three types of oncoviruses – human papillomavirus, hepatitis B virus and hepatitis C virus. The major risk factors for cancer are consistently more prevalent among people with lower socio-economic characteristics, such as lower income and education levels. There are also large disparities in cancer risk factors by gender to the detriment of men – notably for cigarette smoking, alcohol consumption, poor diet, and overweight and obesity. Men across the EU27 are 51% more likely to be daily smokers and more than twice as likely to report heavy alcohol drinking as women.

All countries have scope to prioritise prevention policies and learn from other countries' best practices. Even with heightened prevention investment following the COVID-19 pandemic, only 5.1% of total health spending was dedicated to prevention on average in the EU27 in 2021. Countering alarming trends in cancer incidence and inequalities requires key prevention policies to address cancer risk factors, but no policy is sufficient on its own. **A comprehensive package of prevention policies** is necessary to tackle different cancer risk factors and target at-risk population groups – including **fiscal and regulatory policies**; accessibility of **health information**; **health-promoting and empowering communities** that engage people via **primary healthcare, schools and workplaces**; and better **health literacy** across population groups.

Screening alone is insufficient to ensure access to early detection; improved awareness, outreach and a greater role for primary care are also necessary

Screening for breast, cervical and colorectal cancers is effective in raising early detection and improving survival. This report demonstrates that countries with higher breast cancer screening participation rates have better outcomes, such as a lower breast cancer mortality-to-incidence rate ratio. Despite population-based screening programmes for breast, colorectal and cervical cancers in most EU countries in 2023, participation rates vary greatly and are concerningly low in many countries. In 11 EU+2 countries, less than half of women aged 50-69 have had a mammogram within the past two years. There are also disparities in cancer screening rates to the detriment of groups with lower education or income levels; for example, the likelihood of having had a mammogram is 15% lower among women with lower education levels.

A wide range of policy options exists for EU+2 countries to improve early detection through greater participation in cancer screening and earlier cancer diagnosis. Such efforts should begin with **increasing awareness of cancer, its related symptoms and the benefits of screening**. Efforts should also include establishing **delivery models that reach vulnerable populations in their local communities**, such as use of mobile screening units or self-sampling tests for colorectal and cervical cancer screening. **General practitioners** (GPs) can support early diagnosis by recognising cancer symptoms and recommending screening to their patients, as can **fast-track pathways**, which reduce the time between cancer suspicion and diagnosis.

The difference in public coverage of cancer medicines across EU countries is three-fold, while the cancer workforce is overstretched

As the high prices of oncology medications are taking up an increasing share of healthcare budgets, countries are examining new ways to ensure access to cancer treatments. The OECD analysis shows marked variability in the proportion of breast and lung cancer indications/products that are publicly reimbursed in 2023. Germany reports coverage for all indications/products, while Malta, Cyprus and Latvia cover less than a third.

Delivering people-centred care for cancer patients is also a key issue, given both the increasing number of cancer diagnoses and the healthcare workforce shortages reported by countries – including shortages of GPs, oncologists, nurses, radiologists and psychologists. Countries are relying on a range of solutions to tackle workforce challenges, such as increasing training capacity, reallocating tasks among healthcare professionals, introducing financial incentives and recruiting foreign-trained professionals.

Overall, this report shows that there is much work to be done to address the increasing burden of cancer and inequalities: investing in comprehensive prevention policies and ensuring widespread reach of screening and early diagnosis will make a major dent in Europe's cancer trends in the years to come. Inclusive approaches to cancer prevention and cancer control policies – with particular emphasis on vulnerable groups – should be scaled up to improve the health and well-being of all Europeans. This requires investment in comprehensive, quality cancer registries – linked to data from screening programmes and on individuals' socio-economic status – to provide timely insight on cancer control efforts across the population.

1

Beating cancer inequalities: Current trends and key policy directions

As cancer is anticipated to become the leading cause of death in Europe by 2035, this report aims to provide policy insights for preventing cancer, ensuring timely identification of emerging cases, and improving care for diagnosed patients. This chapter highlights the key findings, beginning with an overview of trends in cancer incidence, mortality and survival, and assessing inequalities in these indicators. It offers an overview of the main behavioural, metabolic and environmental risk factors for cancer, and provides overarching recommendations for addressing them. The chapter also discusses key messages on cancer screening programmes, existing initiatives and emerging approaches to enhance screening reach. It concludes by highlighting major challenges to delivering high-quality cancer care, including workforce limitations, access to oncology medicines and care system organisation.

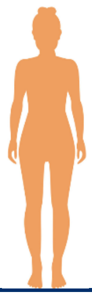
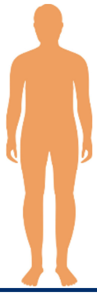
1.1. Cancer is a major public health concern across European countries

1.1.1. In 2022, one new cancer case was diagnosed every 11 seconds in European countries

Across the 27 European Union Member States (EU27) plus Iceland and Norway (EU+2 countries), an estimated 2.78 million new cancer cases were diagnosed in 2022 (ECIS, 2023[1]). This translates to about five people being diagnosed every minute, or one cancer case diagnosed every 11 seconds. Compared to 2020, the number of new cancer cases increased by 2.4% in 2022 (an increase of around 65 000 cases). It is estimated that new cancer diagnoses will increase by around 18% in the EU27 in 2040 compared to 2022.

Leukaemia is the most common cancer diagnosed in children (aged under 15), accounting for around 33% of cancer cases among boys and 30% among girls. In adults, the most common cancers among those estimated to have been diagnosed in the EU27 in 2022 were breast, prostate, colorectum and lung, which together represented 50% of all new cancer diagnoses in 2022 (Table 1.1). The same cancer sites, with the addition of pancreatic cancer, were the leading causes of death in 2020 – responsible for 52% all cancer deaths.

Table 1.1. Breast, prostate, colorectum and lung cancer are estimated to be the leading cancer sites in 2022

	Women					**Men**		
Estimated new cases	Breast	374 836	29%			Prostate	330 492	23%
	Colorectum	158 698	12%			Lung	203 029	14%
	Lung	116 207	9%			Colorectum	197 456	13%
	Corpus uteri	69 163	5%			Bladder	127 640	9%
	Melanoma skin	49 509	4%			Kidney	58 213	4%
	Pancreas	50 438	4%			Melanoma skin	51 998	4%
	Non-Hodgkin lymphoma	41 189	3%			Non-Hodgkin lymphoma	51 518	4%
	Ovary	40 714	3%			Pancreas	49 714	3%
	Thyroid	38 503	3%			Stomach	45 246	3%
	Brain and other CNS	19 539	2%			Multiple myeloma	18 808	1%
	All cancer sites*	**1 276 601**				**All cancer sites***	**1 465 846**	

Note: CNS stands for central nervous system. * Includes all cancer sites except non-melanoma skin cancer. Estimates were calculated based on incidence and mortality trends before the COVID-19 pandemic and may differ from observed rates in more recent years. Lung also includes bronchus and trachea.
Source: ECIS (2023[1]), *European Cancer Information System*, https://ecis.jrc.ec.europa.eu (accessed on 27 April 2023).

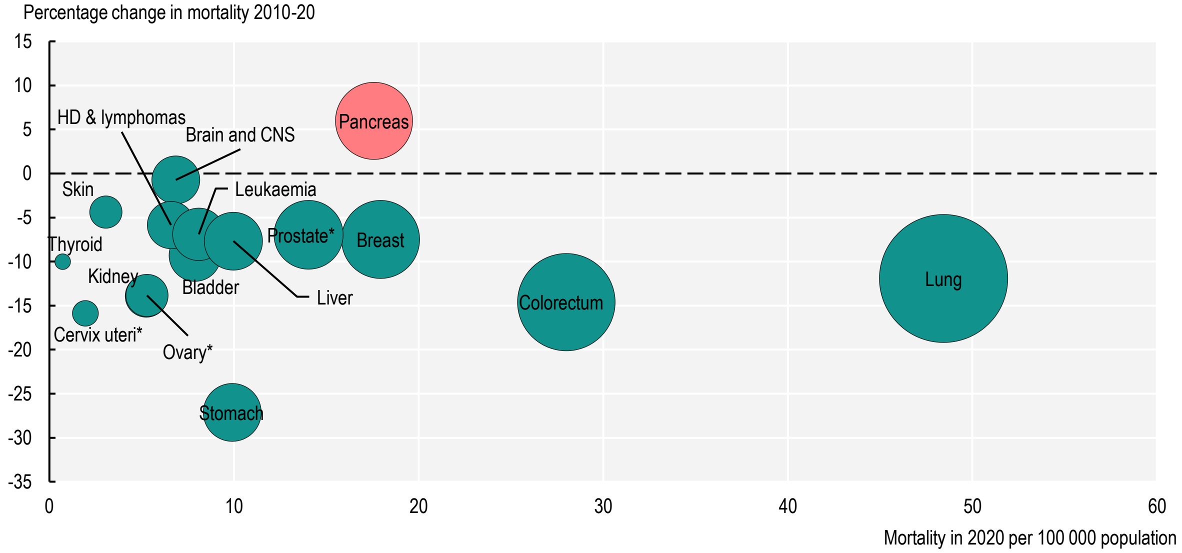
Estimated cancer incidence increased in 14 of the 24 countries with available data between 2010 and 2022. After adjusting for different population age structures, overall cancer incidence was highest in Norway and Denmark, at close to 28% higher than the EU27 average. Ireland, the Netherlands, Croatia and Hungary were also among the 20% of countries with the highest incidence (the highest quintile) among EU+2 countries, with incidence rates above 622 per 100 000 population. In Bulgaria and Austria, overall estimated cancer incidence was the lowest, with rates more than 14% lower than the EU27 average. Low incidence was also seen in Romania, Spain, Greece and Lithuania (all with estimated incidence below 542 per 100 000 – the lowest quintile). In the EU27, cancer incidence rates are estimated to vary near 2-fold across countries.

1.1.2. Cancer mortality rates decreased by 10% between 2010 and 2020 in the EU27, with rates varying greatly across countries

In 2020, about one in four (22.5%) deaths were caused by cancer (Eurostat, 2023[2]). Cancer is the second leading cause of death in Europe after cardiovascular diseases, but it is anticipated to become the leading cause of death by 2035. However, between 2010 and 2020, the age-standardised mortality rate for all cancer decreased by 10% in the EU27. Reductions in cancer mortality rates were observed in all 29 EU+2 countries except Bulgaria and Cyprus. The highest mortality rates occurred in Hungary (32% higher than the EU27 average), but high rates were also observed in Croatia, the Slovak Republic, Latvia, Slovenia and Poland. The lowest mortality rates occurred in Luxembourg (16% lower than the EU27 average), Cyprus, Finland, Malta, Sweden and Spain. Overall, cancer mortality rates varied 1.6-fold across countries.

Mortality rate decreases were seen across almost all cancers, with stomach cancer mortality declining the most (at 27%). Significant decreases in mortality rates were also seen for cancers of the cervix uteri (-16%), colorectum (-15%), kidney (-14%), and lung cancer (-12%) (Figure 1.1).

Figure 1.1. Mortality rates decreased for most of the main cancer sites in the last decade



Note: The red bubble signals an increase in the percentage change in the cancer mortality rate during 2010-20; green bubbles signal a decrease. The size of the bubbles is proportional to the mortality rate in 2020. The mortality rate for some of these cancers is low; hence, the percentage change should be interpreted with caution. * Percentage change for prostate, ovary and cervix uteri cancers refers to 2011-20. HD stands for Hodgkin disease.

Source: Eurostat (2023[2]), Causes of Death – Deaths by Country of Residence and Occurrence, https://ec.europa.eu/eurostat/databrowser/view/HLTH_CD_ARO__custom_6537139/default/table.

In 2020, cancer mortality rates varied greatly across the EU+2 countries, as seen in Table 1.2. This shows a per-cancer-site colour scale where dark red corresponds to the highest quintile of mortality rates and dark blue corresponds to the lowest quintile. The relative predominance of blue across the top indicates lower cancer mortality rates in Nordic and Western European countries, while the predominance of red across the bottom indicates higher cancer mortality rates in Central and Eastern European countries.

Table 1.2. Cancer mortality is consistently higher in Central and Eastern European countries

Age-standardised mortality rate per 100 000 population, 2020, both sexes

	Bladder	Brain and CNS	Breast	Cervix uteri	Colorectum	HD & lymphomas	Kidney	Leukaemia	Liver	Ovary	Pancreas	Prostate	Stomach	Lung
Sweden	6.1	6.3	13.5	1.1	26.4	6.2	4.5	7.2	7.1	4.8	18.6 ↑	21.1	5.0	33.5
Luxembourg	6.3	5.2	20.3	0.3	23.9	6.3	2.9	8.8	7.4	5.1	16.3	13.3	7.2	39.2
Spain	8.5	6.5	12.8	1.3	29.4	6.0	4.2	6.6	10.0	4.1	14.9 ↑	11.2	9.7	44.8
Finland	5.0	6.3	15.8	0.8	20.8	8.9	5.7	5.4	9.1 ↑	4.5	21.2 ↑	14.8	6.7	36.7
Belgium	6.5	6.5 ↑	17.8	1.2	21.6	6.2	4.4	8.5	8.5 ↑	5.1	16.0	13.2	5.8	49.4
Norway	6.0	6.5	12.3	2.1 ↑	32.2	6.3	5.1	6.6	6.6 ↑	5.0	16.0	20.2	5.8	44.6
France	7.2	5.9	18.0	1.1	23.3	6.7	4.8	8.3	12.3	4.7	17.6 ↑	12.0	6.0	44.4
Cyprus	5.9	8.8 ↑	16.3	1.4 ↑	18.6 ↑	6.8 ↑	2.6	10.8 ↑	8.2 ↑	6.4 ↑	14.6 ↑	12.5	8.5 ↑	40.9 ↑
Italy	7.9	6.3 ↑	18.0	0.7 ↑	25.1	7.1	4.8	8.3	11.6	4.6	17.7 ↑	10.0	11.5	44.5
Portugal	7.4	7.9 ↑	15.6	1.8	32.0	7.4	4.0	7.3	11.3 ↑	3.4	14.2 ↑	15.9	18.0	37.2 ↑
Malta	9.3	8.6	20.1	0.8	25.6	6.0	6.6 ↑	7.8	5.9	7.1	22.8 ↑	8.6	5.9	35.6
Greece	10.1 ↑	9.1	17.5	1.2	21.5	5.1 ↑	4.7	9.1	11.0	4.4	16.1 ↑	13.0	9.3	58.0
Austria	6.1	6.8	18.3	1.6 ↑	23.4	7.1	4.1	9.3	9.4 ↑	5.4	20.4 ↑	15.4 ↑	8.2	44.7
Netherlands	8.1	5.5 ↑	18.1	1.4	27.1	7.8	5.3	8.1	7.3	5.9	16.8	17.8	6.6	57.2
Germany	6.0	6.5	19.4	1.7	25.2	7.4	5.3	8.6	8.8	5.5	19.5 ↑	15.5	8.7	47.5
Iceland	7.9	8.7	18.1	2.0 ↑	25.6	6.9	6.9	6.7	7.5 ↑	5.4	16.7 ↑	23.4 ↑	6.1	50.1
Denmark	7.7	7.6	18.5	1.5	28.8	6.0	4.2	8.6	7.7	5.5	19.5 ↑	23.9	7.2	57.2
Romania	9.1 ↑	8.7 ↑	18.7 ↑	6.9	34.3 ↑	3.6	4.7 ↑	6.3	14.4	5.3	15.4 ↑	13.5 ↑	15.6	49.1
Bulgaria	8.4 ↑	8.9 ↑	19.3 ↑	4.8 ↑	36.0 ↑	4.2 ↑	5.1 ↑	5.8	9.1	6.0 ↑	16.3 ↑	16.8 ↑	14.4	44.8 ↑
Ireland	6.9	7.8 ↑	19.9	1.7	27.3	8.5	5.5	7.1	10.5 ↑	7.4	16.1	17.4	7.8	52.1
Czechia	8.8	7.2	17.1	2.7	33.3	6.1 ↑	8.7	9.5	8.2	6.0	21.9	15.1	9.3	48.8
Poland	11.8 ↑	8.3	19.9 ↑	4.1	35.6	5.3 ↑	6.7	8.0	5.9	7.4	13.8	16.9 ↑	13.4	60.5
Lithuania	8.7	9.3 ↑	19.1	6.4	30.4	5.8 ↑	7.8	9.3	7.9 ↑	8.9	17.4 ↑	18.1	20.8	41.4
Estonia	7.8	8.1	18.9	4.6	29.8	7.0	9.5 ↑	8.9	9.6 ↑	7.2	18.7 ↑	17.4	18.9	44.6
Hungary	10.7	6.6 ↑	22.9	3.8	50.5	5.3	7.8	8.4	8.2	7.0	22.0 ↑	14.2	13.3	81.0
Slovenia	11.3 ↑	7.1	21.9	1.8	30.9	9.8 ↑	7.4	8.6	13.6 ↑	4.9	18.9	20.5	14.4	53.3
Slovak Republic	9.8 ↑	8.5 ↑	23.8 ↑	3.5	46.3	7.0 ↑	8.8 ↑	9.8 ↑	9.1	6.9 ↑	20.6 ↑	17.7	13.7	47.5
Croatia	10.9 ↑	9.7	16.8	2.9 ↑	47.6	7.3	8.2	9.1	11.0	7.2 ↑	17.6 ↑	18.4	15.3	63.0
Latvia	11.1 ↑	10.0 ↑	22.4 ↑	5.6	33.3	6.6	9.8	8.1	9.1 ↑	10.5	20.6 ↑	21.1 ↑	20.0	46.8
EU27 average	7.9	6.9	18.0	2.0	28.0	6.6	5.3	8.1	10.0	5.3	17.6 ↑	14.0	9.9	48.4

Notes: CNS stands for central nervous system. The colours correspond to quintiles of mortality among the 29 countries, where blue is the quintile with the lowest mortality rate, light blue the second quintile, white the third quintile, light red the fourth quintile and dark red the quintile with the highest mortality rate. The order of countries in the table is determined by the average position of annual mortality rates for each cancer. In Iceland, the 2020 mortality rate is a five-year rolling average (2016-20) and the 2010 mortality rate is a four-year rolling average (2006-09) (no data for 2010). Arrows indicate an increase greater than 3% in mortality rates between 2010 and 2020; except for Iceland and Denmark, and for cervix uteri, ovary and prostate cancers, which show the difference between 2011 and 2020. EU27 averages include only EU Member States and are calculated as population-weighted averages.

Source: Eurostat (2023[2]), Causes of Death – Deaths by Country of Residence and Occurrence, https://ec.europa.eu/eurostat/databrowser/view/HLTH_CD_ARO__custom_6537139/default/table.

Variations in cancer mortality between EU+2 countries are wide. In 2020, breast cancer mortality rates varied almost two-fold, and the mortality rates for colorectal, liver, prostate, stomach and lung cancer varied between more than two-fold and four-fold.

As with the improvement in cancer mortality rates over the last decade, five-year estimated survival probabilities for most cancers have improved (or changed very little) in most countries for people diagnosed between 2010 and 2014 compared to people diagnosed between 2005 and 2009, mostly because of earlier diagnosis (through better imaging, biomarkers and screening strategies) and new treatments. Among countries, there are major differences in estimated cancer survival probabilities. Western European and Nordic countries such as Belgium, Norway, Sweden, Iceland, Germany and Portugal consistently have survival estimates in the top quintile (the best performing) for most cancers. Cyprus also has survival estimates in the top quintile for 8 of the 11 cancers examined. Bulgaria, the Slovak Republic, Czech Republic (hereafter "Czechia"), Croatia, Poland, Romania and Lithuania have some of the lowest estimated five-year survival estimates across the 11 cancer sites, with estimates in the lowest quintile for at least 5 cancer sites, suggesting important room for improvement.

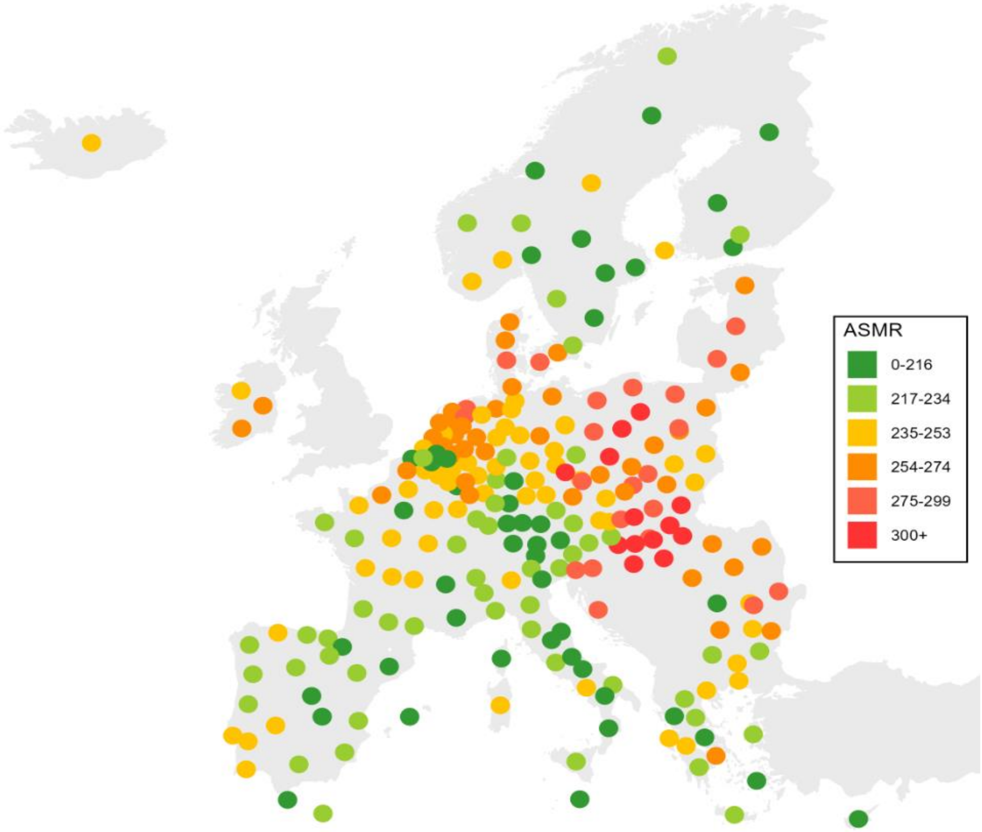
1.2. There are large gaps in the cancer burden within countries by geographical region, gender and socio-economic group

1.2.1. Cancer mortality rates vary by up to 37% between regions within a country

Large geographical disparities in cancer incidence, cancer survival and cancer mortality rates exist, and cancer outcomes can vary dramatically within different regions of the same country (Figure 1.2). The largest within-country differences in overall cancer mortality by European NUTS2 regions can be found in Romania, where Bucuresti-Ilfov had 37% higher cancer mortality rates than Sud-Vest Oltenia in 2020. There were also large regional disparities in overall cancer mortality in Poland, France, Spain and Germany, with at least a 30% variation in mortality rates. By contrast, relatively small countries such as Slovenia, Ireland, the Slovak Republic and Lithuania had smaller geographical disparities in cancer mortality in 2020.

Figure 1.2. Cancer mortality rates vary considerably by region in Romania, Poland, France, Spain and Germany

Age-standardised cancer mortality rate (ASMR) per 100 000 population by NUTS2 regions



Note: The map is based on cancer mortality rates in 2020. In Iceland, the 2020 mortality rate is a five-year rolling average (2016-20).
Source: Eurostat (2023[3]), Causes of Death – Standardised Death Rate by NUTS 2 Region of Residence, https://ec.europa.eu/eurostat/databrowser/view/HLTH_CD_ASDR2__custom_6414996/default/table.

1.2.2. Men have a higher overall cancer mortality rate than women by 70%

Among the EU27, age-adjusted cancer incidence in 2022 was 40% higher among men, while cancer mortality rates in 2020 were almost 70% higher among men than women. The gender gap in both cancer incidence and mortality rates has decreased over time. These figures vary widely by country, however. EU+2 countries with the highest gender gaps in cancer mortality were the Baltic countries (Lithuania, Latvia and Estonia), Portugal and Spain, while Nordic countries (Iceland, Denmark and Sweden) and Ireland had the smallest gender gaps.

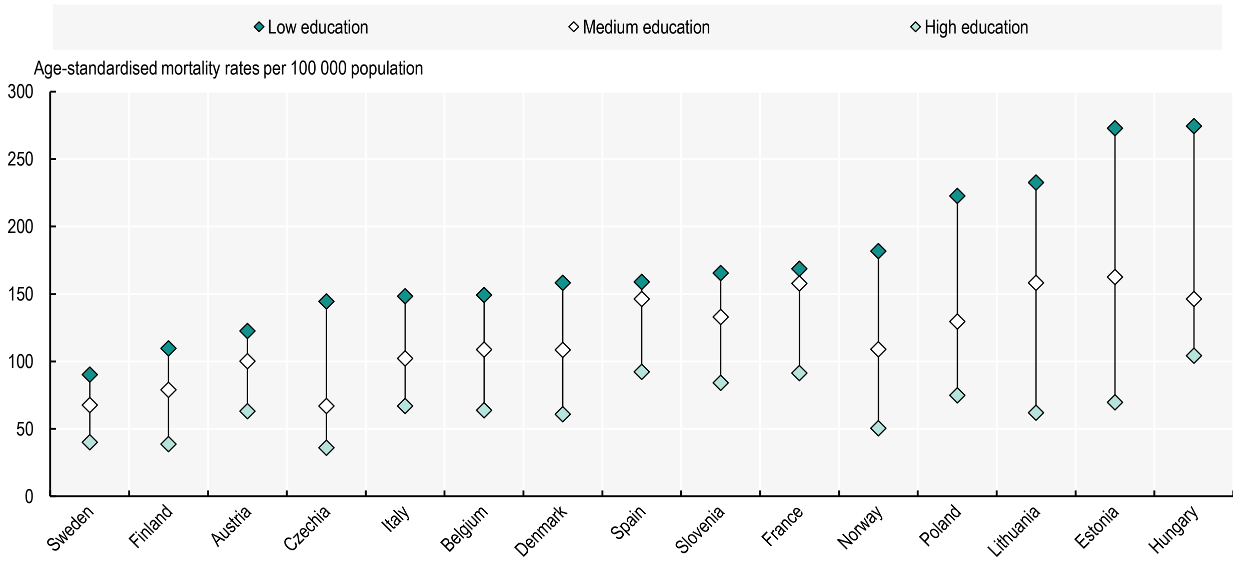
While the majority of cancer deaths occur in the oldest age group, the proportion of cancer deaths among all deaths is highest in the group aged 50-69 (at 37%), compared to 19% among those aged 70-85 in 2020.

1.2.3. Lung cancer mortality rates were higher among women and men with lower education levels than among their counterparts with higher education levels

Systematic differences in cancer incidence, survival and mortality are observed between social groups – most often assessed on the basis of education levels (Vaccarella et al., 2023[4]; Launoy, Zadnik and

Coleman, 2021[5]). A recent study of 18 European countries confirmed that people with lower education levels diagnosed during 1990-2015 had higher mortality rates for nearly all cancer types than their more educated counterparts (Vaccarella et al., 2023[4]). This is especially notable for tobacco-related and infection-related cancers. Preliminary findings from the EUCanIneq study show that lung cancer mortality rates were 2.6 times as high among men with lower than higher levels of education (Figure 1.3), and 1.7 times as high among women with lower than higher levels of education. Figure 1.4 offers a summary of population groups vulnerable to cancer.

Figure 1.3. Lung cancer mortality rates among men vary with education level in all countries



Note: Caution is recommended when interpreting results, as figures are based on predictions for 2015-19, with different methodology across countries and varying levels of population coverage.
Source: Preliminary findings from the EUCanIneq study.

There is a crucial lack of research on inequalities in cancer outcomes by ethnicity or migrant population because of a lack of information on ethnicity, nationality or country of birth in many cancer registries. In Denmark, Finland, Iceland and Norway, non-Western immigrant women have a lower risk than the native-born population of developing breast (-29%), colorectal (-28%) and lung cancer (-45%) initially after migration; however, the likelihood increases with the length of stay in the host country (Lamminmäki et al., 2023[6]). These results corroborate the so-called "healthy migrant effect", which suggests that migrants are often in better health than the native-born population on arrival in the host country, but that their health deteriorates with length of residence. This worsening health status over time may occur as a result of lifestyle changes (wherein migrants change from more traditional to Westernised lifestyles), challenges in access to healthcare for migrants (including cost, language and cultural barriers, poor health literacy and discrimination) (Bradby, Hamed and Lebano, 2019[7]) or lower socio-economic status and weaker social networks (Berchet and Jusot, 2012[8]). Using data from the Survey of Health, Ageing and Retirement in Europe, new analysis also suggests a healthy migrant effect in countries with available data, with non-citizen populations less likely to report a cancer diagnosis than citizens of the country of residence.

Nevertheless, given the higher prevalence of infection-driven cancer risks in migrants (such as hepatitis C and hepatitis B virus infections), as well as exposure to unhealthy environments in the host country (such as air pollution, poor nutrition or lack of physical activity) and reduced access to prevention and other healthcare services, the health risks faced by migrant populations in Europe warrant targeted consideration (Chapter 3).

Figure 1.4. Certain population groups experience disparities in cancer mortality

Age

37% of all deaths

in the group aged 50-69 attributable to cancer compared to 19% of deaths in the group aged 70+

Education

1.7 - 2.6 times higher risk

of lung cancer mortality among people with lower than higher levels of education

Sex

70% higher risk

of cancer mortality among men than women

Deprivation

Up to 9 percentage points

higher cancer survival probabilities among the least deprived compared to the most deprived groups

Sources: Eurostat (2023[2]), Causes of Death – Deaths by Country of Residence and Occurrence, https://ec.europa.eu/eurostat/databrowser/view/HLTH_CD_ARO__custom_6537139/default/table; preliminary findings from the EUCanIneq study; Zadnik et al. (2022[9]), "Cancer patients' survival according to socioeconomic environment in a high-income country with universal health coverage", https://doi.org/10.3390/cancers14071620; Finke, I. et al., (2021[10]), "Small-area analysis on socioeconomic inequalities in cancer survival for 25 cancer sites in Germany", https://doi.org/10.1002/ijc.33553; Bambury, N. et al. (2023[11]), *Cancer Inequalities in Ireland by Deprivation, 2004-2018: A National Cancer Registry report*, NCRI, Cork.

1.2.4. In order to make data-driven decisions to improve outcomes and close gaps, countries need to link socio-economic data to cancer registries

Cancer registries in Europe have evolved into indispensable instruments for assessing the cancer burden and facilitating evidence-based decision making in cancer control. Their near-universal coverage and potential for data linkages enable comprehensive monitoring of the cancer burden and research on its treatments. A national cancer registry exists in 24 of the 29 EU+2 countries, while 5 (France, Greece, Italy, Romania, Spain) do not have a national cancer registry covering the entire population. The French Senate approved a law supporting the creation of a national cancer registry in June 2023, to be implemented in the near term. Among countries with cancer registries, however, the scope of information and extent of data quality, timeliness and utilisation of the registries varies widely. Mortality and diagnosis data are contained or linked in at least 26 EU+2 countries, while stage and survival data are contained or linked in 25 and 26 countries respectively, and treatment data captured in 24 countries. On the other hand, genetic information and patient-reported outcomes or experiences are more rarely included or linked to cancer registry information. Cancer registries are particularly helpful when integrated with national screening databases and information on socio-economic characteristics, but this poses challenges in some European countries. Only 18 of the 29 EU+2 countries report that their cancer registries contain or link to screening data (for positive cases only). Linking of screening data to the cancer registry is critical to allow effective evaluation of national screening efforts. In addition, although a number of countries report national incidence information by region, only a few do so by socio-economic status or deprivation level (France, Ireland, Italy and Sweden). Ensuring that key socio-economic information is included or linked to cancer registries would facilitate better monitoring and addressing of disparities in cancer care.

1.3. Comprehensive prevention policy packages are needed to reduce risk factors associated with cancer

With the number of cancer diagnoses increasing, and cancer expected to become the leading cause of death in Europe by 2035, countries are exploring what can be done to prevent it. Effective policy making requires an in-depth understanding of the known and modifiable risk factors for cancer, of which population groups are most affected, and of the most effective approaches to address the risks.

1.3.1. Over half of cancer deaths among men and a third of cancer deaths among women are attributable to modifiable risk factors

Globally in 2019, 50.6% of cancer deaths among men and 36.3% among women were attributable to behavioural, environmental, occupational and metabolic risk factors. By far, the leading risk factor for cancer burden in disability-adjusted life-years (DALYs) and deaths in the EU+2 countries is tobacco, with more than a quarter of all cancer deaths attributed to it in 2019. Alcohol is the next leading cancer risk factor (accounting for 6.3% of cancer deaths), followed by dietary risks such as diets high in processed and red meat and low in fruit and vegetables (6.2%), occupational risks – mainly through asbestos exposure (5.9%), overweight and obesity (5.7%), high blood sugar (5.6%), air pollution exposure – mostly through fine particulate matter ($PM_{2.5)}$ exposure (2.0%), physical inactivity (1.2%) and human papillomavirus (HPV) infection (1.2%; cervical cancer only). While addressed through similar interventions as nutrition and physical activity, the metabolic factors of overweight and obesity and high blood sugar (associated with diabetes) are considered independent cancer risk factors. Furthermore hepatitis B virus (HBV) and hepatitis C virus (HCV) infections, which are concentrated in certain risk groups, are also risk factors for cancer.

Table 1.3 shows the prevalence of selected factors that put individuals at higher risk of cancer across EU+2 countries, alongside an indication of changes over time. Compared to 2011, there has been a reduction at the population level in the prevalence of some of the risk factors for cancer, including a reduction in smoking and alcohol use, and lower exposure to $PM_{2.5}$ pollution. However, prevalence of overweight and obesity grew by 3% in the EU between 2014 and 2019, and low fruit and vegetable consumption remained prevalent. In 2019, more than half of adults in EU+2 countries were living with overweight and obesity. Large variation in cigarette smoking, alcohol consumption, overweight and obesity, dietary risk, physical inactivity, levels of HPV vaccination and exposure to $PM_{2.5}$ can be seen across EU+2 countries.

Table 1.3. Prevalence and trends for selected cancer risk factors (or associated measures) vary across EU+2 countries

	SMOKING		ALCOHOL		OVERWEIGHT AND OBESITY		DIETARY RISK		PHYSICAL INACTIVITY		LOW LEVELS OF VACCINATION		AIR POLLUTION	
	Daily smokers (% population aged 15+; change 2011-21)		Litres consumed per capita (% population aged 15+; change 2011-21)		Population with BMI≥25 (% population aged 15+; change 2014-19)		Fruit and vegetable consumption < 5 portions per day (% population aged 15+; change 2014-19)		Less than 150 minutes per week (% population aged 15+; change 2014-19)		Not receiving all doses of HPV vaccine (% of girls aged 15; change 2012-22)		Mean population exposure to PM2.5 (micrograms per m3; change 2010-20)	
EU27	18.8	↓	10.0	↓	51.3	↑	87.6	→	67.3	↓	36.4[1]	↓	11.6	↓
Austria	20.6	↓	11.1	↓	51.1	↑	94.4	↑	56.2	↑	47.0	↓	11.0	↓
Belgium	15.4	↓	9.2	↓	48.8	↑	84.9	↓	70.7		30.0	↓	11.3	↓
Bulgaria	28.7	↑	11.2	↑	53.4	↑	95.0	↓	88.7	↓	91.0	↑	17.5	↓
Croatia	22.1	↓	9.6	↓	63.8	↑	90.2	↓	80.1	↓			16.0	↓
Cyprus	21.2	↓	9.6	↓	48.5	↑	92.1	↑	77.6	↑	36.0	↓	13.7	↓
Czechia	17.6	↓	11.6	↑	58.4	↑	92.3	↑	74.9	↑			14.3	↓
Denmark	13.9	↓	10.4	↓	48.8	↑	77.1	↑	44.6	↓	18.0	↓	9.1	↓
Estonia	17.9	↓	11.1	↓	55.1	↑	86.7	↑	74.2	↓	40.0	↓	6.3	↓
Finland	12.0	↓	8.1	↓	57.7	↑	86.5	↓			33.0	↓	5.0	↓
France	25.3	↓	10.5	↓	45.4	↓	80.5	↓	72.6	↓	58.0	↓	9.6	↓
Germany	14.6	↓	10.6	↓	52.1	↑	89.1	↓	51.0	↓	46.0	↓	10.4	↓
Greece	24.9	↓	6.3	↓	56.2	↑	87.6	↓	80.4	↓			14.5	↓
Hungary	24.9	↓	10.4	↓	58.3	↑	91.8	↑	67.7	↓	20.0	↓	14.2	↓
Iceland	7.2	↓	7.4	↑	60.1	↑	90.9	↑	44.1	↑	6.0	↓	5.6	↓
Ireland	16.0	↓	9.5	↓			67.1	↓	62.7	↓	17.0	↓	8.1	↓
Italy	19.1	↓	7.7	↑	44.7	↑	89.5	↑	80.3	↓	39.0	↑	14.4	↓
Latvia	22.6	↓	12.2	↑	56.7	↑	92.8	↑	79.8	↑	56.0	↑	12.4	↓
Lithuania	18.9	↓	12.1	↓	55.0	↑	84.1	↓	79.1	↓	29.0	↓	9.3	↓
Luxembourg	19.2	↑	11.0	↓	47.1	↑	86.4	↑	55.1	↓	57.0	↑	8.7	↓
Malta	19.4	↑	8.1	↑	63.9	↑	88.4	↑	87.8	↑	22.0	↑	11.8	↓
Netherlands	14.7	↓	8.1	↓	48.3	↑	70.5	↓	38.0		34.0	↓	10.9	↓
Norway	8.0	↓	7.4	↑	49.6	↑	91.4	↓	32.4	↓	8.0	↓	6.0	↓
Poland	17.1	↓	11.0	↑	56.7	↑	91.4	↑	79.7	↓			18.0	↓
Portugal	14.2	↓	10.4	↓	54.5	↑	85.6	↑	83.1	↑	6.0	↓	8.3	↓
Romania	18.7	↓	11.0	↑	56.4	↑	97.6	↑	92.0	↑			14.2	↓
Slovak Republic	21.0	↑	9.6	↓	57.8	↑	91.5	↑	69.5	↓			15.5	↓
Slovenia	17.4	↓	10.6	→	56.6	↑	94.7	↑	67.4	↑	56.0	→	14.4	↓
Spain	19.8	↓	10.5	↑	52.3	↑	89.1	↑	64.6	↓	14.0	↓	9.8	↓
Sweden	9.7	↓	7.6	↑	49.6	↑	92.4	↑	43.6	↓	15.0	↓	5.7	↓

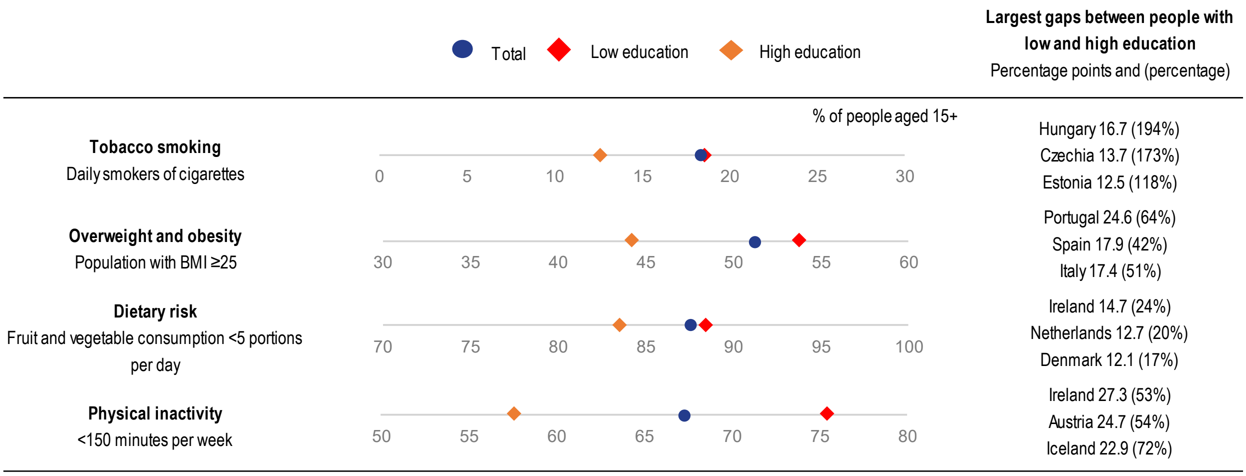
Note: BMI stands for body mass index. For smoking, alcohol, HPV vaccination and air pollution the EU27 averages are unweighted while for overweight and obesity, dietary risk and physical inactivity, the EU27 averages are weighted. The EU average for HPV vaccination is calculated based on 21 EU countries. Green indicates the prevalence of the risk factor is lower than the median of the EU+2 countries by 1 median absolute deviation (MAD) or more; blue indicates that the prevalence is close to the EU+2 median (less than 1 MAD); red indicates the prevalence is worse than the EU+2 median (by 1 MAD or more). For all risk factors, ↓ indicates a reduction in the risk factor over time, regardless of magnitude, ↑ an increase over time and → indicates no change. Change refers to the specified years; data for the nearest years available were used where data from the specified years were not available.

Source: OECD Health Statistics 2023, European Health Interview Survey (Eurostat 2023); WHO (2023[12]), Global Health Observatory database, www.who.int/data/gho; OECD Environment Statistics 2023.

1.3.2. Prevalence of smoking is almost 50% higher among people with lower education levels compared to those with higher education levels

A socio-economic gradient can be seen in most risk factors, as people with lower education and income levels are more likely to use tobacco, be overweight, have unhealthy diets and be physically inactive than people with higher education or income levels in EU+2 countries (Figure 1.5). The gap between socio-economic groups grew for tobacco, alcohol and poor diets between 2014 and 2019.

Figure 1.5. Socio-economic gaps to the detriment of people with lower education levels are found for several cancer risk factors



Note: The percentages refer to the population aged 15+ in the EU27. Low education is defined as people who have not completed secondary education (ISCED 0-2), whereas high education is defined as people who have completed tertiary education (ISCED 5-8).
Source: Eurostat (EHIS, 2019).

- People with low education levels are nearly 50% more likely to smoke daily (18.6%) than those with high education levels (12.7%), but those with a medium level of education had the highest smoking prevalence, at 21.9%.
- Across the EU27, people with low education levels are 21% more likely to be overweight and obese and 31% more likely not to undertake the recommended minimum of 150 minutes of health-enhancing physical activity per week than people with high education levels.
- For air pollution, a systematic review of available evidence in European countries suggests that higher socio-economic deprivation is generally associated with higher levels of exposure to particulate matter and nitrogen oxides (Fairburn et al., 2019[13]). Evidence from some European countries indicates that minority groups and foreign-born populations may be more exposed to air pollution.
- Data from the Netherlands, Denmark, France, Sweden and Poland indicate lower rates of HPV vaccination or lower confidence in HPV vaccine among people with lower socio-economic characteristics and migrant groups.

1.3.3. Men across the EU27 are more than twice as likely to report heavy alcohol drinking as women

Similarly, there are gaps in some risk factors between genders that align with the greater cancer incidence and mortality among men. Men smoke cigarettes more than women in nearly all countries. The highest gender gaps are in Lithuania and Romania, with daily smoking more than three times as common among men, and in Cyprus, Latvia and Portugal, where it is more than twice as common. Similarly, 26.3% of men compared to 11.4% of women reported heavy episodic drinking at least once a month in the EU27 in 2019. Men are also more likely to be living with overweight and obesity, and to have diets with insufficient fruit and vegetables compared to women, while women have higher rates of physical inactivity. Between 2014 and 2019 in the EU27, gender gaps in smoking, overweight and obesity, and dietary risk stayed steady, but they decreased for alcohol consumption and physical inactivity. In addition, 85% of occupational cancer deaths in 2019 in EU+2 countries were among men (mostly due to exposure to asbestos).

Certain groups are at higher risk of HBV and HCV infection, which can become chronic and lead to liver cancer. People who inject drugs, people who engage in high-risk sex, prisoners and people who have migrated from endemic areas may be particularly vulnerable. Age constitutes an additional factor worth consideration, as some emerging potential risks – such as e-cigarette use – are particularly common (and growing in prevalence) among young people.

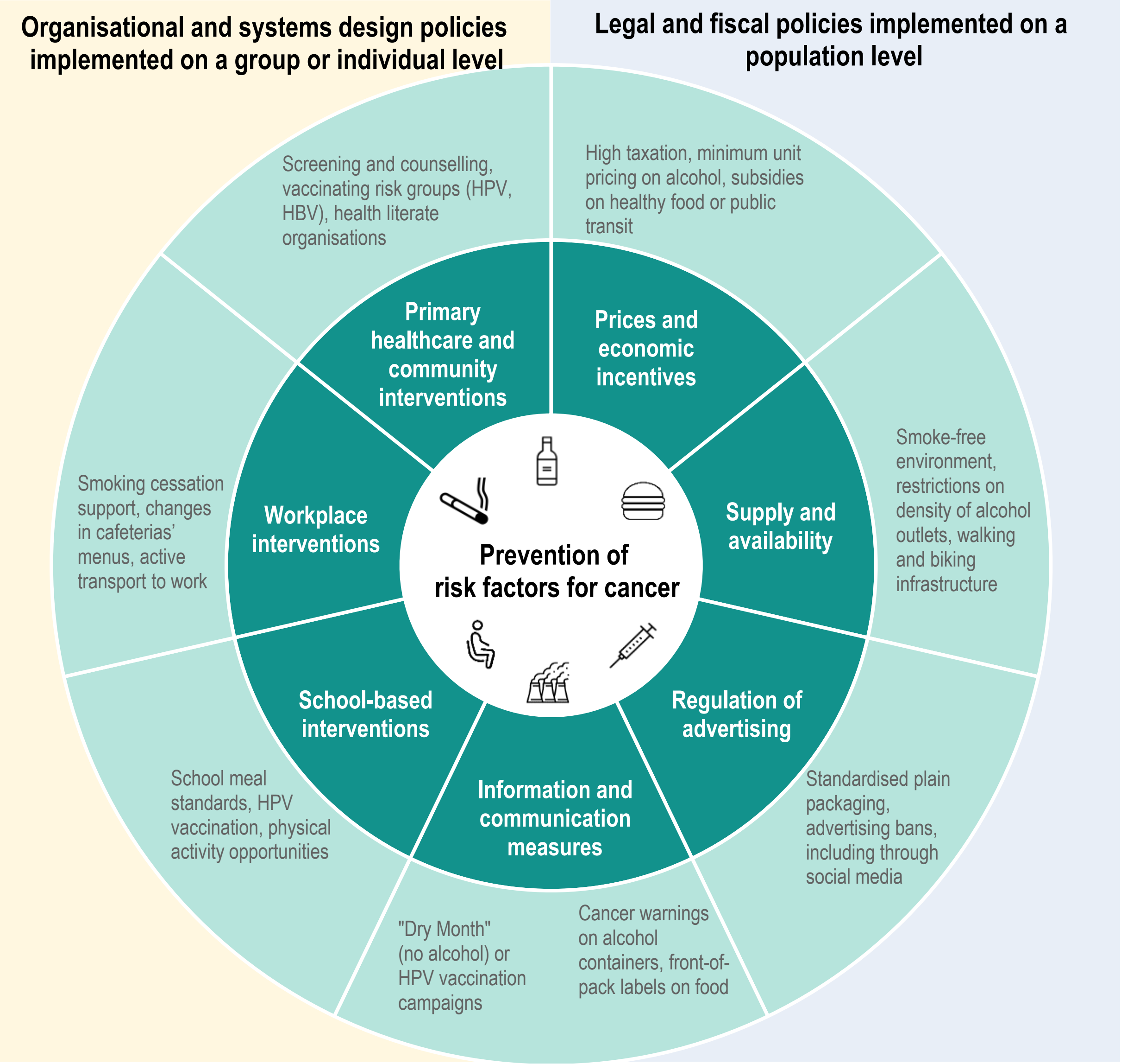
Engagement in cancer prevention behaviours is linked to health literacy – the knowledge and skills that people have to access, understand, appraise and use information to promote health. Concerningly, around 50% of respondents to the European Health Literacy Population Survey 2019-21 had an inadequate level of health literacy. A social gradient (considering education, perceived social status and financial deprivation) in health literacy was also demonstrated in all participating countries, to differing degrees.

1.3.4. Cancer prevention requires risk-factor-specific interventions, but key themes and lessons transcend risks

> *The most effective approach to address each cancer risk factor is a comprehensive prevention policy package*

A variety of policy actions have been shown to reduce specific cancer risk factors such as tobacco and alcohol consumption, unhealthy diets and physical inactivity, and to increase HPV vaccination and engagement in prevention or treatment of viral hepatitis (B and C). These include population-level regulatory and fiscal policies that modify prices, availability and advertising of products associated with cancer risk, and information and communication measures to affect attitudes around the risk factors. Organisational and systems design policies include measures delivered to groups or individuals in places where people spend their time, such as schools, workplaces, and the healthcare system. A comprehensive set of policy levers is needed to tackle each of the top cancer risk factors (Figure 1.6).

Figure 1.6. A comprehensive prevention policy package is needed to address cancer risk factors



Note: Only selected policy examples are included.

Policy packages to reduce tobacco use include high taxation on tobacco products, banning smoking in a range of places, investing in public awareness campaigns, using clear visual health warnings, restrictions on advertising and providing cessation support to those interested in quitting. Based on these measures, Ireland, France and the Netherlands had the strongest tobacco control policies in 2021, while Bulgaria and Germany had the weakest policies. Almost all the 29 EU+2 countries have increased their tobacco restrictions over the past decade. Importantly, countries with a higher tobacco control score in 2010 experienced a greater reduction in smoking prevalence in the following decade. Similarly, a cross-sectoral alcohol policy comprising a combination of effective and cost-effective interventions is associated with larger gains in prevention of alcohol-related cancer than single interventions in isolation, with the greatest expected impact in the Baltic, Central and Eastern European countries (OECD, 2021[14]). Table 1.4 classifies key risk-factor-specific interventions by general themes, emphasising the applicability of lessons learned to a range of risk factors.

Table 1.4. Tackling the main cancer risk factors requires an integrated policy approach

Risk factor	Prices and financial measures	Information and communication	Regulatory measures	Primary care and healthcare organisations	Country examples
Tobacco	High cigarette taxes Financial coverage for smoking cessation programmes & support	Visual pictorial warning labels Language- and culture-specific targeted campaigns and online tools Operating a quitline/ awareness campaigns	Comprehensive smoking bans Standardised packaging/ warning labels Advertising bans	Physician recording of smoking status & initiation of cessation discussion Referral to smoking cessation resources	**Denmark, Estonia, Finland**: highest taxes as a share of average retail selling price **Cyprus, Ireland, Romania:** full reimbursement of nicotine replacement therapies **Denmark, Finland, Iceland, Ireland, Norway**: ban on tobacco advertising across all mediums, sponsorships, point of sale or product display **Iceland**: highest per capita national spending on anti-tobacco campaigns
Alcohol	Excise, value added taxes (adjusted for inflation) and minimum unit pricing	Health-related warning labels Awareness campaigns	Restrictions on density of outlets Advertising bans Minimum legal age	Screening and brief interventions	**Iceland, Ireland, the Slovak Republic:** minimum unit pricing on alcohol **Belgium, France, Italy, Romania, Spain:** alcohol taxes adjusted for inflation **Cyprus**: restriction on density of both on- and off-premise alcohol outlets
Dietary risk, physical inactivity, overweight and obesity, high blood sugar	Taxes on unhealthy food Subsidies on healthy food	Front-of-pack labelling Awareness campaigns	Advertising bans Reformulation School meal standards or school-based sales restrictions	Counselling on nutrition and physical activity Physical activity prescription	**Belgium, Croatia, Denmark, Finland, France, Hungary, Ireland, Latvia, Poland, Portugal**: excise tax on sugar-sweetened beverages **Belgium, France, Germany, Luxembourg, the Netherlands**: Nutri-Score front-of-pack labelling **Estonia, Finland, Sweden:** free school meals for primary and secondary school children
Environmental and occupational exposure	Cap & trade taxes Subsidies for cleaner fuel, appliances & retiring old cars (means-based) Subsidies for public transit	Energy efficiency labelling on appliances Active transit campaigns Asbestos awareness and safety campaigns	Standards set for fuel, appliances and industrial plants Low-emission zones Strict asbestos occupational exposure limits	–	**Austria, Germany, Luxembourg, Malta**, **and the Netherlands**: long-term network tickets valid on all or most modes of transit **Austria, Finland, Germany, Ireland, Luxembourg, the Netherlands, the Slovak Republic:** national government programmes to support active transit to both school and workplaces **Poland:** national programme for safe removal of asbestos & asbestos database
HPV infection; low HPV vaccination coverage	Free universal vaccination for both boys and girls Free vaccination of high-risk groups	Campaigns to promote confidence around vaccines Culturally adapted community/peer education efforts	Shift to one-dose vaccination regimen School-based vaccination programmes	Reminders to physicians and/or parents Bundling with other vaccinations Vaccination by nurses, pharmacists and mobile vaccination clinics	**Austria, Belgium*, Croatia, Cyprus, Estonia, Finland, France, Hungary, Iceland, Ireland, Norway, Slovenia, Spain, Sweden**: school-based HPV vaccination programmes **Ireland:** one-dose HPV vaccine regimen **Denmark, Iceland:** pharmacists able to provide HPV vaccine **the Netherlands:** HPV vaccination buses and pop-up vaccination stops **France:** Extended HPV vaccination target age for certain high-risk groups
HBV and HCV infection	Free vaccination (HBV) for all children and risk groups	Sexual health programmes Awareness campaigns	–	Antenatal screening (HBV) Harm reduction for people who inject drugs (HBV, HCV)	**France, Greece:** screening for HBV/HCV and linkage to services of vulnerable groups **Hungary:** school-based HBV vaccination programme

Notes: * Belgium’s school-based HPV vaccination programme is in the Wallonia-Brussels region only. The policies and examples highlighted here do not include all those available.

To promote equity, policies need a design that not only reduces overall risk factors but also narrows disparities among population groups

It is important to recognise that some policies can be effective to reduce risk factors for the population as a whole, yet lead to an increase in disparities through larger improvements in one group than another. For instance, mass media campaigns are effective at disseminating messages that help prevent cancer through improving health literacy and people's awareness of cancer risk factors. However, people with higher levels of education may benefit more from mass media campaigns, as they may more effectively understand and act upon health information. Similarly, smoking bans that are not comprehensive are often more common and more stringently enforced in areas with higher socio-economic characteristics. In contrast, higher taxation of unhealthy products (tobacco, unhealthy food, alcohol) has consistently been proved effective in reducing consumption among people with lower socio-economic characteristics, such as lower incomes. To ensure that such measures do not lead to financial hardship for people with low incomes, price increases should be accompanied by measures to ensure access to cessation services (tobacco, alcohol), or by price decreases and subsidies for healthy products (food). Taxes affecting sugar-sweetened beverages are the most common nutrition-related tax but are present in only 13 EU+2 countries. School-based measures can intervene on health-promoting choices across a range of risk factors.

- Of the 29 EU+2 countries, 19 set mandatory standards for healthy food in school meals and 12 restrict availability of sugar-sweetened beverages in schools. Some countries provide school meals free of charge to students to ensure access for all, including children from families with lower socio-economic characteristics.
- School-based programmes that provide HPV vaccines are in place in 14 of the EU+2 countries, helping to reach all children in the target group.

Policies can be tailored to the needs of hard-to-reach population groups or to be effective in underserved areas (Box 1.1). Although gender is an important determinant of cancer risk, evidence of the effectiveness of policies that reduce gaps by gender is scarce, highlighting an avenue that warrants more attention, given the underlying differences in motivations, behaviour and responses between men and women.

Box 1.1. Some countries are using effective policies and interventions to reach people who are most at risk

- In the **United Kingdom (Scotland)**, introducing a minimum unit price of GBP 0.50 per UK unit of alcohol was found to decrease weekly alcohol purchases by 7.6%, with a larger impact among low-income groups than high-income groups. In 2023, only three EU+2 countries had implemented minimum unit pricing (**Iceland, Ireland and the Slovak Republic)** and five (**Belgium, France, Italy, Romania** and **Spain**) had adjusted taxation to inflation to ensure that alcohol does not become more affordable in real terms over time.
- Specific local interventions in **Greece** and **France** reach vulnerable populations (people who inject drugs, prisoners or migrants) to ensure screening coverage for hepatitis B and C, and link them to health services to prevent further health harms, including liver cancer.
- **The Netherlands** operates mobile HPV vaccination teams that visit underserved or rural communities and temporary pop-up vaccination stops in locations frequented by young people.
- The Flemish Government in **Belgium** prevents exposure to asbestos among workers by requiring owners of units built prior to 2001 to record asbestos present in the property, requiring asbestos removal as a precondition for solar panel installation and, from 2022, requiring certification on asbestos and its safe management and removal prior to the sale of a building.

Policies that promote healthy living through environmental changes can reduce risk factors without requiring an active change in behaviour

Creating environments conducive to healthy lifestyles is an effective policy to reduce cancer risks, leading to a reduction in prevalence without requiring active behaviour change among the population. Increasing the availability of healthy options in the environment while decreasing exposure to unhealthy ones is relevant for most risk factors.

- **Smoking** bans reduce second-hand exposure to tobacco smoke in various settings, as evidenced by improvements in lung function among both non-smokers and smokers after the implementation of an indoor smoking ban in Denmark. In the Netherlands, the Smoke-free Living for Everyone Programme takes a local, tailored approach to reducing smoking in vulnerable communities, designing interventions with local residents' involvement, wherein smoking is tackled alongside other community challenges.
- A reduction in the number and density of **alcohol** sales outlets is effective to reduce alcohol consumption, as well as associated socio-economic inequalities, yet only 10 of the 29 EU+2 countries regulate this. The Nordic countries (Iceland, Norway, Sweden and Finland) effectively regulate sales of strong alcohol via state monopolies, and modelling studies suggest that dismantling of the monopolies would result in increases in alcohol consumption and mortality.
- Policies to improve **air quality** by reducing road transit pollution include regulatory (low-emission zones), infrastructure (developing cycling and pedestrian routes) and financial (affordable public transit) measures, among others. Gaining additional health benefits from synergies with increasing physical activity levels, 17 EU+2 countries had national government support for active transport to school or work in 2023. For example, Ireland collaborates with employers via campaigns and educational materials to promote active travel to work.
- To improve **diet**, regulatory limits on specific nutrients incentivise manufacturers to reformulate products, making them healthier. Indirect incentives for reformulation can include taxation of unhealthy nutrients or labelling of food nutritional content. Most EU+2 countries have agreements with the food industry on reformulation of food products, yet these remain mostly voluntary in nature, and thus potentially less effective than mandatory limits. Agreements to reduce fat content exist in 10 EU+2 countries, and sugar is targeted in 16.

Primary healthcare interventions are effective in reducing cancer risk factors while also improving health literacy

Reaching people across the population, a well-structured and accessible primary care system can have an important role in health promotion. For instance, primary healthcare can be an important venue to promote and provide vaccinations, including those against HPV or HBV. Healthcare workers can also initiate conversation about, and connect smokers or people consuming large amounts of alcohol to, cessation support services. Screening and brief interventions in primary care settings are cost-effective in most EU27 countries in reducing alcohol-attributable morbidity and deaths; however, their implementation varies across EU+2 countries owing to differences in policies and training given to healthcare providers.

On an organisational level, primary care providers can make navigating choices in health and healthcare easier for people with low health literacy by facilitating access, understanding and use of health information. This entails effective communication and support to patients, among others. Additionally, physical activity prescription programmes, wherein evidence-based recommendations and community support are prescribed by healthcare providers, exist in 10 EU+2 countries. Portugal is leveraging its national healthcare system to deliver brief counselling on nutrition, and counselling and prescription of physical activity, with training provided to health professionals. Slovenia integrates health-promotion centres in all primary healthcare centres, thus providing free lifestyle interventions against key risk factors, and establishing cross-sectoral partnerships with different stakeholders, including social services and non-governmental organisations at the local-community level. As a result, more than half of Slovenia's population have been screened for lifestyle and risk factors, while almost 50 000 patients per year take part in lifestyle interventions run by the centres.

Co-operation between countries can deliver additional gains in reducing cancer risk factors

Co-operation between countries can deliver important gains in comparison to individually implemented interventions. Given the transnational reach of air pollution, the EU is collaborating to achieve clean air through a mix of regulatory and financial incentives, product design standards, communication and education campaigns, and partnership programmes. Considering the economic integration of Europe and freedom of movement across borders, lessons from these actions are relevant for other measures.

- While the EU already collaborates on tobacco control via several key directives, stronger harmonisation of tobacco pricing and taxation between European countries could mitigate cross-border trade challenges. Importantly, the industry's release of new products such as e-cigarettes and heated tobacco point to a need to revise existing EU-wide policies continually.
- Alongside acting as a health information dissemination measure for consumers, co-ordinated labelling on food packages can simplify compliance with regulations for food manufacturers. Although monochrome back-of-pack nutrition labels are mandatory in the EU, a range of front-of-pack labelling systems are in use, which are not applied by all manufacturers due to their voluntary nature. The largest evidence base in terms of understanding and use across different groups of consumers supports the Nutri-Score labelling system.

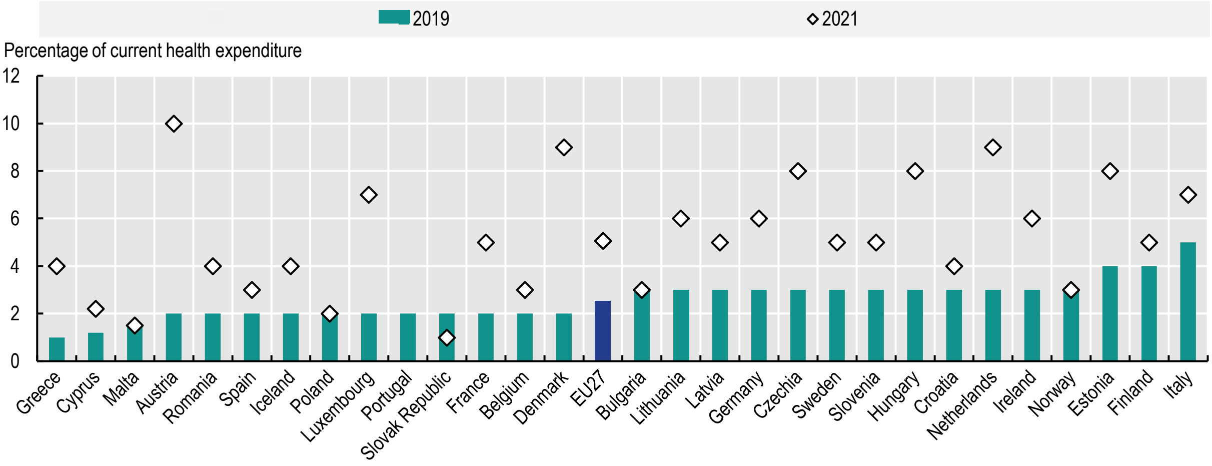
Given that much media content crosses borders, and forms of commonly used media can change over time, co-ordination on comprehensive advertising restrictions between countries can make them more effective. Conversely, select or inconsistent bans can lead to reallocation of resources to advertising forms that are not yet restricted.

- The EU restricts tobacco and alcohol advertising (that specifically targets minors or encourages excessive drinking) on various media platforms, but challenges persist, such as limited bans on alcohol marketing on social media. Social media use has been associated with more frequent alcohol consumption among young people, yet only Lithuania and Norway restrict alcohol advertising via social media. Importantly, countries cannot impose their advertising rules on content from other countries.
- Owing to the cross-national reach of advertisements, most EU countries regulate direct advertising of unhealthy food or beverages to young people, yet only 11 countries do this through mandatory legislation, which is considered more effective than voluntary measures. In 2023, Norway announced a plan to fully ban all advertising of unhealthy food and beverages targeted at minors across media channels.

1.3.5. There is scope to increase spending on prevention

Despite the breadth of possible prevention activities, their cost – effectiveness and the vast benefits they can deliver through reduction in rates of chronic diseases – including cancer – prevention spending in EU+2 countries is generally perceived to be insufficient. Prior to the COVID-19 pandemic in 2019, it accounted for an average of 2.5% of health expenditure across the EU27, ranging from 1% in Greece to 5% in Italy. During the COVID-19 pandemic in 2021, it temporarily increased for nearly all countries owing to spending on COVID-19 infection prevention and control, amounting to an average of 5.1% of health expenditure (Figure 1.7). As most of the additional spending went to vaccines, masks and other COVID-19 prevention efforts and did not address underlying population health, there is potential to increase investments that effectively tackle factors that increase cancer risk (OECD/European Union, 2022[15]).

Figure 1.7. Spending on prevention as a share of current health expenditure is relatively low



Source: OECD Health Statistics (2023[16]), https://doi.org/10.1787/health-data-en.

1.4. Improving the reach of cancer screening and early diagnosis is a priority area to improve cancer outcomes

Along with preventing cancer by reducing risk factors, countries are planning to improve early detection of cancer. This effort comprises two key aspects: screening – or testing asymptomatic and apparently healthy individuals to potentially identify a precursor or early-stage cancer lesion in people without symptoms – and early diagnosis, which focuses on detecting symptomatic people as early as possible. In December 2022, a new EU Council Recommendation on Cancer Screening was adopted. This replaces and extends the scope of the previous Council Recommendation 2003/878/EC on cancer screening adopted in 2003, which encompassed recommendations for breast, colorectal and cervical cancer screening.

1.4.1. Population-based screening for breast, colorectal and cervical cancer are in place in most EU+2 countries, with varying eligibility and testing approaches

Aside from Bulgaria, Lithuania and Romania, all other EU+2 countries have population-based screening programmes in place for breast cancer. These are generally organised at the national level, except in Belgium, Denmark, Italy and Sweden, where they are organised by the regions. Consistent with the 2022 EU Council Recommendation, breast cancer screening programmes target women aged 50-69 with a mammogram every two years in 18 countries (Table 1.5). Austria, Cyprus, the Czech Republic (hereafter “Czechia”), France, Hungary, Iceland, the Netherlands and Sweden conduct screening on a broader age range. In several countries, there are also plans to extend the age limits of the target population to 45-74 (Cyprus, Germany, Malta, Poland and Spain). Among 22 of the 29 EU+2 countries, a population-based colorectal cancer screening programme is in place, organised at the national or regional level, but only 7 countries align with the EU Council Recommendation to perform faecal immunochemical testing (FIT) for those aged 50-74. With the exception of Austria, which will target people aged 45-75 when the recent recommendations are implemented, EU+2 countries include narrower age ranges, such as 60-68 in Estonia, 59-69 in Ireland and 55-65 in Norway.

Table 1.5. In many countries, the target age for the population-based cancer screening programme differs from the 2022 EU Council Recommendation

Category	Breast cancer screening	Colorectal cancer screening	Cervical cancer screening
Number of countries with population-based programmes	26 EU+2 countries	22 EU+2 countries	21 EU+2 countries
Target age and test in line with the 2022 EU Council Recommendation	Belgium, Croatia, Denmark, Estonia, Finland, Germany, Greece, Ireland, Italy, Latvia, Luxembourg, Malta, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain	Belgium, Cyprus, Czechia, Denmark, France, Portugal, Slovenia	Estonia, Finland, France, Ireland and Netherlands

Note: According to the 2022 EU Council Recommendation, breast cancer screening is recommended for women aged 50-69; for colorectal cancer screening, the preferred screening test is quantitative FIT for people aged 50-74; for cervical cancer screening, HPV testing is recommended for women aged 30-65.

For cervical cancer, 21 EU+2 countries have a population-based screening programme in place, organised at the national or regional levels. Compared to breast and colorectal cancer screening, there is wider variation in age ranges of the population screened in EU+2 countries. Only Estonia, Finland, France, Ireland and the Netherlands perform HPV testing for women aged 30-65, as recommended by the EU Council Recommendation. Some countries include lower age limits, such as Germany and Slovenia (20), and some include women until 69 (Norway) and 70 (Czechia, Latvia and Sweden). In addition, only seven countries have only HPV-based screening in place (Denmark, Finland, Ireland, the Netherlands and Portugal since 2020, Estonia since 2021, and Norway since 2023) although evidence supports the use of HPV-based screening as an effective method compared to the cytology test.

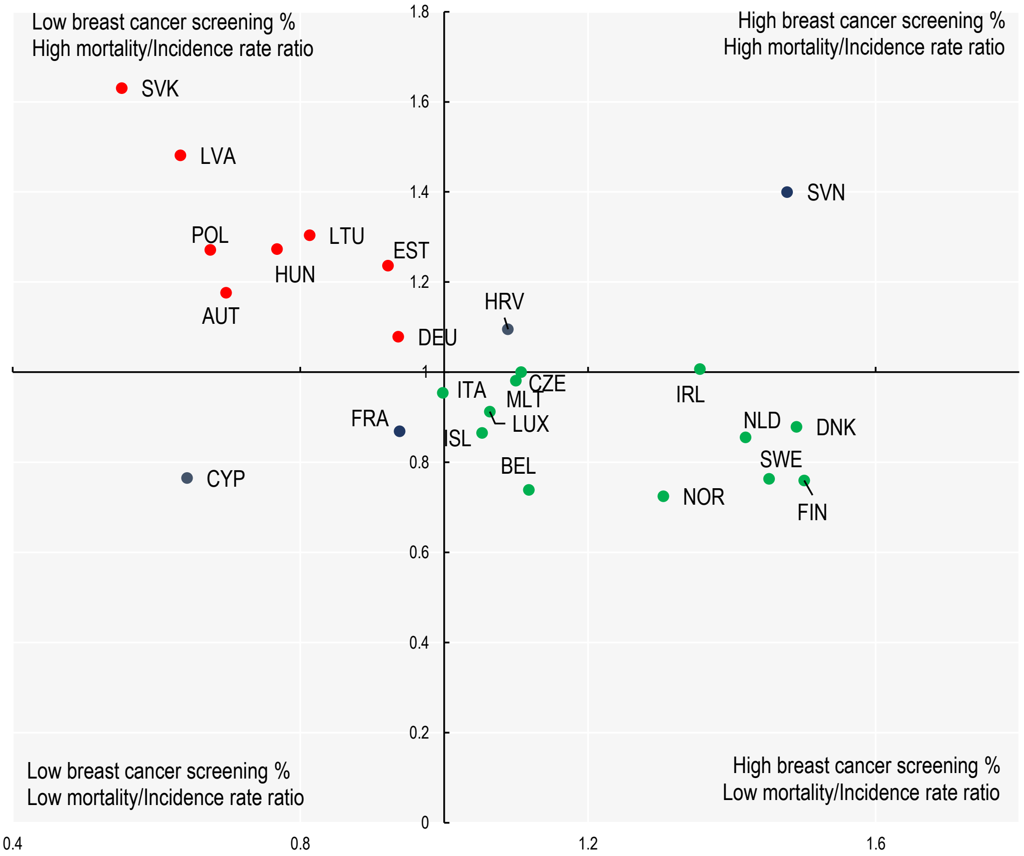
Importantly, an increasing number of countries offer self-sampling tests for colorectal and cervical cancer screening, sent by post or delivered in local pharmacies or by general practitioners (GPs), to improve participation rates. For colorectal cancer, 14 countries provide the option to self-test at home and send a sample to a laboratory for analysis (as in the Netherlands, Belgium, Denmark and Italy). Seven EU+2 countries provide the option of self-sampling for HPV testing: Czechia, Estonia, France, the Netherlands, Norway, Spain (in some regions) and Sweden. In Denmark, women who do not respond to the cervical cancer screening invitation are offered HPV self-sampling tests in the second reminder letter. A pilot programme in Czechia sent self-sampling HPV tests to women aged 50-65 from vulnerable groups, such as women at risk of poverty and social exclusion in deprived areas.

1.4.2. Countries with higher participation in breast cancer screening programmes have better breast cancer outcomes

There is clear evidence that breast, colorectal and cervical cancer screening increases the likelihood of successful treatment – particularly when cancer is identified at an early-stage – and leads to a reduction in mortality rates (Zielonke et al., 2020[17]). Early diagnosis of cancer also leads to better survival probabilities, fewer complications and better quality of life (Hawkes, 2019[18]; Neal et al., 2015[19]).

Breast cancer screening rates based on programme data demonstrate that countries with higher participation rates among the eligible population in 2015 have better cancer outcomes in 2020, such as a lower ratio of breast cancer mortality to incidence rate (Figure 1.8). Among the 25 countries with available data, 8 had lower participation rates in breast cancer screening and a higher ratio of mortality to incidence (top left quadrant). A further 12 countries had higher participation rates in breast cancer screening and a lower ratio of mortality to incidence (bottom right quadrant).

Figure 1.8. Higher coverage rates for breast cancer screening programmes are associated with lower ratios of breast cancer mortality to incidence



Notes: The quadrant chart shows the association between breast cancer screening rates (2015) and cancer outcome as measured by a breast cancer mortality to incidence rate ratio. Age-standardised breast cancer mortality data are from 2020; age-standardised breast cancer incidence rates are 2020 estimates from the Joint Research Centre; and breast cancer screening rates are based on programme data from 2015 (or nearest year). The centre of the quadrant chart is the EU average.
Source: OECD Health Statistics (2023[16]), https://doi.org/10.1787/health-data-en; Eurostat (2023[2]), Eurostat (2023), *Causes of Death – Deaths by Country of Residence and Occurrence*, https://ec.europa.eu/eurostat/databrowser/view/HLTH_CD_ARO__custom_6537139/default/table (accessed on 16 June 2023); ECIS (2023[1])., European Cancer Information System, https://ecis.jrc.ec.europa.eu.

1.4.3. Despite population-based programmes, cancer screening participation rates remain lower than 50% in at least one-third of EU+2 countries

For the three cancer screening programmes, the proportions of the eligible population receiving the test vary widely across EU+2 countries. In 2021 (or the latest available year), the proportion of women aged 50-69 who had had a mammography examination in the two preceding years ranged from a high of 83% of the eligible population in Denmark to a low of 9% in Romania. Similarly, the coverage rates for cervical cancer screening vary from 85% in Austria to 12% in Poland. Overall, participation rates among the eligible population in EU+2 countries are lower than 50% in 9 countries for cervical cancer screening programmes, in 11 countries for breast cancer screening programmes and in 21 countries for colorectal cancer screening programmes. Overall, only Austria, Denmark, Finland, the Netherlands and Slovenia, have participation rates above 50% for all three cancer screening programmes (Table 1.6).

Table 1.6. Only five EU+2 countries have above 50% participation rates in all three of the main cancer screening programmes

Less than 50% participation in…					Above 50% for all three cancers
All three cancer screening programmes	Cervical & colorectal cancer only*	Mammography & colorectal cancer only*	Cervical cancer only*	Colorectal only*	
Germany	Belgium	Bulgaria	Malta	Croatia	Austria
Hungary	Italy	Cyprus		Czechia	Denmark
Latvia		France		Estonia	Finland
Poland		Lithuania		Greece	Netherlands
Romania		Luxembourg		Iceland	Slovenia
Slovak Republic				Ireland	
				Norway	
				Portugal	
				Spain	
				Sweden	

Note: The data show the number of countries with participation rates for the three cancer screening programmes: mammography screening within the past two years (% women aged 50-69), cervical cancer screening within the past three years (% women aged 20-69), colorectal cancer screening coverage (% of population aged 50-74 screened). The data refer to either programme or survey data (see Chapter 4), limiting the international comparability. Categories with an asterisk indicate that countries in the corresponding list have above 50% participation rates on the other cancer screening test(s) not listed. No countries had less than a 50% screening rate on mammography only.

Source: OECD Health Statistics (2023[16]), https://doi.org/10.1787/health-data-en.

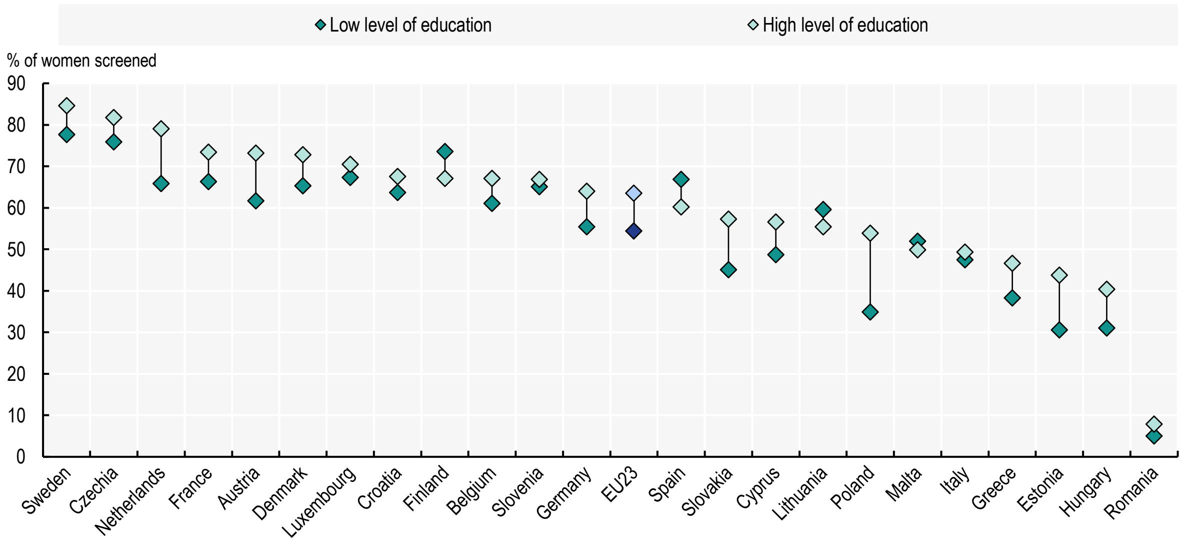
1.4.4. People with low education levels are 15% less likely to receive mammography screening than people with high education levels

Overall, across EU+2 countries with available data, less well-off groups have a lower probability on average of screening for breast and colon cancer. For breast cancer screening, the likelihood of having received a mammogram is 54% among women with low education levels compared to 64% among those with high education levels (Figure 1.9). Inequalities in favour of better-educated people are observed in 19 out of 25 countries.

For colon cancer, only 31% of individuals with low education levels had received screening tests compared to 38% of people with higher education levels, and inequalities in favour of better-educated groups were observed in 18 out of 25 countries. Furthermore, it was found that while people with a migration background have a lower likelihood of accessing breast cancer screening, the relationship is entirely explained by lower education and income. In contrast, people living in rural areas also have a significantly lower likelihood of having been screened for breast and colon cancer than those living in urban areas even after considering socio-economic factors.

Figure 1.9. Women with low education levels have a lower likelihood of receiving a mammogram in 19 EU+2 countries

Indirectly age-standardised probability of having had a mammogram, by country and education level



Note: Analysis based on 16 035 observations of women aged 50-74 living in a private household in 25 countries. Probabilities are based on indirect age standardisation. Education level is built according to the International Standard Classification of Education (ISCED), with ISCED 0-2 for low level of education and ISCED 4-6 for high level of education.
Source: Survey of Health, Ageing and Retirement in Europe (wave 8).

1.4.5. A mix of strategies has proved effective at expanding screening and early diagnosis

Increasing awareness of cancer and the benefits of screening is key to raising screening participation rates

Greater awareness about cancer, the benefits of screening and cancer symptoms is key to greater participation in screening programmes and early diagnosis. However, cancer awareness varies across countries, and tends to be lower among those from lower socio-economic groups and ethnic minority groups. Of the 26 countries responding to the 2023 OECD Policy Survey on Cancer Care Performance[1], 21 have awareness campaigns on screening, of which a number rely on media campaigns and information leaflets. More specifically, 18 countries reported that they have screening awareness campaigns and education initiatives to focus on hard-to-reach populations (Box 1.2).

Box 1.2. Of the 26 countries responding to the 2023 OECD Policy Survey on Cancer Care Performance, 18 have initiatives targeting vulnerable or hard-to-reach populations

- **Slovenia** and **Sweden** use peer-to-peer helpers who educate those within their community networks about screening.
- **France** and **Germany** employ simple language and easy-to-read and -understand screening materials to ensure accessibility for people with low literacy levels.
- **Belgium (Flanders), Finland, Germany, Ireland, the Netherlands** and **Slovenia** make invitations to screening, online education guides, video messages or other screening information available in various languages.
- **Ireland** and **the Netherlands** ensure access to and/or awareness and engagement of lesbian, gay, bisexual and transgender (LGBT+) communities in cervical and/or breast cancer screening.
- **Slovenia** works with organisations that support people with disabilities and provides home screening assistance to increase screening participation.

Mobile screening units and expanding the role of pharmacists in screening help programmes reach remote populations

New delivery models have been adopted to reach socially vulnerable populations, rural and underserved groups in their local communities. Mobile breast cancer screening programmes have been implemented in a few countries (Croatia, Cyprus, Estonia, France, Iceland, Ireland, Norway, Slovenia and Sweden). In France, mobile mammography units have been found to increase participation in breast cancer screening, to reduce geographical and social inequalities, and to be more cost-effective than placing radiologist offices in underserved areas. Another approach takes advantage of pharmacies' wide accessibility and familiarity with patients to increase screening in more remote areas. For example, France and Spain use pharmacies for distribution of and education on colorectal screening tests, and Norway engages them in skin cancer screening, with images of moles and pigmented lesions sent to dermatologists for assessment.

Primary healthcare providers play an important role in cancer screening and early diagnosis

Primary healthcare providers have a key role in early cancer detection – reminding their patients about screening, clarifying patients' questions and referring symptomatic patients to specialist care. Their recommendations and reminders are helpful in increasing screening participation rates, and may be particularly important for individuals who have never been screened or are under-screened. Of the 26 countries responding to the 2023 OECD Policy Survey on Cancer Care Performance, 15 rely considerably on primary healthcare providers to deliver cancer screening activities for cervical cancer, while 12 do so for colorectal cancer. For cervical cancer, the screening itself often takes place in primary care settings, whereas for colorectal cancer, specialists, hospitals or GPs are involved, depending on the country. Furthermore, optimising primary healthcare recognition and interpretation of symptoms is an important way to improve earlier diagnosis of cancer. GP-targeted cancer awareness campaigns, training and continuous medical education about referral guidelines have been shown to be effective in selecting patients for urgent cancer referral. Such training is part of the continuous medical education programme in Denmark, along with the United Kingdom and Australia. In addition, in the United Kingdom, primary care providers have access to decision-support tools within their software systems to help them identify relevant patients presenting with non-specific symptoms for cancer testing.

Fast-track pathways help to reduce delays in cancer diagnosis

Fast-track pathway policies help to reduce the time between cancer suspicion, cancer diagnosis and start of initial treatment to improve cancer prognosis. They have been developed in a few countries, including Denmark, Ireland, Latvia, Lithuania, Poland, Slovenia, Sweden and some regions in Spain. In Latvia, Lithuania and Poland, the fast-track pathways ensure that patients receive required diagnostic and care services within established national time limit guarantees (e.g. in Latvia, specialist consultation and diagnostic examination within ten working days of the date of referral). In Denmark, the pathway requires GPs to take a pre-defined minimum panel of blood and urine tests from patients, and to assess the results of computerised tomography (CT) scans prior to further evaluation at hospitals. For all cancer patients, three-year relative survival increased from 45% to 54% after implementation of the cancer pathways in Denmark (Jensen, Torring and Vedsted, 2017[20]). Ireland's system of rapid access clinics undertakes much of the country's diagnostic work on breast, lung or prostate cancer, and an analysis of the initial patients assessed via this programme showed more than double the rates of lung cancer identified at early stages compared to figures from the country's national cancer registry (Dunican et al., 2023[21]).

Monitoring inequalities helps to promote engagement with vulnerable groups and to build quality improvement cycles

Use of cancer screening data in quality assurance mechanisms could be improved to assess outcomes and monitor inequalities. Only 13 of the 26 EU+2 countries responding to the 2023 OECD Policy Survey on Cancer Care Performance integrated information from both population-based and non-population-based screening into existing cancer screening databases, and only 16 acknowledged using screening data in quality improvement cycles. For example, in the Netherlands, screening data are translated into performance measures that are monitored at the local, regional and national levels. In Czechia, the National Oncological Registry provides epidemiological statistics, incidence by region and clinical stages of diagnosed cancers. While most countries responding to the OECD Policy Survey collect information on age and geography in their screening programmes, only 6 do so for socio-economic information (France, Germany, Italy, the Netherlands, Slovenia and Sweden). Denmark, Italy and Sweden report collecting data about education.

1.4.6. Harnessing new technologies could improve early detection and patient experiences, but implementation should be evidence-based

Innovations in cancer screening and early diagnosis – such as risk stratification, biomarker detection and use of artificial intelligence (AI) and machine learning (ML) algorithms – have the potential to improve the chances of early cancer detection. A stratified-risk screening approach follows a personalised screening decision, where the individual characteristics of each citizen are taken into consideration to determine screening frequency and test type rather than having screening determined exclusively based on sex and age. Risk stratification can also be guided by genomic testing, which can provide information on individual risk to help personalise prevention and early diagnosis. For breast cancer, research is under way on a risk-based approach based on family history, hormonal and reproductive aspects, mammographic breast density and common genetic variants. Similarly, for colorectal cancer, the possibility of sex-specific and age-specific cut-off values for FIT and the possibility of tailoring screening intervals according to the results of prior FIT results is being researched. For cervical cancer, self-sampling tests targeting women at higher risk are being developed that can identify positive high-risk HPV infections that are relevant to cancer.

Implementation of risk-stratified approaches, however, faces relevant implementation challenges such as resource considerations, health literacy and support for informed decision making, as well as the need for workforce training and acceptability among healthcare professionals and the general population. Another potential screening innovation is use of liquid biopsies, which can detect certain types of cancer by analysing DNA fragments in a person's blood that are released by cancer cells. While liquid biopsies have been effective in monitoring disease progression and treatment response, their use in early diagnosis of cancer is a subject of current research.

Image-based risk prediction using ML on mammograms, X-rays and magnetic resonance imaging (MRI) has been studied to predict the likelihood of breast, lung and prostate cancers. New efforts are under way to establish large repositories for cancer images to aid in developing algorithms that can improve screening accuracy and early diagnosis. While only a few countries currently use AI for cancer screening, a number are engaging in discussions or pilot projects in this realm. In Germany, a project is using AI algorithms to support diagnosis of melanoma, while a joint collaboration project between universities in Latvia, Lithuania and Estonia – along with the Norwegian Cancer Registry – is focusing on the cost – effectiveness of specific AI tools in personalised cervical cancer screening. For colorectal cancer, a wireless ingestible capsule that utilises AI to analyse X-ray images is being researched, offering the opportunity to increase both the effectiveness and reach of colorectal screening. However, use of AI technology in cancer is in the early stages, and further work needs to be undertaken on regulatory, legal, ethical, clinical and economic aspects, including ensuring implementation without exacerbating existing inequalities.

1.5. In the context of the rising burden of cancer and growing cost pressures, countries need to ensure the sustainability of high-quality cancer care systems

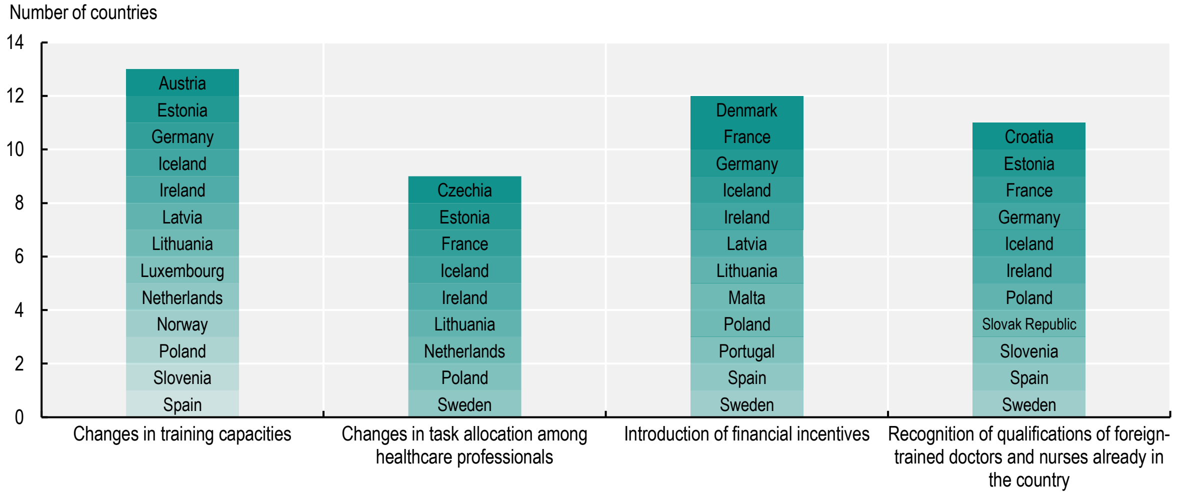
In cases of positive cancer screening and early cancer detection, the focus shifts to the care system, which has its own set of challenges. To care for an increasing number of people with cancer, countries need to seek effective and efficient ways of delivering high-quality cancer care. Most European countries, however, face shortages of various types of professionals providing cancer prevention, diagnosis and care services, and difficulties in securing access to high-quality professionals across regions within countries. With emerging technologies in cancer medicines and medical equipment, EU+2 countries also face financial challenges in securing access to innovative treatments and in providing sustainable, high-quality cancer care.

1.5.1. Workforce shortages need to be addressed in order to safeguard the sustainability of high-quality cancer care

Most EU+2 countries face workforce shortages in the health sector as a whole and in cancer care, affecting the delivery of cancer prevention, screening, diagnosis, treatment and palliative care. Twenty-two countries responding to the 2023 OECD Policy Survey on Cancer Care Performance reported shortages of GPs, and most also reported shortages of oncology nurses, radiologists, radiation therapists and oncologists. Shortages of psychologists (Ireland, Slovenia and Sweden), palliative care professionals (Slovenia) and navigator nurses or survivorship co-ordinators (Malta) were also noted. Furthermore, geographical distribution challenges are substantial, in both primary and cancer care. Austria, Czechia, Hungary, Italy, Latvia, Norway, Portugal and Romania reported inadequate geographical distribution of oncologists, affecting equitable delivery of cancer care.

Countries have implemented various policy levers to tackle workforce shortages (Figure 1.10). Half of the countries responding to the OECD Policy Survey have increased training capacity to improve availability of the workforce providing cancer care. In Slovenia, there has been an increase in training sites for clinical psychologists and palliative care, as the country plans to increase the number of mobile palliative care units and expand the availability of psychological support. About one-third of countries pursued task substitutions and reallocations among healthcare professionals. To support pharmacists in providing high-quality cancer care and identifying their training needs, Ireland, for example, has developed the National Competency Framework, which outlines the behaviours, skills and knowledge required for pharmacists working in cancer care. Ireland has also developed a number of educational initiatives to equip various types of nurses with adequate knowledge, skills and competencies in areas such as anti-cancer therapy and psychosocial care to provide cancer care safely and effectively. Provision of financial incentives such as funding of training abroad or additional funds for staff working weekend shifts is another common approach taken to resolve health workforce shortages. These are used in 12 of the 26 countries responding to the OECD Policy Survey. In 2023, Denmark allocated funding to pay healthcare professionals for weekend shifts to improve workforce capacities in cancer care. Another policy option to address workforce shortages is to recruit foreign-trained health professionals; this has been implemented in 11 of the 26 responding countries. In Slovenia, alongside recognition of foreign-trained healthcare professionals, which has been in place for many years, the language requirements were relaxed recently to attract greater numbers.

Figure 1.10. Policy responses to address workforce shortages vary across EU+2 countries



Notes: Information is not available for Belgium, Cyprus and Denmark. The policies listed have not been adopted in Bulgaria, Greece, Italy or Malta.
Source: 2023 OECD Policy Survey on Cancer Care Performance.

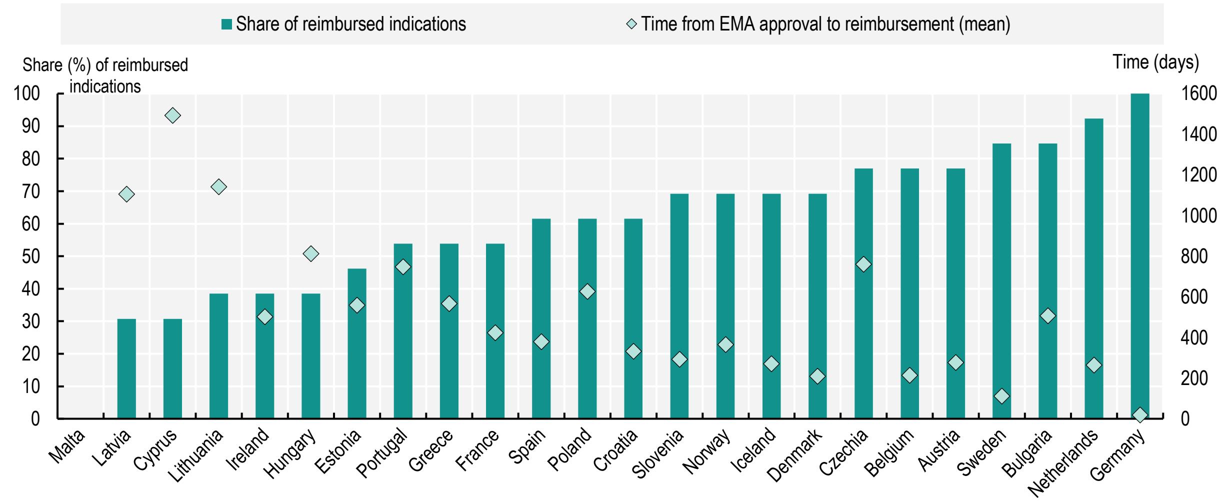
1.5.2. Unequal access to cancer medicines requires mechanisms to rationalise coverage decisions and encourage market entry of generics and biosimilars

Between 2004 and 2022, 152 new cancer medicines were granted centralised marketing authorisation by the European Medicine Agency (EMA), with a marked increase in the number of approved oncology medicines over time. Except for Cyprus and Slovenia, all EU+2 countries have established a health technology assessment (HTA) agency to inform decision making around pricing and coverage of cancer medications. This is particularly relevant given the rising prices of individual cancer medicines and rising expenditure on cancer pharmaceuticals as a share of cancer care costs.

An OECD analysis of a sample of indications with high clinical benefit in breast and lung cancer, with EMA marketing authorisation, shows that the proportion of indications reimbursed/covered varies substantially across countries. Germany reports coverage for all indications, while Malta, Cyprus and Latvia cover less than one-third. However, it should be noted that not all eligible patients in clinical practice may have access to medication on a reimbursement list because of budget or other constraints; in parallel, early access schemes (as in Malta) or alternative medications in specific treatment settings may be available in cases where the specific medications examined are not reimbursed.

Actual market access to new medications depends both on when a company decides to file an application in a particular country (based on the company's launch strategy, the size of the market and expected benefit) and on HTA and pricing processes. The time from EMA authorisation to issuing a reimbursement decision ranged from less than 100 days in Germany and Sweden to over 3 years in Cyprus, Latvia and Lithuania (Figure 1.11).

Figure 1.11. Shares of selected indications of cancer medicines that received public reimbursement/coverage vary across EU+2 countries



Notes: A total of 24 countries responded to the pilot data collection. Thirteen indications of ten cancer medicines used in the treatment of breast cancer and lung cancer with marketing authorisation by the EMA after 1 January 2016 and active authorisation on 26 March 2023, and with the highest clinical benefit according to the European Society for Medical Oncology Magnitude of Clinical Benefit Scale (ESMO-MCBS) scoring system (scores of A and 5), were included in the analysis. The shares show the inclusion status of the indications in the public reimbursement list on 1 April 2023.
Source: 2023 pilot data collection on access to cancer medicines in EU+2 countries.

Some countries may also choose to limit reimbursement based on health status of patients, stage of treatment, therapy length or cut-off value for gene expression. While 9 of the 24 EU+2 countries with available data did not restrict reimbursement beyond EMA authorisation, Estonia, France and Croatia reported that more than half of all reimbursed indications had restrictions, and Czechia reported that all indications had restrictions.

Timelines for assessment of new cancer medicines and extensions of their indications may experience improvements in the years to come. The adoption of Regulation (EU) 2021/2282 on HTA mandates joint clinical assessments and joint scientific consultations of patients, clinical experts and other relevant experts (European Commission, 2023[22]). This will apply to all new cancer medicines as of 12 January 2025. Joint European HTA and cross-border joint procurement (such as Beneluxa among Belgium, the Netherlands, Luxembourg, Austria and Ireland; and FINOSE among the Nordic countries excluding Iceland) are also good policy options to expedite public reimbursement/coverage decisions in the context of rising cancer medicines costs. At the same time, value frameworks (such as the ESMO-MCBS) have been developed to support the process of HTA and to assist in rationalising reimbursement decisions. By offering a grading system of new indications of cancer medicines and the relative magnitude of clinical benefit that can be anticipated based on data derived from pivotal clinical trials or meta-analyses, the ESMO-MCBS value framework could be used as a tool to support the process of prioritisation of access to cancer medicines by national health authorities when resources are constrained (Cherny et al., 2015[23]; Cherny et al., 2017[24]). New medicines with a potentially high clinical benefit could be reviewed on a fast-track basis, whereas those with a potentially low clinical benefit could be de-prioritised.

Patent expirations in oncology are expected to alleviate part of the financial pressure. Here too, however, there are great differences by country in the share of biosimilars for cancer medicines that are publicly reimbursed, and in the time taken between EMA approval and reimbursement/coverage decisions. The mean time from EMA approval to public reimbursement/coverage of biosimilars exhibited great variation between countries, ranging from around 200 days in Germany and Spain to between 700 and 835 days in Greece, Iceland, Latvia, Lithuania and Slovenia, and almost 1 400 days in Cyprus. Encouraging market entry and use of generics and biosimilars when the originator product has gone off patent or lost market exclusivity is an important option to lower prices for oncology treatment, helping to redirect financial resources to pay for newer medicines with high clinical benefit and improve the financial sustainability of healthcare systems.

1.5.3. The ageing and unbalanced distribution of medical equipment needs to be addressed to tackle inequalities in cancer care

Availability of medical equipment has improved over the past decade. The supply of radiotherapy equipment per population has grown in all but eight EU+2 countries, and increased by 14% on average in the EU27. The availability of CT scanners and MRI units has also increased in almost all EU+2 countries over the last 10 years. However, while the use of outdated equipment is not recommended, old equipment is used in some countries. About one-quarter of radiation therapy equipment is more than 15 years old in Belgium, Germany, Ireland, Italy, the Netherlands, Portugal and Spain. On average in the EU27, 17% of radiation therapy equipment is more than 15 years old.

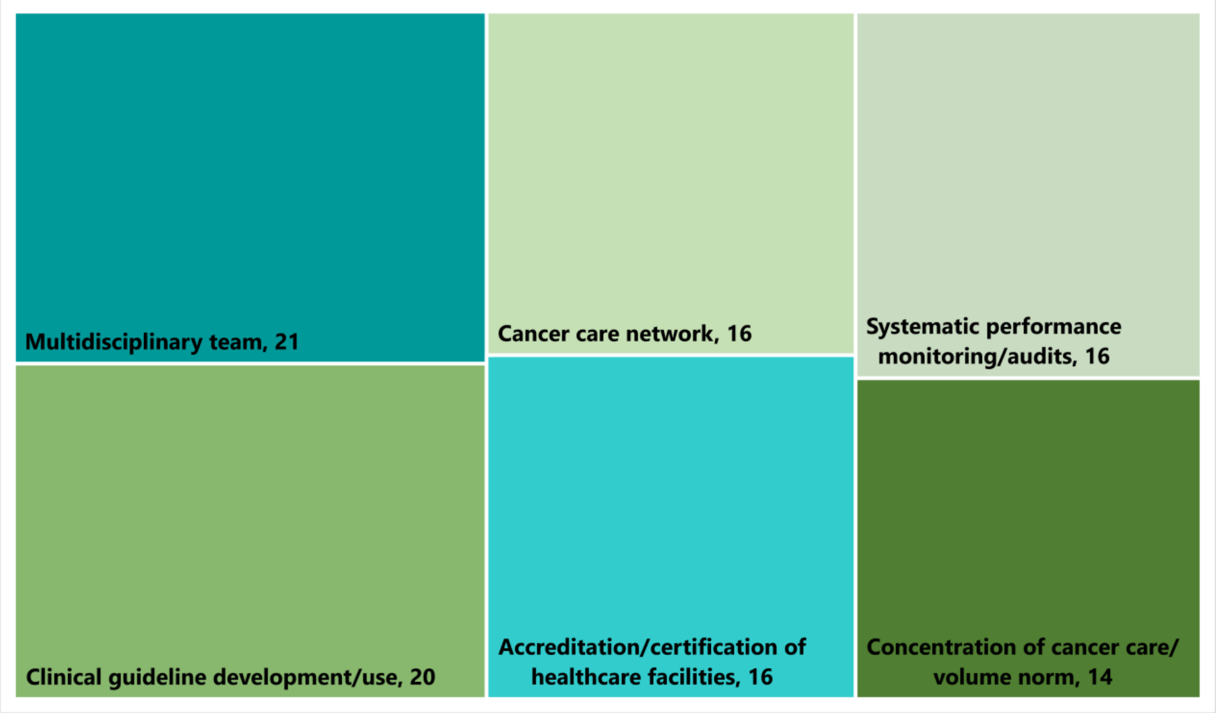
In addition, uneven distribution of medical equipment – which leads to unequal access to medical technologies and the latest clinical procedures – is reported in a few countries. In Cyprus, for example, the majority of medical equipment is in private sector institutions, leading to long waiting times for public healthcare services and financial barriers to access for lower income groups (OECD, 2023[25]). In Spain, six provinces and the two autonomous cities (Ávila, Huesca, Palencia, Segovia, Soria, Teruel, Ceuta and Melilla) do not have radiotherapy units in their territories, creating substantial access barriers to cancer care among vulnerable groups as a result of long journeys or accommodation costs (OECD, 2023[26]).

1.5.4. Care concentration, structured networks, multidisciplinary teams and better availability of home care are critical to deliver high-quality cancer care

While the clinical benefits of concentrating cancer care on quality and health outcomes are well known (Weitz et al., 2004[27]; Morishima et al., 2013[28]), about half of the 26 countries responding to the 2023 OECD Policy Survey on Cancer Care Performance had concentrated cancer care delivery (Figure 1.12).

Figure 1.12. Half of EU+2 countries have concentrated cancer care delivery, and over two-thirds use multidisciplinary teams to enhance the quality of cancer care

Number of countries using each of the following practices for cancer quality improvement



Note: From 26 countries responding to the OECD Policy Survey on Cancer Care Performance.
Source: 2023 OECD Policy Survey on Cancer Care Performance.

Several countries, including Austria, Hungary and Germany, have established vertically tiered cancer care delivery systems, with comprehensive centres of expertise, regional specialty centres and local certified cancer centres. In some countries (Czechia, France, Germany, the Netherlands and Spain), a volume norm is set to pay for cancer care or for a facility to be authorised to deliver certain treatment, leading to cancer care concentration. Countries such as Belgium and Portugal, which have cancer care systems that are mostly decentralised, also concentrate delivery of selected cancer surgical procedures and therapies. Some countries with small population sizes (including Austria, Denmark, Estonia, Iceland and Norway) make arrangements to allow for referrals abroad and international collaboration in cases of rare cancers or specific therapies to compensate for the lack of expertise within the country.

In addition, cancer care networks (which are associated with higher-quality care, including better compliance with evidence-based guidelines) have been established in over half of the countries responding to the OECD Policy Survey. In some countries (Czechia, France and Italy), cancer care networks are organised horizontally across providers at regional levels to improve quality of cancer care, including care co-ordination. Several countries have also developed networks for specific types of cancer (Poland) and for palliative care (Portugal). To promote high-quality cancer care across countries, the European Commission has committed to developing an EU Network of Comprehensive Cancer Centres; this plans to link recognised national centres in every Member State by 2025.

Multidisciplinary teams (MDTs) have been recommended to improve the quality of cancer care and outcomes, alleviate shortages in the health workforce, and facilitate provision of integrated cancer care. While MDTs – typically including oncologists, surgeons, radiologists and pathologists – entail considerable costs, 21 responding countries use them to provide high-quality cancer care in an efficient and effective manner (see Figure 1.12). In the Netherlands, all new diagnosed cancer cases are discussed in MDT meetings organised according to the type of cancer.

To respond to the needs of patients who prefer to receive care in the community where they live, countries are expanding availability of home care for cancer patients. Using video consultation, doctors and psychotherapists can provide follow-up care to their patients at home after surgery, examine the healing process of a surgical wound or have a psychotherapeutic consultation. An increasing number of countries are developing mobile palliative care for cancer patients at home. In Czechia, 15 accredited comprehensive cancer centres have a contract for palliative home care, and mobile palliative care teams providing home care are covered by the country's health insurance funds (OECD, 2023[29]). France has made a large investment to expand home palliative care in recent years, including investments in mobile palliative care teams as part of a national plan to guarantee access to end-of-life care for all citizens as close as possible to where they live.

1.5.5. Promoting continuous quality improvement requires implementation of clinical guidelines, accreditation of providers and care monitoring

Clinical guidelines are key to ensuring standardised high-quality cancer care across providers throughout a country, and 20 the 26 countries responding to the 2023 OECD Policy Survey on Cancer Care Performance reported having developed clinical guidelines for cancer care (see Figure 1.12). Several countries, such as Iceland and Romania, benefit from clinical guidelines developed in other countries or at the international level. Provider accreditation or certification – which has been shown to be associated with a safety culture, hospital efficiency (Hussein et al., 2021[30]) and cancer care outcomes (Schroeder et al., 2022[31]) - is used in 16 EU+2 countries (see Figure 1.12). In Czechia, comprehensive cancer centres are subject to Ministry of Health accreditation every five years, based on criteria including staffing, availability of MDTs and minimum volume norms for selected treatments. In a few countries, such as Belgium, Bulgaria and France, cancer care providers need to be accredited in order to receive reimbursement.

Since timely access to cancer care is essential for good cancer outcomes, at least one-third of EU+2 countries have set waiting time targets in areas such as diagnostic services, specialist referral and treatment initiation. In most cases, these are general guidelines across cancer sites; however, in some countries (Ireland and Luxembourg), the guidelines depend on the type of cancer. Furthermore, some countries, such as Finland, penalise providers if targets are not met. In Denmark, if a region cannot provide treatment within the maximum waiting time, it is obliged to refer patients to another hospital within the country or abroad that can do so.

Monitoring of cancer care quality also supports continuous improvement of access to and quality of cancer care in 16 countries. Poland undertakes systematic monitoring of cancer care with stakeholders, using indicators developed to measure the quality of oncological care and patient safety; shared ownership and patient involvement have enhanced rigorous monitoring. In some countries, including Denmark or Iceland, waiting times are monitored and assessed regularly to promote timely access to cancer care. To improve delivery of people-centred cancer care, a growing number of countries – including Belgium, Estonia, Germany, Iceland, Ireland, Italy, Latvia, the Netherlands, Slovenia and Sweden – also collect and monitor patient-reported measures. Some countries with systematic monitoring of cancer care (Estonia, France, the Netherlands, Norway and Slovenia) also provide feedback at the provider level and publish the results.

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Notes

[1] Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain and Sweden responded to the 2023 OECD Policy Survey on Cancer Care Performance.

2 Trends in the cancer burden

Cancer mortality rates in the EU declined by 10% in the decade leading to 2020, with substantial reductions across many important cancers. However, without major changes, cancer will become the leading cause of death in Europe by 2035. Indeed, new cancer cases have been increasing, with breast, prostate, colorectal and lung cancers estimated to account for half of all cancers diagnosed in EU countries in 2022. Furthermore, the gaps in cancer outcomes between countries – as well as by region, socio-economic status and gender within countries – are large, providing opportunities to learn from good practices. Alongside national cancer control plans, the European Commission’s Europe’s Beating Cancer Plan is underpinning efforts to tackle cancer in EU countries. National cancer registries that integrate or can be linked to information on clinical data, screening, genomic and socio-economic status will be a key instrument in monitoring policies across the spectrum of cancer prevention and care.

Key findings

- There were an estimated 2.74 million new cancer cases in the 27 EU Member States (EU27) in 2022, representing an age-standardised incidence rate of 571.5 new cases for every 100 000 people. Between 2010 and 2022, the rate of new cancer cases increased in 14 of 24 of the EU27 plus Norway and Iceland (EU+2 countries).
- The most common cancer sites in the EU27 in 2022 were breast, prostate, colorectum and lung, which together represented 50% of all new cancer cases. The same sites, with the addition of pancreatic cancer, were the leading causes of death in 2020, accounting for 52% of all cancer deaths.
- Cancer mortality decreased by 10% in the EU27 between 2010 and 2020, although cancer still represented 22.5% of all deaths in 2020. In the decade to 2020, mortality rates fell across a number of cancers, including colorectal (-15%), cervix uteri (-16%) and stomach cancers (-27%).
- Estimated cancer survival probabilities improved for most cancers in EU+2 countries between 2005-09 and 2010-14, except for cervical cancer and acute lymphoblastic leukaemia. Seven countries (Austria, Croatia, Czechia, Iceland, Latvia, Malta, and Slovenia) had decreases in cervical cancer five-year net survival.
- There is wide variation in cancer mortality across EU+2 countries. In 2020, breast cancer mortality rates varied almost two-fold across countries, and the mortality rates for colorectal, liver, lung, stomach and prostate cancers varied between more than two-fold and four-fold.
- For many cancers, lower estimated five-year survival probabilities are found in Central and Eastern European countries (Bulgaria, Croatia, Czechia, Lithuania, Poland, Romania and the Slovak Republic), while Western European and Nordic countries (Belgium, Norway, Sweden, Iceland, Germany and Portugal, among others) and Cyprus consistently have estimated five-year survival probabilities in the top quintile.
- Within countries, cancer mortality rates can be up to 37% higher across different regions, suggesting scope for targeted interventions to reduce regional disparities.
- There are also large differences in cancer outcomes by sex and socio-economic status within countries. Lung cancer mortality rates were 2.6 times higher among men with lower than higher levels of education, and 1.7 times higher among women with lower than higher levels of education.
- Integrated national cancer control plans are found in 25 of the 29 EU+2 countries. The areas most prioritised in the plans are screening, treatment, prevention and quality of cancer care. Cancer in children, adolescents and young adults; cancer networks; digitalisation; and health information are less often prioritised.
- A national cancer registry covering the full population exists in 24 of the 29 EU+2 countries. Four countries (Spain, Italy, Romania and France) have regional registries covering varying percentages of the population, while Greece does not have any population-based cancer registries.
- Harmonising standards and improving interoperability across databases facilitates integration of cancer registries and national screening data; this leads to better monitoring of the cancer burden and cancer care. It is critical to enable the linkage of data related to socio-economic status, ethnicity and migration to cancer registries in order to monitor cancer inequalities and inform targeted policy actions.

2.1. The burden of cancer in Europe is large

2.1.1. Cancer is a major public health concern in Europe

It is estimated that almost 2.8 million citizens in Europe were diagnosed with cancer in 2022

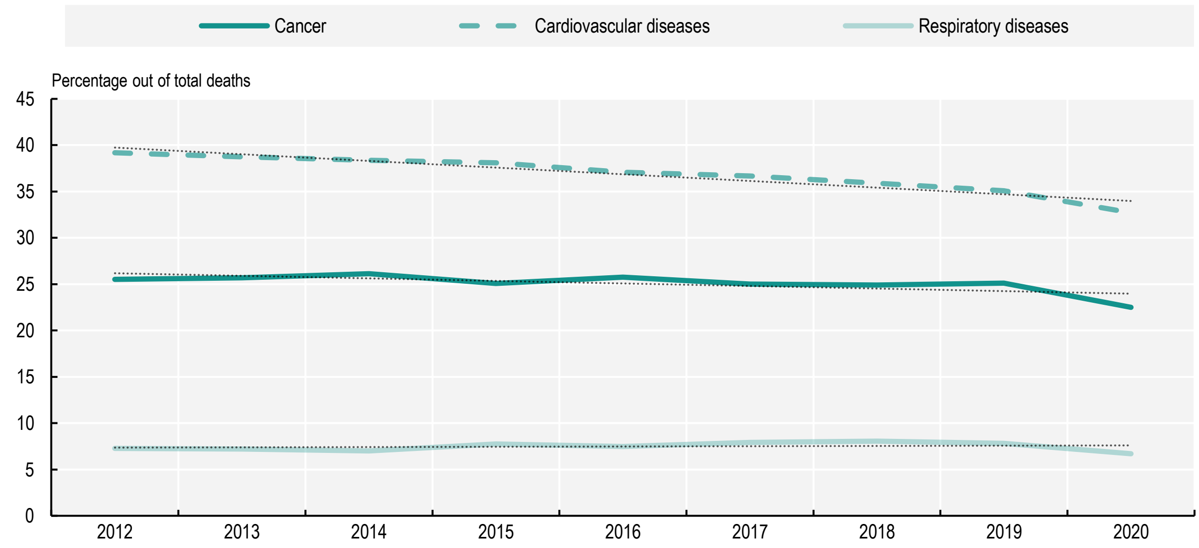
In 2022, there were an estimated 2.78 million new cancer cases (across all sites excluding non-melanoma skin cancer) in the 27 European Union Member States (EU27), plus Iceland and Norway (EU+2 countries), including 2.74 million cases in the EU27 and 39 112 cases in Iceland and Norway (ECIS, 2023[1]). This translates to about five people being diagnosed every minute, or one cancer case diagnosed every 11 seconds. Compared to 2.72 million estimated cancer cases in 2020, it represents an increase of around 65 000 cases. Among children, there were an estimated 9 294 new cancer cases in 2022 in the 29 EU+2 countries. It is estimated that by 2040 new cancer diagnoses among all ages will increase by around 18% in the EU27 compared to 2022.

In 2020, 1.17 million cancer-related deaths occurred in the EU27 (Eurostat, 2023[2]). The proportion of deaths attributable to cancer in the EU27 has slowly been decreasing – from 25.5% of all deaths in 2012 to 25.1% in 2019. However, cancer represented 22.5% of all deaths in the EU27 in 2020. This sharp decline can be explained by the COVID-19 pandemic, which reduced the number of deaths with cancer as the underlying cause, and by changes in the international coding rules for underlying causes of death (Henley et al., 2022[3]).

While the burden of cancer among all causes of death is decreasing, the reduction is less pronounced than that for cardiovascular diseases – the current leading cause of death in the EU27 (Figure 2.1). Between 2012 and 2019 (before the COVID-19 pandemic), the proportion of cancer deaths declined by only 0.4 percentage points, compared to a decline of 4.1 percentage points (from 39.2% in 2012 to 35.1% in 2019) for deaths attributable to cardiovascular diseases. In line with these trends, it is estimated that, without decisive action, cancer will be the leading cause of death in Europe by 2035 (European Commission, 2022[4]). In 2021, cancer also accounted for 27% of potential years of life lost[1] in the EU27 countries with available data, compared to 21% accounted for by cardiovascular diseases. Governments are thus facing pressure to prioritise and improve cancer prevention and treatment. In response, authorities have placed prevention and early detection at the centre of countries' strategies to reduce the burden of cancer (further explored in Chapters 3 and 4).

Overall, with growing cancer case numbers and decreasing mortality rates, the prevalence of cancer is increasing in EU+2 countries (Box 2.1). In 2020, an estimated 9.5 million people (2.1% of the population) living in EU+2 countries had received a cancer diagnosis in the last five years (IARC, 2023[5]).

Figure 2.1. The percentage of deaths with cancer as the underlying cause is decreasing at a slower pace than the percentage with cardiovascular diseases

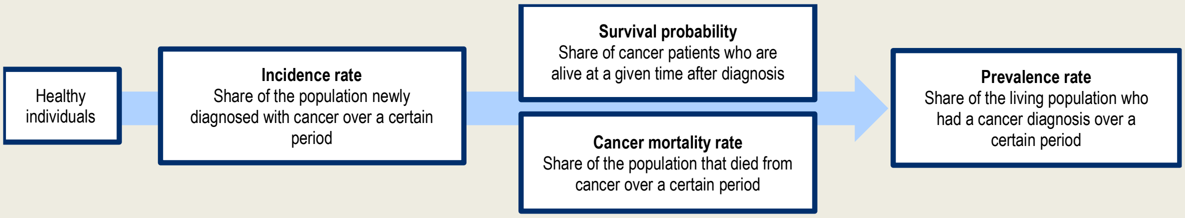


Notes: The graph represents the weighted values for EU27 countries as calculated by Eurostat. A linear model using ordinary least squares was calculated for each series. International Classification of Diseases 10th Revision (ICD-10) codes used: cancer (C00-C97), cardiovascular diseases (I00-I99), respiratory diseases (J00-J99). COVID-19 (ICD codes U07.1, U07.2) is not included in any of the disease groups shown in the figure.
Source: Eurostat (2023[2]), Causes of Death – Deaths by Country of Residence and Occurrence, https://ec.europa.eu/eurostat/databrowser/view/HLTH_CD_ARO__custom_6537139/default/table.

Box 2.1. Framework for understanding cancer statistics and data sources

This chapter examines cancer burden relying on three common indicators – incidence, survival and mortality (Figure 2.2). Each of these three indicators provides information on the effectiveness of cancer prevention, detection and treatment, and only together do they provide an accurate picture of cancer care. While prevalence is often referenced in order to provide a snapshot of the living population who currently have or have ever had cancer (including those in remission) in a defined time period, it provides limited insight into the dynamic nature of cancer control and care (Cho et al., 2014[6]; Ellis et al., 2014[7]).

Figure 2.2. Cancer burden definitions



Source: Authors based on Cho, H. et al. (2014[6]), "When do changes in cancer survival mean progress? The insight from population incidence and mortality", https://doi.org/10.1093/jncimonographs/lgu014; Ellis, L. et al. (2014[7]), "Cancer incidence, survival and mortality: Explaining the concepts", https://doi.org/10.1002/ijc.28990.

Incidence rates provide an understanding of the rate of new cancer diagnoses within a given period – often over the course of a year. When key cancer risk factors such as tobacco use or unhealthy diets increase, cancer incidence will increase in the following years. In parallel, increases in diagnostic or screening activities will also increase incidence, as more cases are detected at an early stage. This is generally a positive development that will lead to lowered mortality rates and higher probability of survival – a higher share of patients with cancer surviving for a given period. However, it can also result in overdiagnosis of cases that would not have had any clinical significance, or that would have progressed slowly enough to not affect mortality. As such, a higher survival probability – which can represent improved, appropriate early-stage diagnosis or improvement of cancer treatment – could also be artificially inflated due to overdiagnosis. Mortality rates facilitate an understanding of how many people within the population have died from cancer over a period, and are essential to show progress in cancer control and treatment. It is important to remember that an increase in mortality rates can result from a large increase in incidence, despite a parallel improvement in cancer care and probability of survival.

Data sources

Estimates of cancer incidence (2022 and 2010) and of mortality (2022) are obtained from the European Cancer Information System (ECIS) of the European Commission (ECIS, 2023[1]). Observed incidence data are obtained from national sources collected through the 2023 OECD Policy Survey on Cancer Care Performance[2], to which 26 EU+2 countries responded. Prevalence data are from the International Agency for Research on Cancer (IARC) (2023[5]). Observed mortality data for 2010-20 are from Eurostat (2023[2]). Survival estimates are obtained from the CONCORD-3 study (Allemani et al., 2018[8]), and are age-standardised using the International Cancer Survival Standard weights. This report uses the European age standardisation 2013 edition (Eurostat, 2013[9]) when reporting incidence and mortality rates. Further information is taken from the EU Country Cancer Profiles (OECD, 2023[10]), complemented by the 2023 OECD Policy Survey on Cancer Care Performance.

Cancer incidence rates vary near 2-fold across EU+2 countries

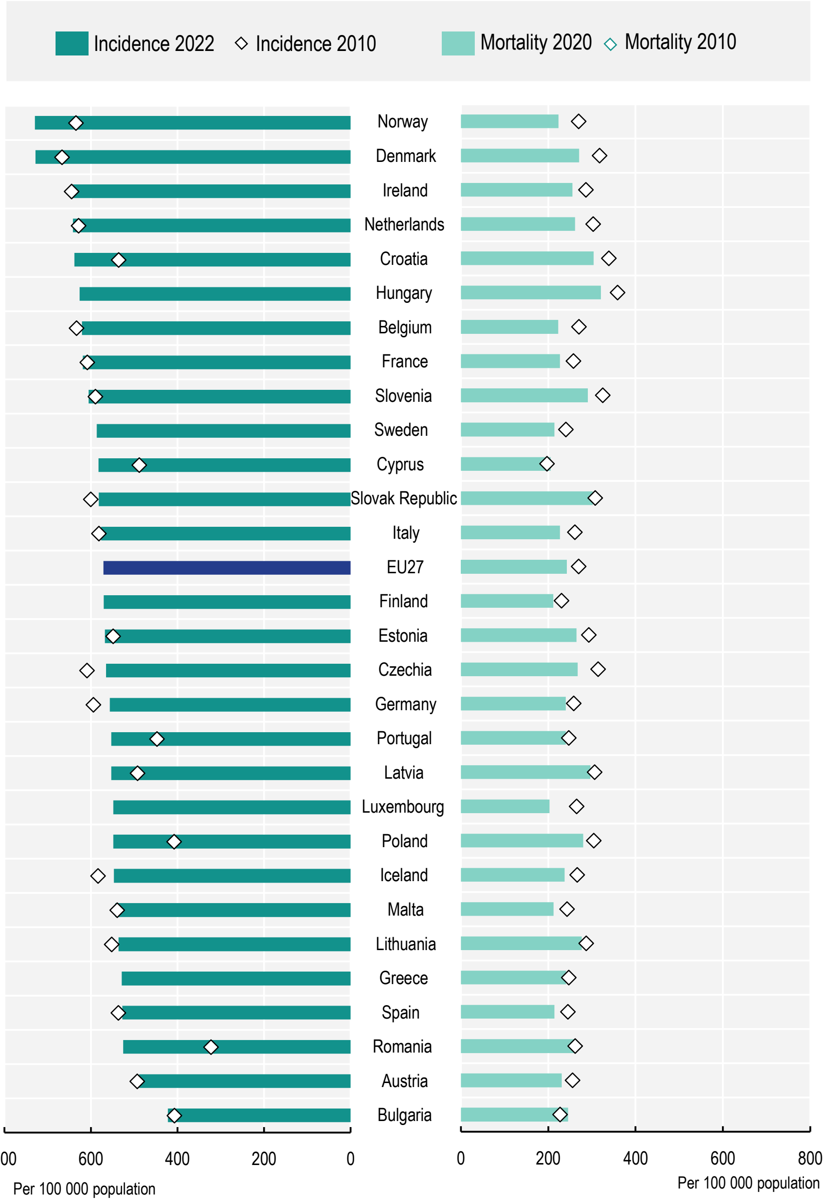
The estimated cancer incidence rates for 2022 are shown in Figure 2.3. After adjusting for different population age structures, overall cancer incidence rates were highest in Norway and Denmark, at close to 28% higher than the EU27 average. Ireland, the Netherlands, Croatia, and Hungary were also among the 20% of countries with the highest incidence (the highest quintile) among EU+2 countries, with incidence rates above 622 per 100 000 population. In Bulgaria and Austria, overall estimated cancer incidence was the lowest, with rates more than 14% lower than the EU27 average. Low incidence was also seen in Romania, Spain, Greece and Lithuania (all with estimated incidence below 542 per 100 000 – the lowest quintile). In the EU27, cancer incidence rates are estimated to vary near 2-fold across countries.

Between 2010 and 2022, estimated cancer incidence increased in 14 of the 24 countries with available data. The largest estimated increases were in Romania and Poland – two countries that experienced an improvement in detection capabilities (OECD, 2023[11]; OECD, 2023[12]). Over the same period, estimated cancer incidence decreased in Czechia (7%), Iceland (-6%), the Slovak Republic (-3%), Lithuania (-3%) and Belgium[3] (-2%).

In 2020, the highest mortality rates (for both men and women combined) occurred in Hungary (321 per 100 000 population, which is 32% higher than the EU27 average), and high rates were also observed in Croatia, the Slovak Republic, Latvia, Slovenia and Poland (all reporting mortality rates above 277 per 100 000 – the highest quintile). The lowest mortality rates occurred in Luxembourg (203 per 100 000 population, which is 16% lower than the EU27 average), and Cyprus, Finland, Malta, Sweden and Spain all had rates lower than 221 per 100 000 population. Overall, cancer mortality rates varied 1.6-fold across countries. Between 2010 and 2020, the age-standardised all-cancer mortality rate decreased by 10% in the EU27. Decreases in cancer deaths were observed in all 29 EU+2 countries except Bulgaria (8% increase) and Cyprus (4% increase).

Figure 2.3. The 10% cancer mortality decrease in 2010-20 contrasts with cancer incidence increases in most EU+2 countries in 2010-22

Age-standardised incidence (estimated) and mortality (observed) rates per 100 000 population, both sexes



Notes: Estimated national age-standardised rates (European 2013 edition) per 100 000 population. Incidence estimates were created before the COVID-19 pandemic, based on incidence trends from previous years, and may differ from observed rates in more recent years. Incidence rates are calculated for all cancer sites except non-melanoma skin, while mortality rates correspond to all malignant neoplasms. The EU average for mortality includes EU Member States and is calculated as a population-weighted average. The 2010 cancer incidence rates are estimated from subnational registries with different population coverage, limiting the international comparability of these estimates: Germany (80% coverage), Spain (27% coverage), France (20% coverage), Italy (57% coverage) and Romania (23% national coverage). Further, these 2010 measures in the graph is weighted to reflect the size of registries present in ECIS 2010 data. In Iceland, the 2020 mortality rate is a five-year rolling average (2016-20), and the 2010 mortality rate is a four-year rolling average (2006-09) (no data for 2010). Incidence rates in 2010 are missing for Sweden, Hungary, Finland, Luxembourg and Greece.

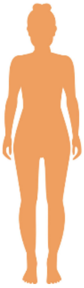
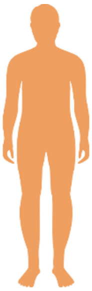
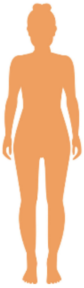
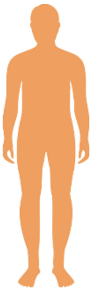
Source: Incidence data from ECIS (2023[1]), *European Cancer Information System*, https://ecis.jrc.ec.europa.eu (accessed on 27 April 2023); mortality data from Eurostat (2023[2]), Causes of Death – Deaths by Country of Residence and Occurrence, https://ec.europa.eu/eurostat/databrowser/view/HLTH_CD_ARO__custom_6537139/default/table.

Four cancers are responsible for 50% of all new cancer diagnoses

The most common cancers among those estimated to have been diagnosed in the EU27 in 2022 were breast cancer in women, with 374 836 new cases (148 per 100 000 women), followed by prostate cancer in men (330 492 new cases; 154 per 100 000 men), colorectum cancer (356 154 new cases; 73.5 per 100 000 population) and lung cancer, including trachea and bronchus (319 236 new cases; 66 per 100 000 population). Together, these four cancer sites were responsible for 50% of all new cancer diagnoses in 2022 (Table 2.1).

In terms of mortality, most cancer deaths in 2022 were expected to be caused by breast cancer (17% of cancer deaths among women), lung cancer (23% of cancer deaths among men and 15% among women), colorectum cancer (12% of cancer deaths), prostate cancer (11% of cancer deaths among men) and pancreas cancer (between 7% and 8% of cancer deaths). According to the Eurostat Database, these five cancers were responsible for 52% of all cancer deaths in 2020 in the EU27.

Table 2.1. The ten leading cancer sites affecting men and women in the EU27 in 2022

	Women					Men		
Estimated new cases	Breast	374 836	29%			Prostate	330 492	23%
	Colorectum	158 698	12%			Lung	203 029	14%
	Lung	116 207	9%			Colorectum	197 456	13%
	Corpus uteri	69 163	5%			Bladder	127 640	9%
	Melanoma skin	49 509	4%			Kidney	58 213	4%
	Pancreas	50 438	4%			Melanoma skin	51 998	4%
	Non-Hodgkin lymphoma	41 189	3%			Non-Hodgkin lymphoma	51 518	4%
	Ovary	40 714	3%			Pancreas	49 714	3%
	Thyroid	38 503	3%			Stomach	45 246	3%
	Brain and other CNS	19 539	2%			Multiple myeloma	18 808	1%
	All cancer sites*	**1 276 601**				**All cancer sites***	**1 465 846**	
Estimated deaths	Breast	95 829	17%			Lung	164 485	23%
	Lung	88 097	15%			Colorectum	88 585	12%
	Colorectum	70 371	12%			Prostate	76 772	11%
	Pancreas	47 744	8%			Pancreas	47 208	7%
	Ovary	27 677	5%			Bladder	39 318	5%
	Stomach	20 262	3%			Liver	36 406	5%
	Leukaemia	20 023	3%			Stomach	31 519	4%
	Liver	17 759	3%			Leukaemia	25 020	3%
	Non-Hodgkin lymphoma	15 865	3%			Kidney	21 781	3%
	Brain and other CNS	15 424	3%			Non-Hodgkin lymphoma	20 150	3%
	All cancer sites	**575 326**				**All cancer sites**	**717 274**	

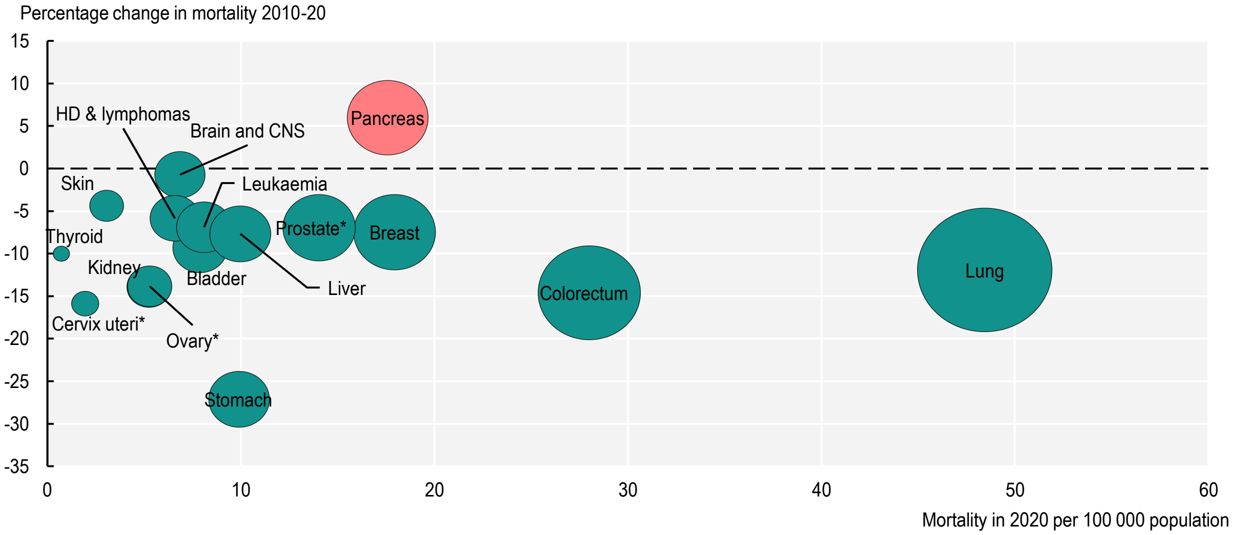
Notes: CNS stands for central nervous system. * Includes all cancer sites except non-melanoma skin cancer. Estimates were calculated based on incidence and mortality trends before the COVID-19 pandemic and may differ from observed rates in more recent years. Lung also includes bronchus and trachea.
Source: ECIS (2023[1]), *European Cancer Information System*, https://ecis.jrc.ec.europa.eu (accessed on 27 April 2023).

2.1.2. Cancer mortality rates are decreasing for most cancers, including the five leading causes of cancer death

National efforts to improve cancer prevention and treatment are reflected in an overall downward trend in cancer mortality (Figure 2.4). Stomach cancer mortality declined the most between 2010 and 2020, decreasing by 27%. Lung cancer, which remains the leading cause of cancer death across both sexes, saw a 12% reduction in mortality rates during this period. Significant decreases in mortality rates were also seen for cancers of the cervix uteri (-16%), colorectum (-15%) and kidney (-14%), while breast cancer mortality rates declined by 7%. Among the most lethal cancers, the only increase in mortality rates was seen for pancreatic cancer (6%).

Despite the growing incidence of several cancers, Hashim et al. (2016[13]) suggest that the decrease in cancer mortality is partly explained by reductions in some cancer risk factors, as well as improvements in countries' early detection and cancer treatment. This is especially the case for breast, cervical and colorectal cancers, for which population-based screening strategies have been introduced in most EU+2 countries. The report explores these topic in detail in Chapters 3 and 4.

Figure 2.4. Age-standardised mortality rates for most cancers decreased in the last decade



Note: The red bubble signals an increase in the percentage change in the cancer mortality rate during 2010-20; green bubbles signal a decrease. The size of the bubbles is proportional to the mortality rate in 2020. The mortality rate for some of these cancers is low; hence, the percentage change should be interpreted with caution. * Percentage change for prostate, ovary and cervix uteri cancers refers to 2011-20. HD stands for Hodgkin disease.
Source: Eurostat (2023[2]), Causes of Death – Deaths by Country of Residence and Occurrence, https://ec.europa.eu/eurostat/databrowser/view/HLTH_CD_ARO__custom_6537139/default/table.

Heterogeneity in cancer mortality highlights the potential for sharing best practices

Table 2.2 presents a dashboard with the age-standardised mortality rates per 100 000 population for selected cancer sites in EU+2 countries, in a lowest to highest cancer mortality average ranking. The table shows a per-cancer-site colour scale where dark red corresponds to the highest quintile of mortality rates and dark blue corresponds to the lowest quintile. The relative predominance of blue across the top and red across the bottom of the table indicates that countries' cancer mortality rates are broadly consistent for the 14 cancers examined, suggesting a better performance – with lower cancer mortality rates – in Nordic and Western European countries.

While Sweden, Luxembourg, Spain and Finland have the lowest average mortality rates for the selected cancers, Latvia, Croatia, the Slovak Republic and Slovenia consistently have somewhat higher mortality rates. Outliers from the general country-level trend may indicate cancer sites that countries need to pay special attention to, or those where favourable policies could be replicated to improve cancer outcomes. For example, mortality rates for prostate and pancreas cancers are relatively high in Sweden – a country that otherwise has low mortality rates for other cancers. Diagnosing these cancers at an early stage has a significant impact on their survival (van den Bergh, Loeb and Roobol, 2015[14]; Gheorghe et al., 2020[15]), highlighting the need for greater efforts to improve prevention and early diagnosis to address these challenges.

Table 2.2. Cancer mortality is consistently higher in Central and Eastern European countries

Age-standardised mortality rate per 100 000 population, 2020, both sexes

	Bladder	Brain and CNS	Breast	Cervix uteri	Colorectum	HD & lymphomas	Kidney	Leukaemia	Liver	Ovary	Pancreas	Prostate	Stomach	Lung
Sweden	6.1	6.3	13.5	1.1	26.4	6.2	4.5	7.2	7.1	4.8	18.6 ↑	21.1	5.0	33.5
Luxembourg	6.3	5.2	20.3	0.3	23.9	6.3	2.9	8.8	7.4	5.1	16.3	13.3	7.2	39.2
Spain	8.5	6.5	12.8	1.3	29.4	6.0	4.2	6.6	10.0	4.1	14.9 ↑	11.2	9.7	44.8
Finland	5.0	6.3	15.8	0.8	20.8	8.9	5.7	5.4	9.1 ↑	4.5	21.2 ↑	14.8	6.7	36.7
Belgium	6.5	6.5 ↑	17.8	1.2	21.6	6.2	4.4	8.5	8.5 ↑	5.1	16.0	13.2	5.8	49.4
Norway	6.0	6.5	12.3	2.1 ↑	32.2	6.3	5.1	6.6	6.6 ↑	5.0	16.0	20.2	5.8	44.6
France	7.2	5.9	18.0	1.1	23.3	6.7	4.8	8.3	12.3	4.7	17.6 ↑	12.0	6.0	44.4
Cyprus	5.9	8.8 ↑	16.3	1.4 ↑	18.6 ↑	6.8 ↑	2.6	10.8 ↑	8.2 ↑	6.4 ↑	14.6 ↑	12.5	8.5 ↑	40.9 ↑
Italy	7.9	6.3 ↑	18.0	0.7 ↑	25.1	7.1	4.8	8.3	11.6	4.6	17.7 ↑	10.0	11.5	44.5
Portugal	7.4	7.9 ↑	15.6	1.8	32.0	7.4	4.0	7.3	11.3 ↑	3.4	14.2 ↑	15.9	18.0	37.2 ↑
Malta	9.3	8.6	20.1	0.8	25.6	6.0	6.6 ↑	7.8	5.9	7.1	22.8 ↑	8.6	5.9	35.6
Greece	10.1 ↑	9.1	17.5	1.2	21.5	5.1 ↑	4.7	9.1	11.0	4.4	16.1 ↑	13.0	9.3	58.0
Austria	6.1	6.8	18.3	1.6 ↑	23.4	7.1	4.1	9.3	9.4 ↑	5.4	20.4 ↑	15.4 ↑	8.2	44.7
Netherlands	8.1	5.5 ↑	18.1	1.4	27.1	7.8	5.3	8.1	7.3	5.9	16.8	17.8	6.6	57.2
Germany	6.0	6.5	19.4	1.7	25.2	7.4	5.3	8.6	8.8	5.5	19.5 ↑	15.5	8.7	47.5
Iceland	7.9	8.7	18.1	2.0 ↑	25.6	6.9	6.9	6.7	7.5 ↑	5.4	16.7 ↑	23.4 ↑	6.1	50.1
Denmark	7.7	7.6	18.5	1.5	28.8	6.0	4.2	8.6	7.7	5.5	19.5 ↑	23.9	7.2	57.2
Romania	9.1 ↑	8.7 ↑	18.7 ↑	6.9	34.3 ↑	3.6	4.7 ↑	6.3	14.4	5.3	15.4 ↑	13.5 ↑	15.6	49.1
Bulgaria	8.4 ↑	8.9 ↑	19.3 ↑	4.8 ↑	36.0 ↑	4.2 ↑	5.1 ↑	5.8	9.1	6.0 ↑	16.3 ↑	16.8 ↑	14.4	44.8 ↑
Ireland	6.9	7.8 ↑	19.9	1.7	27.3	8.5	5.5	7.1	10.5 ↑	7.4	16.1	17.4	7.8	52.1
Czechia	8.8	7.2	17.1	2.7	33.3	6.1 ↑	8.7	9.5	8.2	6.0	21.9	15.1	9.3	48.8
Poland	11.8 ↑	8.3	19.9 ↑	4.1	35.6	5.3 ↑	6.7	8.0	5.9	7.4	13.8	16.9 ↑	13.4	60.5
Lithuania	8.7	9.3 ↑	19.1	6.4	30.4	5.8 ↑	7.8	9.3	7.9 ↑	8.9	17.4 ↑	18.1	20.8	41.4
Estonia	7.8	8.1	18.9	4.6	29.8	7.0	9.5 ↑	8.9	9.6 ↑	7.2	18.7 ↑	17.4	18.9	44.6
Hungary	10.7	6.6 ↑	22.9	3.8	50.5	5.3	7.8	8.4	8.2	7.0	22.0 ↑	14.2	13.3	81.0
Slovenia	11.3 ↑	7.1	21.9	1.8	30.9	9.8 ↑	7.4	8.6	13.6 ↑	4.9	18.9	20.5	14.4	53.3
Slovak Republic	9.8 ↑	8.5 ↑	23.8 ↑	3.5	46.3	7.0 ↑	8.8 ↑	9.8 ↑	9.1	6.9 ↑	20.6 ↑	17.7	13.7	47.5
Croatia	10.9 ↑	9.7	16.8	2.9 ↑	47.6	7.3	8.2	9.1	11.0	7.2 ↑	17.6 ↑	18.4	15.3	63.0
Latvia	11.1 ↑	10.0 ↑	22.4 ↑	5.6	33.3	6.6	9.8	8.1	9.1 ↑	10.5	20.6 ↑	21.1 ↑	20.0	46.8
EU27 average	7.9	6.9	18.0	2.0	28.0	6.6	5.3	8.1	10.0	5.3	17.6 ↑	14.0	9.9	48.4

Notes: CNS stands for central nervous system. The colours correspond to quintiles of mortality among the 29 countries, where blue is the quintile with the lowest mortality rate, light blue the second quintile, white the third quintile, light red the fourth quintile and dark red the quintile with the highest mortality rate. The order of countries in the table is determined by the average position of annual mortality rates for each cancer. In Iceland, the 2020 mortality rate is a five-year rolling average (2016-20) and the 2010 mortality rate is a four-year rolling average (2006-09) (no data for 2010). Arrows indicate an increase greater than 3% in mortality rates between 2010 and 2020; except for Iceland and Denmark, and for cervix uteri, ovary and prostate cancers, which show the difference between 2011 and 2020. EU27 averages include only EU Member States and are calculated as population-weighted averages.

Source: Eurostat (2023[2]), Causes of Death – Deaths by Country of Residence and Occurrence, https://ec.europa.eu/eurostat/databrowser/view/HLTH_CD_ARO__custom_6537139/default/table.

The Slovak Republic and Latvia are in a challenging position, as they have both higher mortality rates for all cancers shown in the dashboard and recent increases in mortality for at least six of these cancers. Croatia has among the highest mortality rates for eight cancers (bladder, brain and central nervous system (CNS), colorectal, kidney, liver, ovary, stomach and lung), but lower mortality rates for breast cancer (in the second lowest quintile). This relatively good performance may be attributable to effective implementation of the national breast cancer early detection plan. The Croatian population-based screening programme was first implemented in 2006, with around 150 000 mammograms performed on women aged 50-69 every year (Brkljačić and Šupe Parun, 2020[16]).

Sweden, Luxembourg, Spain, Finland and Belgium have the lowest mortality rates, and have seen further decreases in mortality for most cancers over the decade. The decline in cancer mortality since 2010 for most cancers is particularly seen in countries with lower cancer mortality in 2020, with exceptions such as Cyprus, Italy and Portugal. Conversely, countries with higher cancer mortality in 2020 (at the lower end of the dashboard) are more likely to have seen mortality increases between 2010 and 2020. In Slovenia, however, it is important to note that the overall cancer mortality rate had declined substantially in 2019 compared to 2011 (by 10%). Bulgaria and Romania experienced increases in mortality for most cancers between 2010 and 2020, which can be attributed both to a rise in cancer incidence and to improvements in the accuracy of reporting cancer deaths.

Overall, variations in cancer mortality between EU+2 countries are wide. In 2020, breast cancer mortality rates varied almost two-fold, and the mortality rates for colorectal, liver, prostate, stomach, and lung varied between more than two-fold and four-fold. Cervical cancer presents the most extreme variation: Luxembourg has 0.3 deaths per 100 000 population compared to Romania's 6.9 deaths per 100 000 – a 20-fold difference.

Patients with rare cancers have worse health outcomes than other cancer patients

Cancers with an annual incidence rate lower than six cases per 100 000 people are considered rare. Together, rare cancers account for around 20-24% of all cancer diagnoses (Gatta et al., 2011[17]; de Heus et al., 2022[18]). According to the EU-funded Surveillance of Rare Cancers in Europe (RARECAREnet), there are 198 identified types of rare cancers.

The average survival estimates for patients with rare cancers is lower than for those with common cancers. A population-based study in the Netherlands determined that, between 1995-99 and 2015-19, five-year survival estimates increased less for rare cancers (from 46.2% to 52.6% – a 6.4 percentage point increase) than for common cancers (from 56.9% to 70.1% – a 13.2 percentage point increase) (de Heus et al., 2022[18]). Poorer survival estimates for patients with rare cancers may be explained by several challenges, including late or incorrect diagnosis, less access to effective therapies, and a lack of new therapies and research.

More research is needed on country-specific cancer recurrence

Cancer recurrence after its initial remission in individuals is an important factor in the burden of cancer. However, little is known about health system performance in preventing cancer recurrence, as it is widely accepted that recurrence depends more on cancer type than on the effectiveness of treatment. Nevertheless, for several cancer types, effective early detection of recurrence can lead to improvements in outcomes (Israel and Kuten, 2007[19]).

Epithelial ovarian cancer recurrence is observed in almost 25% of cases with early-stage disease, and in more than 80% with more advanced stages (median follow-up of over 4 years) (Salani et al., 2011[20]), which is the highest rate among common cancers that are not diagnosed at a metastatic stage. This is followed by lymphomas, which have a 30% to 75% recurrence rate (median follow-up of over 4 years) (Chihara et al., 2016[21]; Li, Young and Medeiros, 2018[22]; Glimelius and Diepstra, 2016[23]); bladder cancer, with a 50% recurrence rate; and soft tissue sarcomas, with a recurrence rate of 50% (median follow-up of almost 8 years) (Woll et al., 2012[24]) and higher for advanced and rare cases (Casali, 2015[25]).

Cancers for which population-based screening programmes and early detection are widespread often have high recurrence rates. Prostate cancer has a 18-48% 10-year recurrence rate, depending on the risk level of the individual (Kurbegovic et al., 2017[26]). Breast cancer has an over 30% recurrence rate (median follow-up of over 8 years), which can be lowered to 5-9% with surgery or post-surgical medication (Colleoni et al., 2016[27]), and colorectal cancer has a recurrence rate of 17% (median follow-up of 4.4 years) (Pugh et al., 2016[28]). Other cancers with high recurrence rates are glioblastoma (aggressive stage IV brain tumour) (75-80% after median follow-up of 43.0 months) (Jiang et al., 2020[29]), kidney cancer (13-49% after median follow-up of 20.2 months (Santini et al., 2016[30]), melanoma (~30% in the 2 years following initial diagnosis) (Tas and Erturk, 2017[31]) and pancreas cancer (36-46%, after 36 months of follow-up) (Breidert et al., 2012[32]), among others.

2.1.3. Efforts in early detection and treatment have improved cancer survival

Five-year estimated survival probabilities for most cancers have improved (or changed very little) in most countries for people diagnosed between 2010 and 2014 compared to people diagnosed between 2005 and 2009 (Table 2.3). However, estimated five-year survival probabilities for acute lymphoblastic leukaemia in children decreased by more than 1 percentage point in six countries (Norway, France, Italy, Slovenia, Croatia and Czechia). It is important to note that the CONCORD-3 study estimates of five-year net survival can have large 95% confidence interval for countries with low numbers of cases, such as Slovenia. More recent studies (considering people diagnosed until 2016) of cancer survival probabilities in Slovenia show a five-year survival estimate for childhood leukaemia of around 88% (Zadnik et al., 2021[33]).

Estimated five-year survival probabilities for women diagnosed with cervical cancer during 2010-14 compared to 2005-09 also decreased in seven countries (Austria, Croatia, Czechia, Iceland, Latvia, Malta and Slovenia). Decreases in cervical cancer survival probabilities can be explained by both challenges in access to cancer treatment and improvements in prevention activities, including human papillomavirus vaccination (see Chapter 3) and cervical cancer screening programmes (see Chapter 4), which increase the likelihood of finding precancerous lesions. Effective treatment for precancerous lesions prevents most non-aggressive cervical cancers that have a negative effect on cancer survival.

In Iceland, estimated five-year survival probabilities decreased during 2010-14 compared to 2005-09 for four cancers (stomach, rectum, liver and cervix), while six other countries (Slovak Republic, Czechia, Croatia, Romania, Slovenia and Cyprus) each had two cancer sites with decreasing estimated five-year survival probabilities.

Western European and Nordic countries such as Belgium, Norway, Sweden, Iceland, Germany and Portugal consistently have survival estimates in the top quintile (the best performing) for most cancers. Cyprus also has survival estimates in the top quintile for 8 of 11 cancers examined (stomach, colon, rectum, pancreas, breast, cervix, ovary and prostate), suggesting one of the best performances in EU+2 countries.

Bulgaria, the Slovak Republic, Czechia, Croatia, Poland, Romania and Lithuania have some of the lowest estimated five-year survival across the 11 cancer sites, with estimates in the lowest quintile for at least five cancer sites, suggesting important room for improvement. Countries that have around the average survival are interesting case studies. Estonia has among the lowest estimated five-year survival probabilities for colon, rectum, liver, prostate and breast cancers, while having some of the highest estimates for cervix, ovary, pancreas and stomach cancers.

Table 2.3. Central and Eastern European countries tend to have the lowest estimated five-year cancer survival

Age-standardised five-year net survival estimates (%) for patients diagnosed during 2010-14

	Stomach	Colon	Rectum	Liver	Pancreas	Lung	Breast	Cervix	Ovary	Prostate	AL. leukaemia in children
Cyprus	§35.6	§72.1	§75.9 ↓	§10.6 ↓	§16.6	18.7	§92.8	§73.3	§46.4	§99.2	§86.6
Belgium	37.5	67.9	66.6	20.7	12.4	18.2	86.4	65.4	43.1	93.8	90.8
Norway	26.5	66.7	69.2	18.7	9.5	19.0	87.7	73.3	45.5	92.9	83.0 ↓
Sweden	24.8	64.9	64.7	16.6	9.7	19.5	88.8	68.3	46.5	90.7	89.0
Iceland	28.1 ↓	68.2	63.0 ↓	14.3 ↓		20.2	89.1	80.1 ↓	40.3	90.8	92.4
Germany* (10 registries)	33.5	64.8	62.3	13.0	10.7	18.3	86.0	65.2	41.2	91.6	91.1
Portugal	32.2	60.9	59.6	18.7	10.7	15.7	87.6	66.2	43.6	90.9	89.8
Austria	35.4	63.7	64.2	§14.8	§10.5	19.7	84.8	63.9 ↓	41.0	90.2	
France* (21 registries)	26.7	63.7	60.9	18.3	8.6	17.3	86.7	65.0	43.5	93.1	88.6 ↓
Italy* (43 registries)	30.5	64.2	61.3	20.3	9.2	15.9	86.0	66.8	39.4	89.5	87.8 ↓
Finland	25.7	64.9	64.4	§10.4	§7.4	13.0	88.5	67.4	41.1 ↓	93.2	95.2
Netherlands	25.0	63.1	65.3	15.8	7.4	17.3	86.6	67.5	37.5	88.5	90.4
Latvia	28.0	56.5	53.3	12.9	13.7	20.4	82.2	56.0 ↓	45.5	90.4	84.1
Spain* (8 registries)	27.6	63.2	59.5	17.3	7.7	13.5	85.2	64.5	39.8	89.7	84.7
Ireland	27.6	60.5	61.7	14.2	9.6	17.5	82.0	63.6	32.8	91.1	88.3
Denmark	19.9	61.6	64.8	7.5	8.0	16.6	86.1	69.5	39.7	85.6	94.0
Estonia	29.2	58.4	54.8	4.2 ↓	10.2	16.9	76.6	66.5	42.3	86.3	87.7
Slovenia	28.8	61.9	60.3	7.4	6.6	14.8	83.5	65.5 ↓	37.0	85.0	70.1 ↓
Lithuania	27.0	56.9	52.7	§8.0	§7.0	9.9	73.5	59.2	35.0	94.3	74.7
Malta	23.8	57.5	56.1	§0.0	§5.5	14.9	86.9	57.4 ↓	28.0	88.2	
Romania* (Cluj)	§26.0	§52.2 ↓	58.4	§13.2	§6.0	11.1	74.8	65.3	37.2	77.1 ↓	53.9
Poland	20.9	52.9	48.4	10.8	8.0 ↓	14.4	76.5	55.1	37.5	78.1	86.9
Croatia	20.0	51.1	48.2	§9.3	§8.4	10.0	78.6	63.2 ↓	36.0	80.9	85.2 ↓
Czechia	20.6	56.1	52.3	6.7	6.1	10.6	81.4	61.0 ↓	36.5	85.3	88.2 ↓
Slovak Republic	21.1	51.8	48.6	7.6	6.4	11.2	75.5 ↓	60.5	33.4 ↓	74.7	87.0
Bulgaria	16.0	52.4	45.9	6.5		7.7	78.3	54.8	37.3	68.3	78.3
EU25 average	**26.8**	**60.2**	**58.8**	**11.9**	**9.0**	**15.1**	**83.2**	**63.8 ↓**	**39.2**	**87.3**	**85.1 ↓**

Notes: AL leukaemia stands for acute lymphoblastic leukaemia. The colours correspond to quintiles of survival among the 26 countries, where dark red is the quintile with the lowest survival estimate, light red the second quintile, white the third quintile, light blue the fourth quintile and dark blue the quintile with highest survival estimate. Hungary and Luxembourg did not participate in CONCORD-3; Greece only presents data for AL leukaemia in children, and was excluded from the table. Estimates for adults were age-standardised using the International Cancer Survival Standard weights. For children (0-14 years) age-standardised estimates are derived by assigning equal weights to the three quinary age-specific estimates (0-4, 5-9, 10-14). § indicates survival estimate considered less reliable. Arrows (↓) indicate a decrease in probability of survival of more than 1 percentage point with respect to people diagnosed in 2005-09. Five-year net survival refers estimates to the cumulative probability that the cancer patient would have lived five years after diagnosis after correction for other causes of death. Countries with * present estimates covering only part of the population. EU25 average is a non-weighted average of the 25 EU countries in the dashboard.

Source: Allemani, C. et al. (2018[8]), "Global surveillance of trends in cancer survival 2000-14 (CONCORD-3): Analysis of individual records for 37 513 025 patients diagnosed with one of 18 cancers from 322 population-based registries in 71 countries", https://doi.org/10.1016/s0140-6736(17)33326-3.

Denmark and Finland have low estimated five-year survival probabilities for stomach and liver cancer (in the worst and second worst performing quintiles). At the same time, both countries have among the highest estimates (in the best performing quintiles) for breast, prostate and childhood acute lymphoblastic leukaemia (in Finland), and for cervix, rectum and childhood acute lymphoblastic leukaemia (in Denmark) (see Table 2.3). More recent data on estimated five-year survival in these two countries are presented in

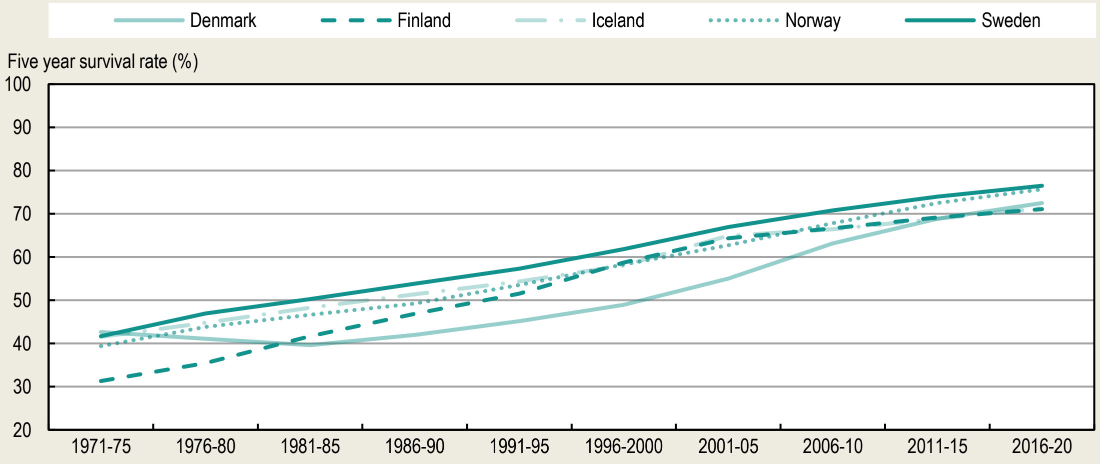
Box 2.2. Updated data indicate a clear upward trend for survival probabilities in all cancers combined, suggesting an overall improvement compared to Table 2.3.

Box 2.2. The NORDCAN survival data combine updated information on five countries

The NORDCAN platform is a valuable compilation of data from the cancer registries of five countries: Denmark, Finland, Iceland, Norway and Sweden. These registries, which include some of the oldest population-based registries in the world, have been providing complete coverage of the now combined population of 27 million for over 60 years. The registries adhere to high quality standards in terms of data completeness and accuracy. The data include or can be linked to a wide range of information such as date of diagnosis, topography, histology, behaviour, method of confirmation, stage at diagnosis and treatment. Despite small variations in registration, screening and coding practices between the countries, information in the Nordic cancer registries is generally similar and more comparable than other international collections of data. Figure 2.5 shows an example of data extracted from NORDCAN.

Figure 2.5. Cancer survival estimates are increasing rapidly in Nordic countries

Age-standardised five-year relative survival for ten cohorts of men and women



Notes: Relative survival is the ratio of the observed survival proportion to the expected survival proportion for patients diagnosed in several periods of time. The figure presents the simple average between men and women per country.
Source: Pukkala, E. et al. (2017[34]), "Nordic cancer registries – an overview of their procedures and data comparability", https://doi.org/10.1080/0284186x.2017.1407039; Larønningen, S. et al. (2023[35]), *NORDCAN: Association of the Nordic Cancer Registries*, https://nordcan.iarc.fr/.

The positive trend in Nordic countries has been attributed to several factors, including new treatments that have improved the probability of curing or improving survival probabilities for several types of cancer (Hemminki, Försti and Hemminki, 2021[36]; Hemminki et al., 2022[37]). At the same time, earlier diagnosis through better imaging, biomarkers and screening strategies has had a direct impact on improving cancer survival, and is central to the cancer strategies of these countries (OECD, 2023[38]; OECD, 2023[39]; OECD, 2023[40]; OECD, 2023[41]; OECD, 2023[42]). Early diagnosis, by definition, increases the length of survival directly as the course of the cancer becomes longer. More importantly, earlier diagnosis can improve survival probabilities by enabling use of treatments that are not available at later stages (such as surgery or adjuvant therapies). Early diagnosis also has implications for tumour size and stage, as smaller tumours in earlier stages may respond better to treatment (Hemminki, Försti and Hemminki, 2021[36]; Burki, 2020[43]).

2.1.4. Disruptions caused by COVID-19 are expected to increase the cancer burden in the short term

The COVID-19 pandemic affected cancer care significantly, disrupting prevention efforts, screening, diagnosis, treatment and access to medications. The pandemic led to a decrease in cancer diagnoses, which could indicate a future increase in cases (European Commission, 2022[4]), and the delays in both treatment and diagnosis are expected to reduce survival probabilities and increase cancer costs and mortality.

Since 2020, cancer screening, diagnosis and treatment have faced an unparalleled challenge due to COVID-19 (WHO, 2023[44]). This was particularly the case during the first wave of infections in early 2020, which led many countries to take containment measures, leading to the slowdown or even cessation of certain healthcare services. Organised cancer screening programmes were significantly reduced (see Chapter 4), which contributed to a major drop in cancer diagnoses over the period (Angelini et al., 2023[45]). For example, comparing April 2019 to April 2020 in Belgium, rates of diagnosis of invasive tumours fell by 44% (Peacock et al., 2021[46]). In Spain, the number of cancers diagnosed at the national level in February 2021 was 13% lower than in March 2019 (Ministry of Health, 2023[47]), and the number in the Catalonia region was 34% lower than expected between March and September 2020 (Sagan et al., 2021[48]). In England (United Kingdom), in April 2020, there were significant reductions in cancer referrals (-63%) and colonoscopies (-92%) compared to the 2019 monthly average, leading to a 22% decrease in cases referred for treatment. Although rates returned to 2019 levels by October 2020, around 3 500 fewer colorectal cancer cases were diagnosed and treated in England than would have been expected between April and October 2020 (Morris et al., 2021[49]). Slovenia conducted one of the first studies documenting the effect of the COVID-19 pandemic on cancer care, exposing reductions of 43% for pathohistological and 29% for clinical cancer notifications between November 2019-February 2020 and April 2020 (Zadnik et al., 2020[50]). In a follow-up study, it was suggested that new cancer diagnoses in the country dropped by 6% in 2020, 3% in 2021 and 8% in July 2022, with the largest drops seen in the 50-64 age group (almost 14% in 2020 and 16% in 2021) (Zagar et al., 2022[51]).

Delays in cancer diagnosis lead to – and the consequences are exacerbated by – delays in medical, surgical or radiotherapeutic treatment, resulting in poorer health outcomes such as higher risk of death (Hanna et al., 2020[52]) and costs. Depending on the type of cancer, a four-week delay in surgery is associated with a 6-8% increase in the risk of death, while a four-week delay in systemic treatment increases the risk of death by between 1% and 28%. For example, in breast cancer, a four-week delay in surgery increases the risk of death by 8%, which grows to 17% for an eight-week delay and 26% for a 12-week delay. Similarly, a four-week delay in colectomy increases the risk of death by 6%, and a four-week delay in cervical cancer adjuvant radiotherapy increases the risk of death by 23% (Hanna et al., 2020[52]). A Canadian model predicts that cancer care disruptions during the COVID-19 pandemic could lead to around 2.0% more cancer deaths in Canada during 2020-30 (Malagón et al., 2022[53]).

Moreover, many cancer patients worldwide are challenged by a cost-of-living crisis. The costs of treatments that were delayed by the pandemic may force patients to make choices such as cutting back on essentials that can influence health outcomes. This issue spans country income levels. People in high-income and middle-income countries can spend over 15% of household income on cancer-related out-of-pocket costs, while the figure in lower-income countries can reach 40% (defined by the World Health Organization (WHO) as the level of catastrophic health expenditure). There is a risk that the exacerbated financial burden started by the pandemic and enhanced by the cost-of-living crisis may push cancer patients away from continuing treatment (Lancet Oncology, 2022[54]).

Amid global recovery from COVID-19, governments and healthcare authorities worldwide must urgently address the challenges in cancer services. Decisive action is imperative, as disrupted referrals and clinical pathways lead to mounting backlogs of undiagnosed patients and overwhelmed healthcare workers. There are high risks of more patients being diagnosed with advanced disease and an increase in avoidable premature deaths. In the United Kingdom, the crisis is described as the most severe in four decades, demanding immediate investments – such as GBP 325 million for diagnostics – to fortify overstretched cancer services (Wilkinson, 2021[55]). In contrast, in some countries, cancer services recovered quickly from the pandemic, resulting in little to no effect of the service delays on cancer outcomes. In the Netherlands, the average two-year probability of survival among patients diagnosed during the pandemic (2020-21) was 76%, which is 1% higher than for patients diagnosed before the pandemic (2015-19). While a long-term negative effect cannot be ruled out, it is unlikely given the strong correlation between short- and long-term cancer survival (IKNL, 2023[56]).

2.2. The burden of cancer differs widely within countries between regions and population subgroups

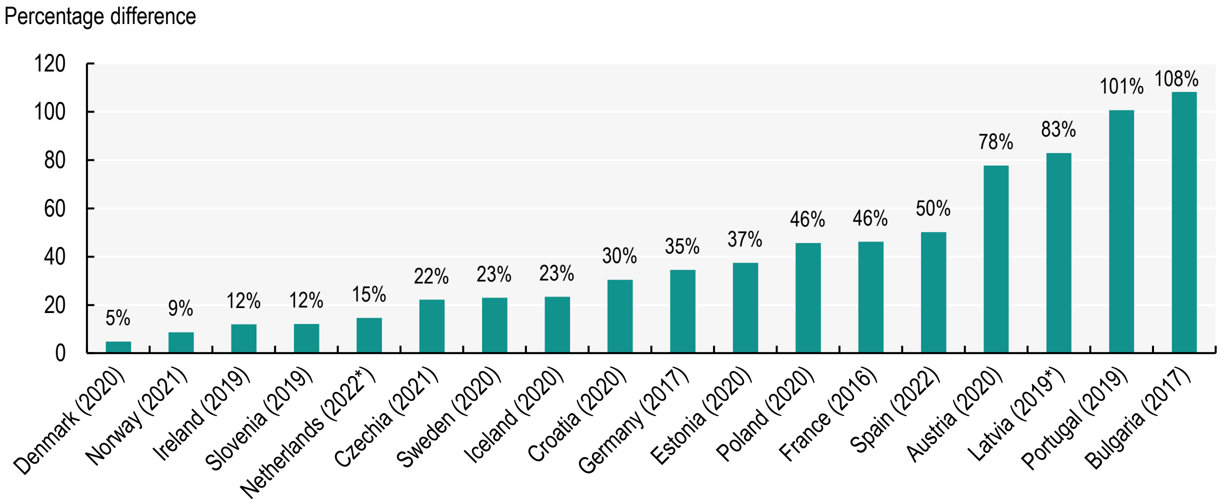
2.2.1. Regions in the same country often have vastly different cancer burdens

> *Cancer incidence rates in Bulgaria, Portugal, Latvia and Austria vary markedly between regions*

Evaluating patterns of cancer incidence between regions or other geographical areas enables policy makers to examine how the cancer burden varies within a country, helping to improve understanding of the causes and risks associated with cancer. Highlighting differences between geographical areas helps in developing appropriate policy options. In 2023, 18 EU+2 countries provided age-standardised cancer incidence rates by region. Figure 2.6 illustrates the percentage difference between the region with the highest and lowest incidence rates in each. Geographical variation was most pronounced in Bulgaria, Portugal, Latvia and Austria, with regional variation in incidence rates of more than 50%. Denmark and Norway had the lowest variation in incidence rates. Geographical disparities in cancer incidence reflect variations in the prevalence of cancer risk factors – such as behavioural and environmental factors (see Chapter 3), and social and economic disadvantage (at both individual and ecological levels) – but are also partly determined by access to cancer screening programmes (see Chapter 4).

Figure 2.6. Cancer incidence rates within a country differ between regions

Percentage difference between regions with the highest and lowest cancer incidence rates, latest year



Notes: Data are not directly comparable between EU+2 countries due to different methodologies and years of observation. For Denmark, Norway, Ireland, Sweden, Iceland, Croatia, Germany, Czechia and Bulgaria, an average of the regional differences for men and women was used. Other countries provided a measure for the total population. For Czechia, the regional incidence data only consider breast cancer for women and prostate cancer for men. * Provisional data.
Source: 2023 OECD Policy Survey on Cancer Care Performance.

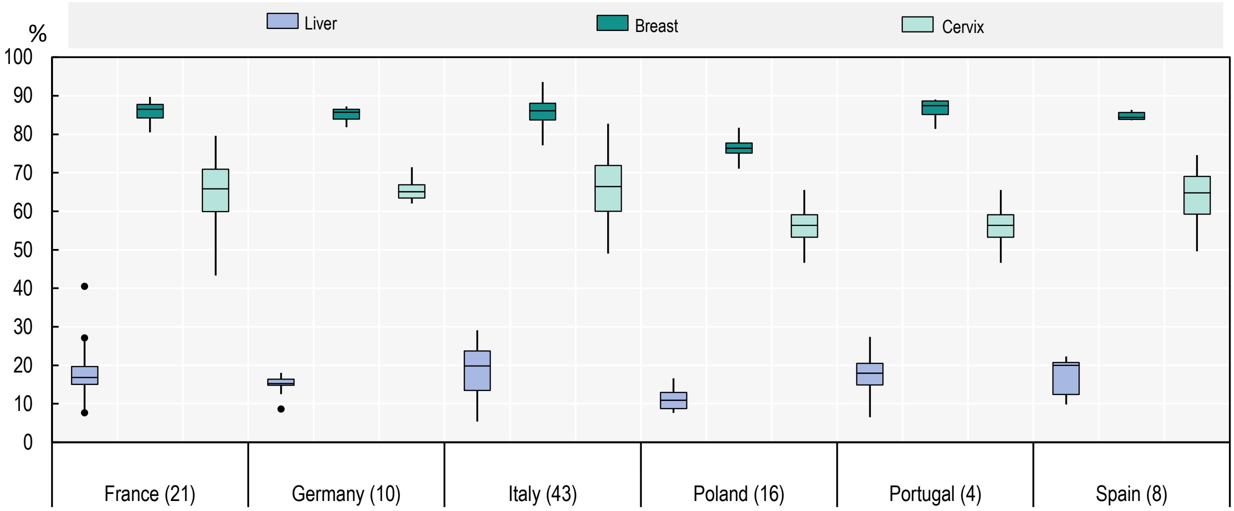
Regional differences in survival probabilities offer opportunities to target intervention

In the CONCORD-3 study, regional variations in five-year net survival probabilities are presented for many cancers in 22 countries (Allemani et al., 2018[8]). For example, for cancers in adults, Portugal has 4 registries (100% population coverage), while Poland has 16 registries (also 100% coverage). Spain provided data from 8 registries (20% coverage), Germany from 10 registries (37% coverage), France from 21 registries (22% coverage) and Italy from 43 registries (58% coverage).

These differences affect the range of variation between registries, and limit the comparability and interpretation of the data. With these limitations in mind, the regional variations in survival probabilities nevertheless offer opportunities for policy makers to use these variations to target interventions.

Regional variations in survival estimates for selected countries are presented in Figure 2.7: each box-plot shows the range of survival estimates among all cancer registries for which suitable estimates could be obtained, for patients diagnosed with liver, breast and cervix cancers in each country (France, Germany, Italy, Poland, Portugal and Spain). The number of registries included is shown in parentheses. The horizontal line inside each box represents the median survival estimate among all contributing registries (50th centile). The rectangular box covers the inter-quartile range (IQR) between the lower and upper quartiles (25th and 75th centiles). The extreme limits of the box-plot are 1.5*IQR below the lower quartile and 1.5*IQR above the upper quartile. Dots indicate “outlier” values outside this range. Overall, larger within-country differences in survival are found for liver and cervical cancer.

Figure 2.7. The range of age-standardised five-year net survival estimates in six countries for patients diagnosed during 2010-14 is wide



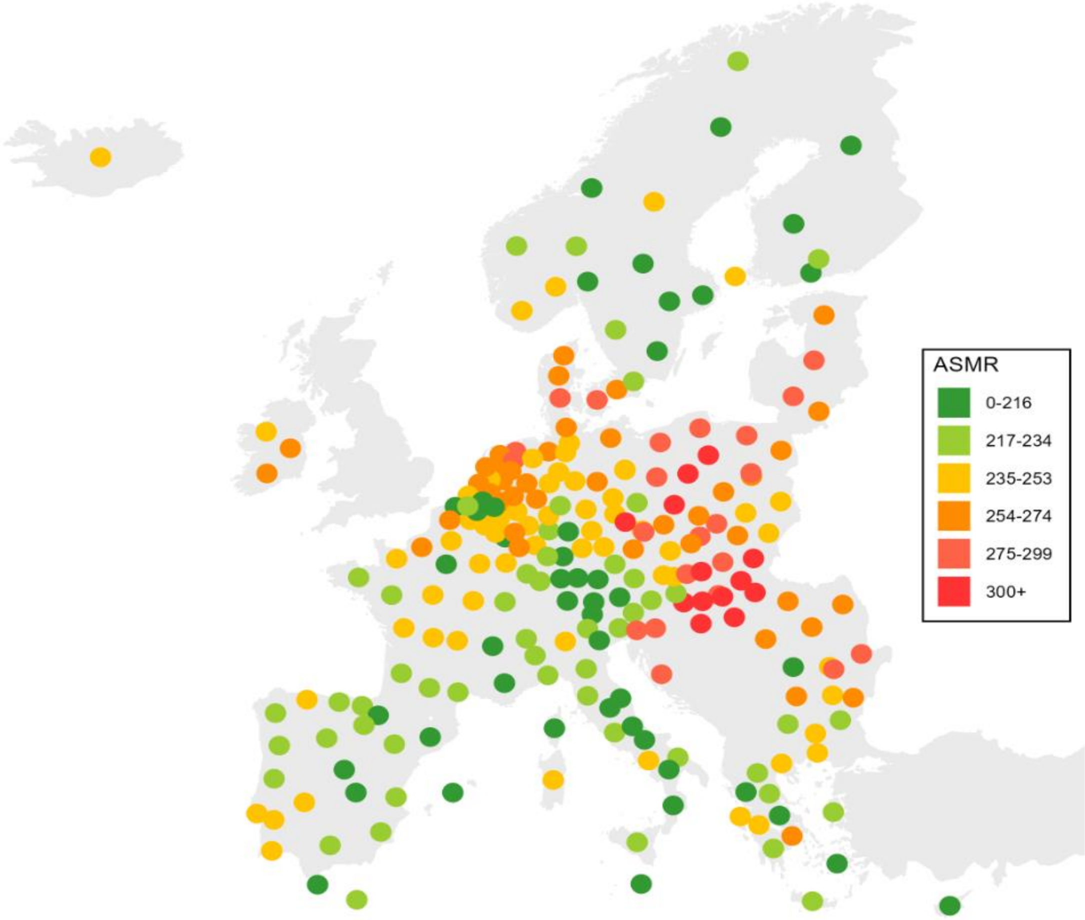
Notes: Outliers identified using Tukey's rule (below $Q1 - 1.5 * IQR$ or above $Q3 + 1.5 * IQR$). Survival estimates considered less reliable by CONCORD-3 were excluded.
Source: Allemani, C. et al. (2018[8]), "Global surveillance of trends in cancer survival 2000-14 (CONCORD-3): Analysis of individual records for 37 513 025 patients diagnosed with one of 18 cancers from 322 population-based registries in 71 countries", https://doi.org/10.1016/s0140-6736(17)33326-3.

Cancer mortality rates vary by up to 37% between regions within a country

The large geographical disparities in cancer incidence and survival are consistent when considering cancer mortality rates by European NUTS2 regions (Figure 2.8). The largest within-country differences in overall cancer mortality (excluding outermost regions as defined by the EU[4]) can be found in Romania, where Bucuresti-Ilfov had 37% higher cancer mortality rates than Sud-Vest Oltenia in 2020. There were also large regional disparities in overall cancer mortality in Poland, France, Spain and Germany, with at least a 30% variation in mortality rates. By contrast, Slovenia, Ireland, the Slovak Republic and Lithuania had smaller geographical disparities in cancer mortality in 2020. As shown in Table 2.2, the map shows a clear disadvantage in Central and Eastern European countries, which have the highest cancer mortality rates, while rates are lower in the Nordic countries.

Figure 2.8. Cancer death rates vary significantly by region in Romania, Poland, France, Spain and Germany

Age-standardised cancer mortality rate per 100 000 population by NUTS2 region, 2020



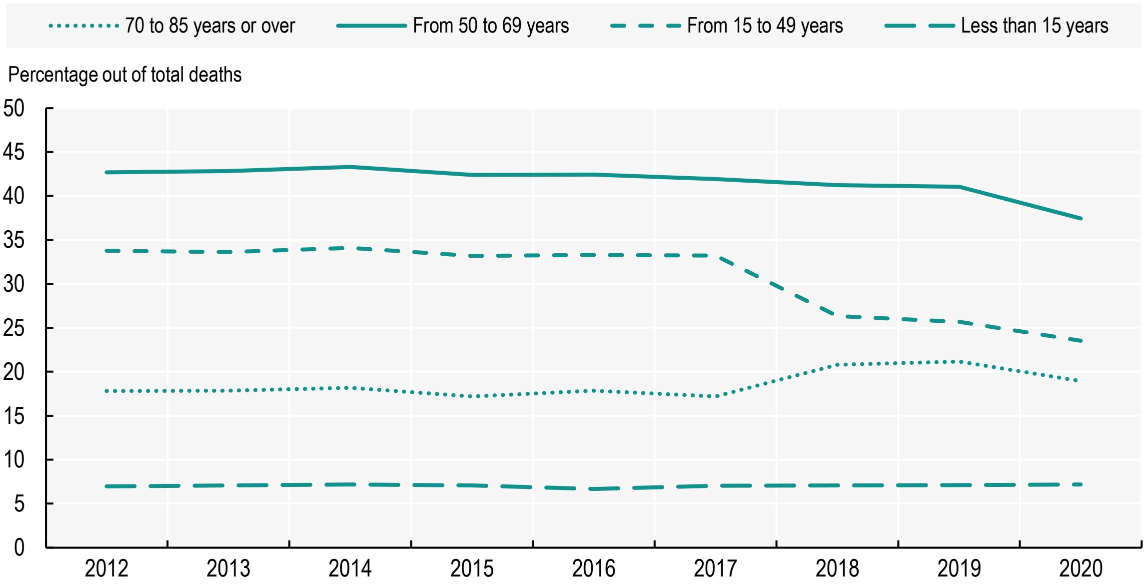
Note: The map is based on cancer mortality rates in 2020. In Iceland, the 2020 mortality rate is a five-year rolling average (2016-20).
Source: Eurostat (2023[57]), Causes of Death – Standardised Death Rate by NUTS 2 Region of Residence, https://ec.europa.eu/eurostat/databrowser/view/HLTH_CD_ASDR2__custom_6414996/default/table.

2.2.2. The proportion of deaths attributable to cancer is highest among the population aged 50-69

It is estimated that nine out of ten new cancers in the 29 EU+2 countries in 2022 occurred among people aged over 50. This trend is consistent around the globe, with cancer cases and cancer deaths in this age group accounting for more than 85% of the cancer burden (Lin et al., 2021[58]).

However, the proportion of all deaths attributed to cancer is higher in the group aged 50-69: 37% of all deaths among this age group were attributable to cancer in the 29 EU+2 countries in 2020, compared to 19% among those aged 70-85 and over (Figure 2.9). Among children (aged less than 15 years), cancer represented 7% of all deaths. This highlights the need to prevent cancer for middle-aged population groups and to identify the disease at an earlier stage.

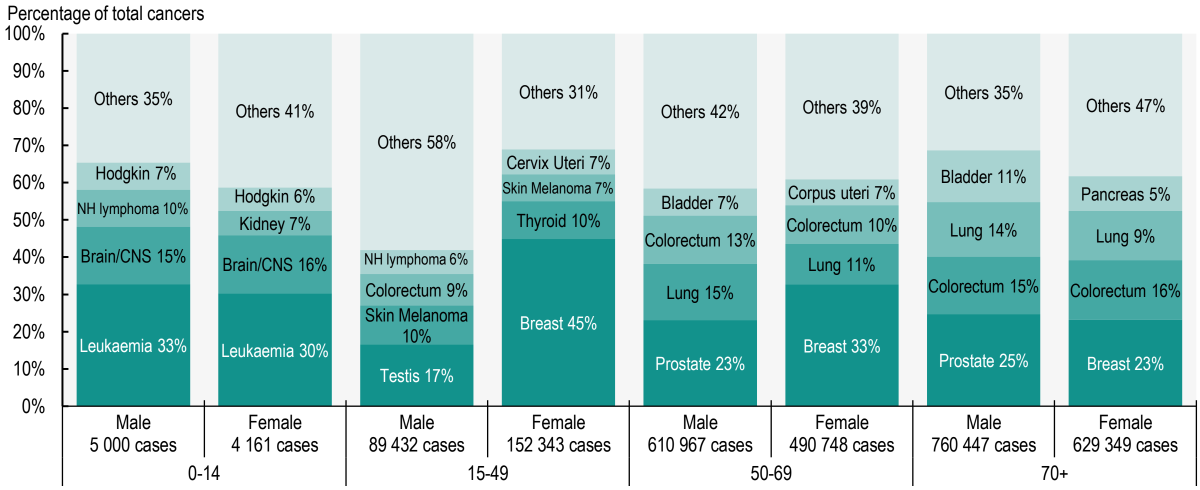
Figure 2.9. The share of cancer deaths among all deaths is highest among the 50-69 age group



Note: The graph shows the total number of cancer deaths divided by the total number of deaths per age group in EU+2 countries.
Source: Eurostat (2023[2]), Causes of Death – Deaths by Country of Residence and Occurrence, https://ec.europa.eu/eurostat/databrowser/view/HLTH_CD_ARO__custom_6537139/default/table.

The most common cancers vary by age group in the EU27, highlighting the need for age-appropriate awareness, prevention and early detection programmes (see Chapters 3 and 4). Leukaemia is the most common malignancy in children (aged less than 15 years), accounting for around 33% of new malignancies among boys and 30% among girls (Figure 2.10). Among young adults (15-49 years), testicular cancer and skin melanoma are the most common new cancers in men, while breast and thyroid cancers are the most common in women. According to ECIS data (2023[1]), up to 83% of testicular cancers arise in young adult men, and 18% of breast cancers in young adult women. Cervical cancers are also common among women in the same age group (36% of cervical cancers are detected in women aged 15-49), necessitating amplified awareness and effective screening strategies (ECIS, 2023[1]). For adults aged 50-69, cancers of the breast, prostate and lung are the most common. From the age of 70, prostate and breast cancers continue to dominate, followed closely by colorectal and lung cancers.

Figure 2.10. The most common cancers vary by age group



Notes: Data relate to all cancer sites except non-melanoma skin cancer. Panels show the proportion of all new cancer cases estimated in 2022 in the EU27 by age at diagnosis. Lung cancer includes trachea and bronchus. CNS stands for central nervous system; NH lymphoma stands for Non-Hodgkin lymphoma; Hodgkin refers to Hodgkin disease (Hodgkin lymphoma).
Source: ECIS (2023[1]), *European Cancer Information System*, https://ecis.jrc.ec.europa.eu (accessed on 27 April 2023).

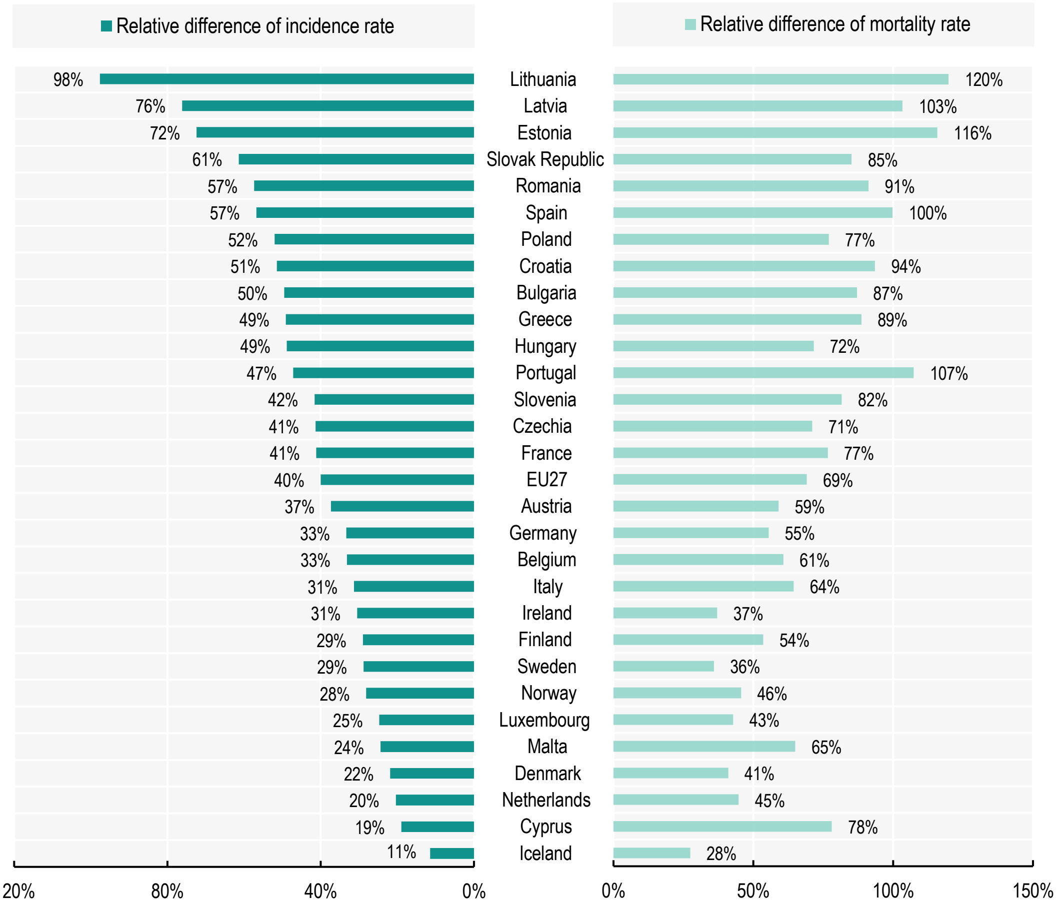
2.2.3. Men have a higher cancer burden than women in all EU+2 countries

Men were more likely to be diagnosed with cancer in 2022 (see also Table 2.1). Across the EU27, cancer incidence rates were 40% higher among men than women, with incidence for men estimated at 684 per 100 000 compared to 488 per 100 000 for women. Incidence was higher in 2022 for men than for women in all age groups, apart from those aged 15-49. Among young adults, estimated cancer diagnoses were substantially higher for women, with incidence estimated at 156.5 per 100 000 women aged 15-49 compared to 90.8 per 100 000 men of this age. Furthermore, the difference in expected age-adjusted incidence rates between the sexes in 2022 was slightly less than it was in 2020 (42%). This is because cancer incidence was expected to remain unchanged among men, while it was expected to increase by 1% among women between 2020 and 2022.

Similarly, in 2020, cancer mortality in the EU27 was 69% higher among men than women (Figure 2.11). While the gender gap in cancer mortality was still prominent, it had steadily decreased since 2010, when it stood at 84% (Eurostat, 2023[2]). Countries with the highest gender gaps in cancer mortality were the Baltic countries (Lithuania, Latvia, Estonia), Portugal and Spain. Some Nordic countries (Iceland, Denmark and Sweden) and Ireland had the smallest gender gaps among EU+2 countries.

Figure 2.11. Men are more likely to be diagnosed with and die from cancer

Relative difference between men and women (%), estimated cancer incidence in 2022 and observed cancer mortality in 2020



Notes: Estimated national age-standardised rates (European new) per 100 000 population. Incidence estimates were created before the COVID-19 pandemic, based on incidence trends from previous years, and may differ from observed rates in more recent years. Incidence rates are calculated for all cancers except non-melanoma skin cancer, while mortality rates correspond to all malignant neoplasms. The EU27 average for mortality rate is calculated as a population-weighted average.
Source: Incidence data from ECIS (2023[1]), *European Cancer Information System*, https://ecis.jrc.ec.europa.eu (accessed on 27 April 2023); mortality data from Eurostat (2023[2]), Causes of Death – Deaths by Country of Residence and Occurrence, https://ec.europa.eu/eurostat/databrowser/view/HLTH_CD_ARO__custom_6537139/default/table.

2.2.4. The burden of cancer falls disproportionately on socio-economically disadvantaged groups

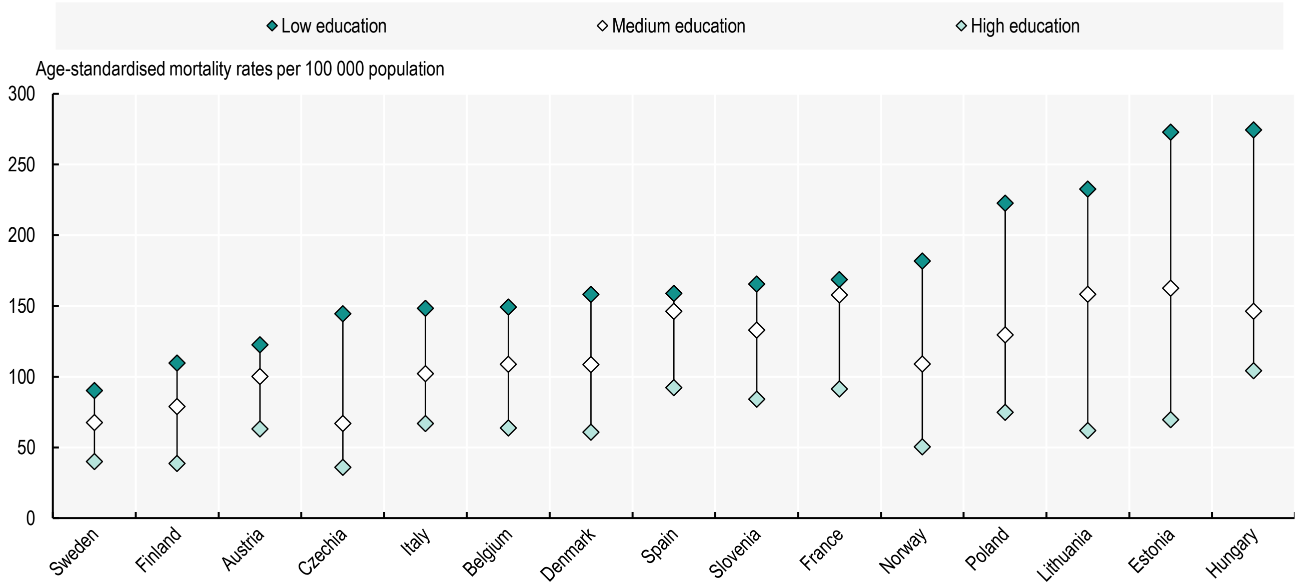
Education-related inequalities in cancer mortality are higher in Baltic, Central and Eastern European countries

Socio-economic inequalities in the cancer burden have been identified in several EU+2 countries (Vaccarella et al., 2023[59]; Launoy, Zadnik and Coleman, 2021[60]). Systematic differences in cancer incidence, survival and mortality are observed between social groups, most often assessed on the basis of education levels, income levels, ethnicity or migration background.

A recent study of 18 European countries confirmed that people with lower education levels diagnosed during 1990-2015 had higher mortality rates for nearly all cancer types than their more educated counterparts (Vaccarella et al., 2023[59]). For total cancer, the age-standardised mortality rates in men were more than twice as high among those in lower than higher education groups in Czechia, Estonia, Hungary and Poland. Overall, the analyses show that education-related inequalities were generally higher in Baltic, Central and Eastern European countries and smaller in Southern Europe. Among women, the largest inequalities in cancer mortality were found in Nordic countries.

Inequalities are especially notable for tobacco-related and infection-related cancers. Preliminary findings from the EUCanIneq study, which aims to develop relevant indicators of socio-economic inequality in cancer mortality in the EU as part of the European Cancer Inequalities Registry, shows that lung cancer mortality rates were 2.6 times as high among men with lower than higher levels of education, and 1.7 times as high among women with lower than higher levels of education. However, the magnitude of inequalities varied significantly between countries. For men, the net difference in all-cancer mortality rates per 100 000 population between those with lower and higher education levels varied widely, ranging from 50 in Sweden to 203 in Estonia (Figure 2.12). Among women, the difference between education groups was highest in Denmark (102) and Norway (108).

Figure 2.12. Lung cancer mortality rates among men vary with education level in all countries



Note: Caution is recommended when interpreting results, as the data are based on predictions for 2015-19, with different methodology across countries and varying level of population coverage.
Source: Preliminary findings from the EUCanIneq study.

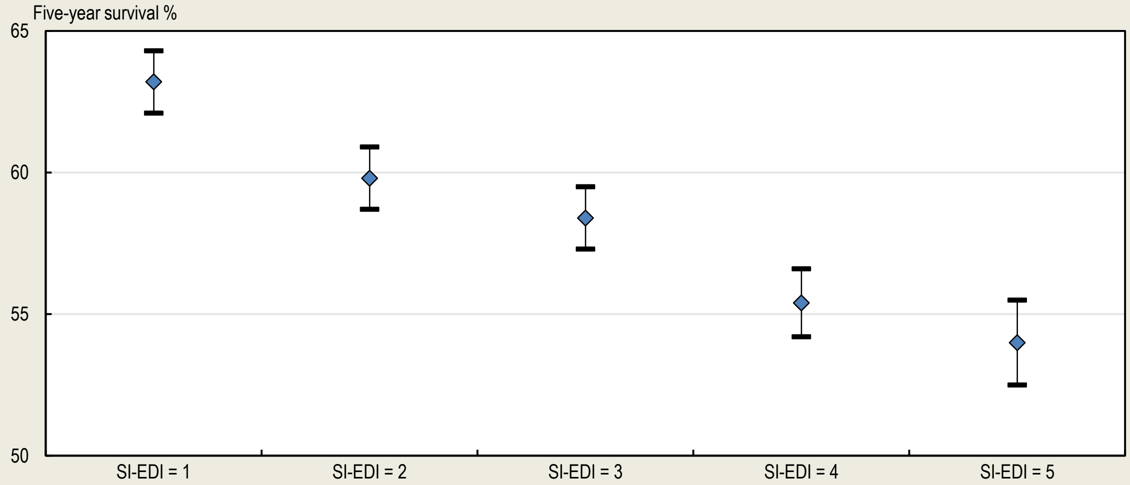
A national study in Italy also showed that, in virtually all regions, cancer mortality was higher among those with lower education levels than among those with higher education levels in 2012-14, for both men and women (Petrelli et al., 2019[61]).

A clear social gradient in cancer survival has also been observed in several countries. In Slovenia, Ireland and Germany, people living in more deprived areas have consistently lower five-year survival probabilities than those living in less deprived areas (Box 2.3).

Box 2.3. National studies provide evidence on the association between deprivation level and cancer survival – examples from Slovenia, Ireland and Germany

In Slovenia, the European Deprivation Index (a composite measure of socio-economic environments based on education, employment status and household composition, among other variables) has been associated with survival trend (Figure 2.13). Survival for all cancer sites was considerably higher for the more affluent population diagnosed in 2014-18 than for patients from more deprived groups. The five-year survival estimate for all cancer combined was 9 percentage points higher in the most affluent (63%) than the most deprived (54%) population group.

Figure 2.13. The five-year net survival estimate is significantly higher in the least socio-economically deprived group in Slovenia

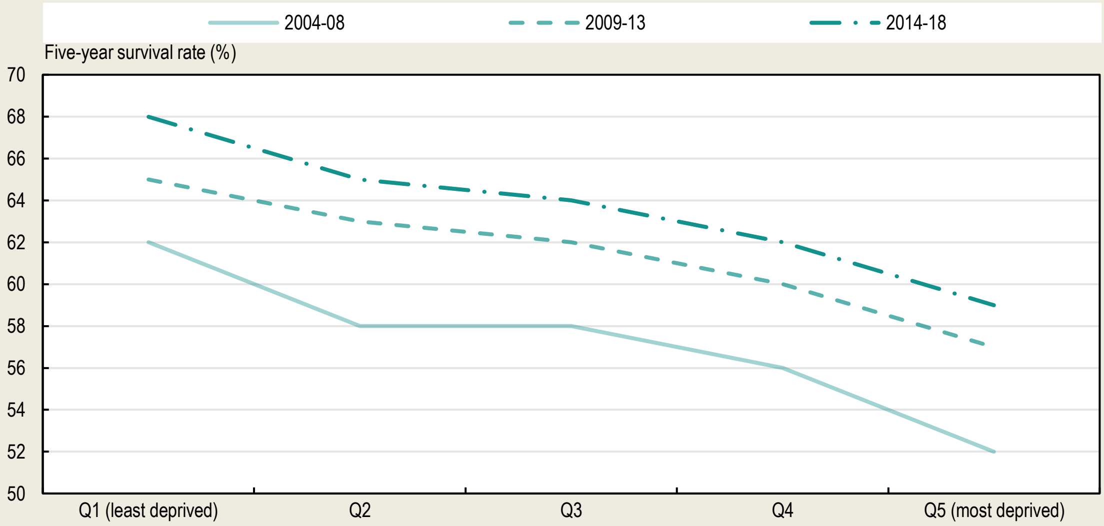


Notes: Shows 95% confidence interval. All adult cancer patients diagnosed between 2014 and 2018. SI-EDI is the Slovenian version of the European Deprivation Index (EDI) which is an index of relative deprivation. SI-EDI = 1 is the most affluent group and SI-EDI = 5 is the most deprived group.
Source: Zadnik, V. et al. (2022[62]), "Cancer patients' survival according to socioeconomic environment in a high-income country with universal health coverage", https://doi.org/10.3390/cancers14071620.

A recent study in Germany examined five-year survival probabilities for patients diagnosed during 2012-14 using the German Index of Multiple Deprivation. It found that survival probabilities were significantly higher in the most affluent quintile than in the most deprived quintile for 17 of 25 cancers, and for all cancer combined (with an average deprivation gap of 2.6 percentage points) (Finke et al., 2021[63]).

Similar gaps are seen in Ireland (Figure 2.14), where the five-year survival estimate for invasive cancers was 68% among those in the most affluent quintile compared with 59% among those in the most deprived quintile for cancers diagnosed during 2014-18. While survival estimates have improved over time for all deprivation levels, a deprivation gap in five-year survival of 8-10 percentage points persists between the most and least deprived groups (Bambury et al., 2023[64]).

Figure 2.14. Cause-specific five-year survival estimates for invasive cancer vary by deprivation quintile and diagnosis period in Ireland



Note: Excludes non-melanoma skin cancer; both sexes combined.
Source: Bambury, N. et al. (2023[64]), *Cancer Inequalities in Ireland by Deprivation, 2004-2018: A National Cancer Registry report*, NCRI, Cork..

Among socially disadvantaged populations (those on lower income or with fewer years of education) or those living in more economically deprived areas, a handful of studies have shown higher incidence of various cancers in European countries. These include lung cancer (e.g. in Denmark, France, Slovenia and the United Kingdom (England and Scotland)), cervical cancer (e.g. in Denmark, England (United Kingdom) and France), oesophagus (e.g. in Denmark, France and Slovenia) and lip, oral cavity and pharynx (e.g. in Denmark and France) (Dalton et al., 2008[65]; Bryere et al., 2014[66]; Bryere et al., 2018[67]; Derette et al., 2022[68]; Lokar, Zagar and Zadnik, 2019[69]; Shack et al., 2008[70]; Tweed et al., 2018[71]). In France, socially disadvantaged men have higher incidence rates of larynx, pancreas and bladder cancers, and the relative risk between the lowest and highest socio-economic groups can reach 1.9 for cancers of the lip, oral cavity and pharynx (Bryere et al., 2014[66]; Bryere et al., 2018[67]). A higher incidence of head and neck cancer among disadvantaged groups has been reported in Slovenia (Lokar, Zagar and Zadnik, 2019[69]).

Conversely, for some cancers, there is a reverse social gradient. These include prostate cancer (e.g. in Denmark, France, Scotland (United Kingdom) and Slovenia), breast cancer (e.g. in Denmark, France, Ireland and the United Kingdom (England and Scotland)) and malignant melanoma (e.g. in England (United Kingdom), France, Denmark, Ireland and Slovenia) (Dalton et al., 2008[65]; Bryere et al., 2014[66]; Bryere et al., 2018[67]; Lokar, Zagar and Zadnik, 2019[69]; Tweed et al., 2018[71]; Shack et al., 2008[70]; Bambury et al., 2023[64]). A reverse social gradient in breast cancer incidence can be explained by several factors, including differences in hormonal patterns, childbearing practice or other biological factors.

Beyond differences in access to healthcare and cancer treatment, possible explanations for the relationship between cancer mortality rates and deprivation level are health behaviour differences and higher environmental exposure to risk factors. Smoking behaviour, diet and physical activity vary between socio-economic groups (see Chapter 3). Participation in screening programmes also plays a role in the differences in mortality rates. Individuals from lower socio-economic groups are less likely to participate in screening programmes (Chapter 4), leading to later diagnosis and higher mortality (Poiseuil et al., 2023[72]).

A healthy migrant effect can be observed in many EU+2 countries

Because of a lack of information on ethnicity, nationality or country of birth in many cancer registries, there is a crucial gap in research on inequalities in cancer outcomes by ethnicity or migration status. In several EU+2 countries, studies suggest a lower risk of cancer or cancer mortality for foreign-born people compared to native-born people. In Denmark, Finland, Iceland and Norway, non-Western immigrant women have a lower risk than the native-born population to develop breast (-29%), colorectal (-28%) and lung cancer (-45%) initially after migration; however, the likelihood increases with the length of stay in the host country (Lamminmäki et al., 2023[73]). They also have a lower risk of dying from breast (-36%), colorectal (-34%) and lung cancer (-49%) than native women. Similar findings have been shown in Spain, where the risk of premature cancer mortality (after controlling for individual characteristics) is lower among migrants than natives, but the advantage decreases with increasing length of residence in the host country (Grande, Garcia-Gonzalez and Stanek, 2023[74]). These results corroborate the so-called “healthy migrant effect”, which suggests that migrants are often in better health than the native-born population on arrival in the host country, but that their health deteriorates with length of residence. This worsening health status over time may occur as a result of lifestyle changes, wherein migrants change from more traditional to Westernised lifestyles (such as by increasing smoking rates, gaining excess body weight and changing to less healthy diets) and become more sedentary (Labree et al., 2011[75]). In addition, challenges in access to healthcare for migrants – including cost, language and cultural barriers, poor health literacy and discrimination – may all contribute to the decline in health status (Bradby, Hamed and Lebano, 2019[76]). Low socio-economic status and weaker social networks may also contribute to the worsening of migrants’ health status (Berchet and Jusot, 2012[77]).

Data from the Survey of Health, Ageing and Retirement in Europe (waves 4 to 8) – which inquires whether people currently have a cancer diagnosis – also suggest a “healthy migrant effect” in countries with available data. Controlling for all core individual characteristics and country-specific effects, the analysis confirms the negative association between citizenship and self-reported cancer diagnosis (Table 2.4). Pooled estimations suggest that non-citizen populations are less likely to report a cancer diagnosis than citizens of the country of residence. This may be because non-citizen populations have less access to cancer diagnosis services than citizen populations (as shown in Chapter 4). The analysis also points to the importance of income: in many countries, people with higher income are less likely to report a cancer diagnosis than people on lower income. On the other hand, people with higher education are more likely to report cancer diagnoses, which may be because they are more likely to participate in screening programmes (as shown in Chapter 4).

Table 2.4. Non-citizen populations are less likely to report having a cancer diagnosis in EU+2 countries

Individual characteristics	Likelihood of reporting a cancer diagnosis	
Controls	Age, sex, household	All demographic, household, socio-economic and lifestyle characteristics
Older ages compared to younger ages	↑ (***)	↑ (***)
Women compared to men	↓ (***)	↓ (***)
Non-citizens compared to citizens	↓ (**)	↓ (***)
Rural areas compared to urban areas	↓ (*)	↓ (NS)
Highest income quartile compared to lowest quartile		↓(**)
Highest education level compared to lowest level		↑ (***)

Notes: Probit estimation with N = 139 551 longitudinal observations of 50+ individuals living in a private household in 20 countries. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, NS stands for non-significant result. An up arrow indicates positive marginal effects, and a down arrow indicates negative marginal effects (for example, non-citizen populations have a lower likelihood of reporting a cancer diagnosis than citizen populations).
Source: The Survey of Health, Ageing and Retirement in Europe, waves 4, 5, 6, 7 and 8.

Outside the EU27, in the United Kingdom, a recent analysis showed that Asian and Black people have lower cancer incidence rates for most cancers than White people (Cancer Research UK, 2022[78]), with significantly lower risk for melanoma of the skin and smoking-related cancers. These differences may be explained by genetic and biological factors (such as skin susceptibility) and ultraviolet exposure behaviours for melanoma risk, but also by preventable risk factors such as smoking, overweight and obesity rates, which are often higher among White people than other ethnic groups.

Nevertheless, given the higher prevalence of infection-driven cancer risks among migrants and ethnic minority groups, as well as reduced access to prevention and other healthcare services, and exposure to unhealthy environments in host countries (including air pollution, nutrition and physical activity challenges, among others), the health risks faced by migrant populations in Europe warrant monitoring (Chapter 3). More research is needed to monitor inequalities in cancer risk and survival probabilities by migration status and ethnicity. Data on race and place of birth would need to be captured routinely by cancer registries, but recording of ethnicity is not permitted in some countries (e.g. France and Germany). Analysis of such data would help to improve understanding of the differences between population groups, monitor trends in inequalities and inform targeted policy to improve access to prevention, early diagnosis and treatment.

2.3. Cancer care policies are converging in EU+2 countries

2.3.1. Europe's Beating Cancer Plan defines an overarching strategic vision to help the EU27 tackle cancer

Officially launched in February 2021 by the European Commission, Europe's Beating Cancer Plan is the EU's response to the cancer burden. The main objectives of this comprehensive initiative are to reduce the burden of cancer by focusing on prevention, early detection, diagnosis and treatment, and to improve the quality of life of cancer patients and survivors. The plan comprises eight key components that address various aspects of cancer care. First, it emphasises primary prevention by promoting healthier lifestyles, including tobacco control, improved nutrition and increased physical activity. Second, it aims to enhance cancer screening and early detection programmes to ensure timely diagnosis and treatment. The plan also focuses on improving access to affordable, high-quality cancer care for all patients, with a particular emphasis on reducing inequalities in treatment and improving cancer patients' quality of life. Additionally, it promotes research and innovation in cancer prevention and treatment, fostering collaboration among EU Member States and encouraging the development of innovative therapies and technologies. Finally, the plan puts a special focus on childhood cancer.

The plan is supported by ten flagship initiatives and various actions planned between 2021 and 2030 (European Commission, 2022[4]). These include establishment of a European Cancer Imaging Initiative to improve the quality and accessibility of imaging technologies for cancer diagnosis, adoption of the Regulation on Health Technology Assessment, publication of the EU Country Cancer Profiles (OECD, 2023[10]) of the European Cancer Inequalities Registry, and adoption of the 2022 recommendation of the European Council on cancer screening. Europe's Beating Cancer Plan has facilitated exchange of best practices among Member States and encouraged collaboration between stakeholders, including patients, healthcare professionals and research institutions. In addition, the EU's Cancer Mission is another key effort to provide better understanding of cancer, to facilitate earlier diagnosis and optimisation of treatment, and to improve cancer patients' quality of life. The Mission is supporting Europe's Beating Cancer Plan by enabling and accelerating research and dialogue with both Member States and stakeholders.

2.3.2. National cancer plans have been implemented in 25 EU+2 countries

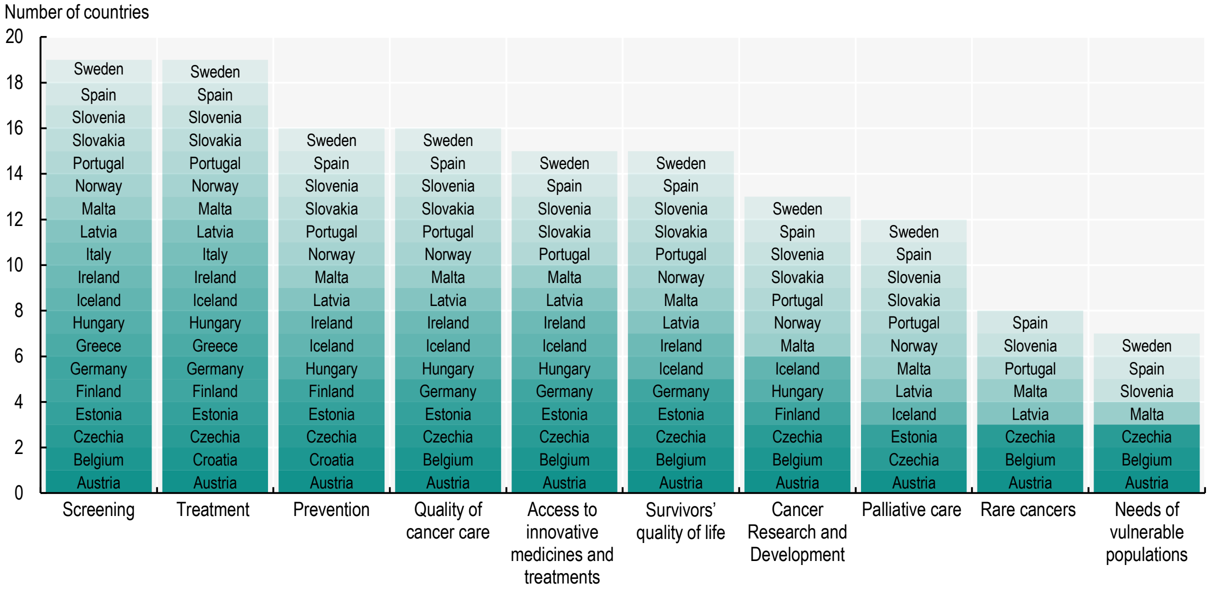
The European Partnership for Action Against Cancer (EPAAC, 2011[79]) played a significant role in promoting the development and implementation of national cancer plans within the EU. It created a collaborative platform for Member States to exchange knowledge, share best practices and align their efforts in addressing cancer. This work resulted in the European Guide for Quality National Cancer Control Programmes (Albreht et al., 2014[80]).

In 2009, the EU agreed that Member States would each implement an integrated national cancer plan by 2013 (European Commission, 2009[81]). However, in 2023, only 25 of the 29 EU+2 countries have effectively put one in place. The Netherlands, Finland, Bulgaria and Greece have not yet implemented a national cancer plan, but the situation in each of these four countries is substantially different. In the Netherlands, the government invests in initiatives that are aligned with Europe's Beating Cancer Plan, and a Dutch cancer agenda is co-ordinated by the Netherlands Cancer Collective (organised by the Dutch Cancer Society, the Netherlands Comprehensive Cancer Organisation and the Netherlands Patient Association). This is supported by a comprehensive national cancer registry and a robust clinical auditing system (OECD, 2023[82]). In Finland, the cancer agenda is managed by government initiatives and several other stakeholders, including the Cancer Society of Finland and the National Cancer Centre, which serves as a centre of cancer expertise (OECD, 2023[38]). Despite an organised cancer strategy, organisations in these countries – such as the Cancer Survivorship Care Taskforce in the Netherlands – are lobbying for a national cancer plan to improve the organisation of cancer care. Bulgaria is in the process of approving and implementing a national cancer strategy that will follow the guidelines established by Europe's Beating Cancer Plan. The national cancer plan was approved by the Council of Ministers in January 2023, but implementation remains a challenge. Coverage of national screening programmes is low, and the data infrastructure to monitor the burden of cancer and outcomes of care is not fully operational, resulting in structural challenges to using cancer and screening registries (OECD, 2023[83]). Greece halted its efforts to create a national cancer care plan in 2012 because of budgetary cuts due to austerity measures, and comprehensive cancer screening programmes have not been developed. The lack of an organised cancer strategy has affected the country's capacity to prioritise, organise and fund programmes (OECD, 2023[84]).

National cancer care plans in EU+2 countries follow the general guidelines of the European Guide for Quality National Cancer Control Programmes (Albreht et al., 2014[80]), and are aligned with Europe's Beating Cancer Plan. However, differences remain. Figure 2.15 presents the ten most commonly prioritised areas in the current national cancer control programme, national health policies or strategies on cancer care, as noted by experts in 21 EU+2 countries. Most countries prioritised screening (19), treatment (19), prevention (17) and the quality of cancer care (16). Rare cancers were only prioritised in nine countries, and the needs of vulnerable populations in only seven countries, despite the proven relationship between deprivation and the cancer burden (see Section 2.2.4). Cancer in children, adolescents and young adults was prioritised less frequently, as were cancer networks, digitalisation and health information.

The ten areas prioritised most frequently were all mentioned in Austria, Czechia, Malta, Slovenia and Spain. Portugal and Sweden prioritised nine of these: rare cancers were the exception in Sweden and the needs of vulnerable people were the exception in Portugal. Other countries had a narrower set of top priorities, such as Italy and Greece (screening and treatment) and Croatia (treatment and prevention). This does not mean that the other areas are not addressed in the national cancer plan; rather, these two areas have a more important role in the national strategy.

Figure 2.15. Screening, treatment and prevention are the most commonly prioritised areas in national cancer strategies



Note: Areas prioritised by only one or two countries are not displayed in the graph, including cancer in children, adolescents and young adults; cancer networks; digitalisation and health information; and early diagnosis.
Source: 2023 OECD Policy Survey on Cancer Care Performance and EU Country Cancer Profiles.

2.3.3. National cancer registries have been established in 24 EU+2 countries

Cancer registries in Europe have evolved into indispensable instruments for assessing the cancer burden and facilitating evidence-based decision making in cancer control (Albreht, Kiasuwa and Van den Bulcke, 2017[85]). They have among the best population coverage in the world, with most countries covering 100% of their population (Allemani et al., 2018[8]). In 2014, 19 of the 29 EU+2 countries provided data covering their entire population to the CONCORD-3 study. Five other countries confirmed 100% coverage, via either the 2023 OECD Policy Survey on Cancer Care Performance (Table 2.5) or the IARC (Forman et al., 2014[86]). This leaves only five countries (France, Greece, Italy, Romania, Spain) without a population-based cancer registry covering the entire population. However, the French Senate approved a law supporting the creation of a national cancer registry in June 2023, to be implemented in the short term (Sénat, 2023[87]).

Although most population-based cancer registries in Europe are well equipped for robust cancer surveillance, the scope of information and the extent of data quality and utilisation vary widely between countries. Besides Greece, which lacks a population-based cancer registry, diagnosis data is collected or linked in the cancer registries in at least 26 of the 29 EU+2 countries. The same number of registries has access to population mortality rates. Similarly, cancer stage and survival data are contained or linked in 25 and 26 EU+2 countries respectively, while treatment data are captured by population-based registries in 24 EU+2 countries.

Most registries can link their individual cancer registrations to national data on deaths, but linkage with data from national screening programmes is less common. Screening-detected cancers are flagged in the registries of only 18 EU+2 countries. The timeliness of the data contained in EU+2 countries' cancer registries can also vary significantly between countries. For example, the latest data available for the Slovak Republic are from 2014, while countries like Spain and the Netherlands (provisional) already have 2022 data available.

Expanding the scope of cancer registries holds the potential to yield stronger epidemiological insights and identify factors contributing to disparities in cancer survival and the quality of life for people living with cancer. However, genetic information and patient-reported experiences or outcomes measures (PREMS/PROMS) are only included in 5 cancer registries of the 26 countries that responded to the 2023 OECD Policy Survey on Cancer Care Performance.

Table 2.5. Most EU+2 countries' cancer registries include or can be linked to incidence, stage at diagnosis, treatment and survival data

Population coverage and type of data directly contained or linked in European cancer registries

Country	National coverage	Incidence (new cases)	Screening (Screen detected)	Cancer stage data	Genetic information	Treatment data	Survival data	Patient-reported indicators	Population mortality rate
Austria	Total	Yes	No	Yes	No	Yes	Yes	No	Yes
Belgium	Total	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Bulgaria	Total	Yes	No	Yes	No	Yes	Yes	No	Yes
Croatia	Total	Yes	Yes	Yes	No	Yes	Yes	No	Yes
Cyprus	Total	Yes	No	Yes	No	Yes	Yes	No	Yes
Czechia	Total	Yes	Yes	Yes	No	Yes	Yes	No	Yes
Denmark	Total	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Estonia	Total	Yes	Yes	Yes	No	Yes	Yes	No	Yes
Finland (*)	Total	Yes	Yes	Yes	NA/NC	Yes	Yes	Yes	Yes
France	Partial (23%)	Yes	No	Yes	No	Yes	Yes	No	Yes
Germany	Total	Yes	Yes	Yes	No	Yes	Yes	No	Yes
Greece	No registry	No	No	No	No	No	No	No	No
Hungary	Total	NA/NC	NA/NC	NA/NC	NA/NC	NA/NC	NA/NC	NA/NC	NA/NC
Iceland	Total	Yes	Yes	Yes	No	Yes	Yes	No	Yes
Ireland	Total	Yes	Yes	Yes	No	Yes	Yes	No	Yes
Italy	Partial (70%)	Yes	Yes	Yes	No	Yes	Yes	No	Yes
Latvia	Total	Yes	No	Yes	No	Yes	Yes	No	Yes
Lithuania	Total	Yes	No	Yes	No	No	Yes	No	Yes
Luxembourg	Total	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Malta	Total	Yes	Yes	Yes	No	Yes	Yes	No	Yes
Netherlands	Total	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Norway	Total	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Poland	Total	Yes	Yes	Yes	No	Yes	Yes	No	Yes
Portugal	Total	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Romania	NA/NC	NA/NC	NA/NC	NA/NC	NA/NC	NA/NC	NA/NC	NA/NC	NA/NC
Slovak Republic	Total	Yes	No	Yes	No	Yes	Yes	No	Yes
Slovenia	Total	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Spain	Partial (28%)	Yes	Yes	No	No	No	Yes	No	Yes
Sweden	Total	Yes	No	Yes	No	Yes	Yes	No	Yes

Note: (*) Information for Finland was obtained from Forman et al. (2014[86]) and online from the Cancer Society of Finland (2023[88]). NA/NC stands for Not answered/Not confirmed.
Source: 2023 OECD Policy Survey on Cancer Care Performance; Allemani, C. et al. (2018[8]), "Global surveillance of trends in cancer survival 2000-14 (CONCORD-3): Analysis of individual records for 37 513 025 patients diagnosed with one of 18 cancers from 322 population-based registries in 71 countries", https://doi.org/10.1016/s0140-6736(17)33326-3.

Information contained in EU+2 countries' cancer registries follows the same patterns as those in other OECD countries. In the United States and Canada, for example, information on all the categories except PREMS/PROMS is included. The collection of screening data is a recurrent challenge, as it is missing in Japanese, Costa Rican and Mexican registries as well. New Zealand has the only national cancer registry among OECD countries that presents information in all the categories. Efforts to enhance the quality and standardisation of data collected by cancer registries are ongoing. The European Network of Cancer Registries and the Joint Research Centre (JRC) have collaborated to establish a comprehensive and standardised list of data quality checks for European cancer registries. The publication of the JRC Technical Report in 2014, followed by an updated version in 2018 and its latest publication in 2023 (Martos et al., 2023[89]), represents a significant milestone in this endeavour. In addition, efforts to unlock the benefits of health data for research and improved patient care for rare cancers on a pan-European basis are underway with the IDEA4RC project (begun in 2022), which spans cancer registries, national registries, and biobank data across European healthcare systems.

However, continued efforts are needed to strengthen the integration of screening data; enhance data quality checks; and expand the scope of cancer registries to include survivorship, genetic information and PREMS/PROMS. In addition, expanding the scope of registries to collect or allow linkage to socio-economic data would facilitate better monitoring of cancer inequalities. For example, although a number of countries report national incidence information by region, few do so by socio-economic status or deprivation level (only France, Ireland, Italy, and Sweden).

While Europe's General Data Protection Regulation (GDPR) assisted in ensuring data rights, privacy and patient trust in health data sharing, it has created challenges in data sharing and conducting important individual-level data analyses that could inform decision making (Vukovic et al., 2022[90]). Partly because of this shortcoming, on 3 May 2022, the European Commission introduced a proposal for a regulation known as the European Health Data Space (European Commission, 2022[91]). The main objectives of the draft proposal include empowering individuals with greater digital access and control over their personal health data, establishing standards for electronic medical record systems to enable interoperability, and constructing a coherent framework that governs the secondary use of health data.

2.3.4. Conclusion: High-quality cancer registries are key to supporting policy to improve cancer prevention, early detection and care

The current policy frameworks in place in EU+2 countries under the umbrella of Europe's Beating Cancer Plan and national cancer strategies signify a critical step in confronting the cancer burden. These collaborative efforts are necessary to address growing cancer burden and the significant disparities in cancer survival and mortality discussed in this chapter. The next two chapters will delve into the significant disparities in cancer prevention and screening programmes across different countries and population groups. They will also explore comprehensive and targeted policies aimed at reducing these disparities.

Despite the strides made in cancer policy, critical gaps remain unaddressed. The absence of fully operational registries in Greece and the lack of timeliness and completeness of several cancer registries underscores a dire need for sustained funding and support. One important policy option in the years to come to support research and healthcare improvement will be allocating support for maintaining and developing cancer registries, harmonising standards, and improving interoperability across databases to ensure that essential data on cancer burden and care are both current and actionable.

Comprehensive data from national cancer registries, linked to data from other relevant sources, will be vital in shaping more effective and inclusive strategies to reduce cancer risks, to improve screening and early detection, and to improve survival. Advances in such data linkages will facilitate evaluation of the effectiveness of the healthcare system for cancer patients (Chapter 5) and continuous monitoring of international, regional and socio-economic disparities in cancer care quality indicators. These developments will be essential in reducing the unequal cancer burden in Europe.

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Notes

[1] Potential years of life lost is a summary measure of premature mortality that provides an explicit weighting of deaths occurring at younger ages, which are, a priori, preventable. The calculation sums up deaths occurring at each age and multiplies by the number of remaining life-years up to a selected age limit (75 years for OECD calculations).

[2] Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain and Sweden responded to the 2023 OECD Policy Survey on Cancer Care Performance.

[3] In Belgium, the decrease in cancer incidence is not confirmed using official data published by the Belgian Cancer Registry.

[4] https://www.europarl.europa.eu/factsheets/en/sheet/100/outermost-regions-ors.

3

Preventing cancer: Identifying risk factors and related inequalities

With cancer expected to become the leading cause of death in the EU by 2035, countries are examining opportunities to prevent cancer and decrease its incidence at a population level. This chapter provides an overview of trends in the leading known and modifiable risk factors for cancer, such as tobacco, alcohol, high body weight, unhealthy diet, physical inactivity, environmental risk factors and viral infections such as human papillomavirus and hepatitis B and C. It examines the gaps in prevalence of these risk factors between countries and between socio-economic groups and sexes. Finally, the chapter provides insights into the current practices, policies and programmes countries are implementing to prevent cancer.

Key findings

- Globally in 2019, 50.6% of cancer deaths among men and 36.3% among women were attributable to modifiable risk factors.
- At a population level, the largest risk factor for cancer deaths in the 27 European Union Member States (EU27) plus Iceland and Norway (EU+2 countries) is tobacco, with more than 25% of cancer deaths attributed to it in 2019. Alcohol is the second leading cancer risk factor (6.3% of cancer deaths), followed by dietary risks – such as diets high in red or processed meat and low in fruits and vegetables (6.2%), occupational risks (5.9%), high body mass index (5.7%), high blood sugar (5.6%), air pollution (2.0%), physical inactivity (1.2%) and human papillomavirus (HPV) infection (1.2%).
- Compared to 2011, there has been an improvement in some of the top risk factors for cancer, including a reduction in daily smoking rates and higher rates of HPV vaccination. Prevalence of self-reported daily smoking decreased in all but four of the EU+2 countries in the decade leading to 2021, with a reduction of 30% or more in seven countries. However, the prevalence of overweight and obesity increased by 3% in the EU27 between 2014 and 2019, while consumption of fruit and vegetables remained low, and physical inactivity remained prevalent.
- Variation between countries is high. Average annual alcohol consumption was twice as high in Latvia and Lithuania as in Greece. More than 90% of girls in Iceland, Portugal and Norway received the recommended doses of HPV vaccine to prevent cervical cancer in 2021 – more than double the rates in Bulgaria, France, Luxembourg, Slovenia and Latvia.
- Socio-economic inequalities can be seen in most risk factors, to the detriment of those with lower levels of education or income. In 2019, those with lower levels of education were more likely to report living with overweight and obesity, smoking cigarettes daily, low fruit and vegetable consumption, or physical inactivity. As some risk factors are decreasing more rapidly in groups with higher socio-economic characteristics, inequalities in daily cigarette smoking and low fruit and vegetable consumption appear to be increasing.
- Disparities in behavioural risk factors by gender to the detriment of men are also large – notably for cigarette smoking, alcohol consumption, overweight and obesity, and low fruit and vegetable consumption. In addition, 85% of occupational cancer deaths in 2019 in EU+2 countries were among men (mostly due to exposure to asbestos).
- **Given the persistent inequalities in exposure to risk factors, policies should be selected and designed to reduce gaps between population groups.** Pricing policies such as higher taxation (on tobacco, unhealthy food and alcohol) are effective in reducing demand – particularly among groups with lower socio-economic characteristics – and thus helping to close gaps. Accompanying these with subsidies to increase affordability of healthy food options remains an underutilised avenue to affect nutrition, while tax increases should be linked to inflation to ensure that their impact does not decrease over time.
- **Policies that change the environment can affect behaviours without requiring an active or conscious change.** Comprehensive smoking bans in public spaces and workplaces are an important environmental lever used increasingly by most EU+2 countries, as these restrict opportunities to smoke and reduce exposure to second-hand smoke. Mandated reductions in availability and accessibility of alcohol – such as age restrictions or regulations on outlet density – support lower consumption. Food reformulation helps to make products healthier, although most efforts in place in EU+2 countries are perceived to have limited impact as they are not mandatory. A supportive environment for clean air delivers synergies with increasing physical activity levels through planning that promotes active transport and creation of green spaces.

- **Messages that reach the population should be health-promoting, while restrictions on marketing of unhealthy products can reduce risks.** Countries can affect messages about tobacco, alcohol and nutrition through advertising limitations, product labelling requirements and targeted communication of public health messages. Use of standard, plain packaging with visual warnings for cigarettes has been implemented in nine of the EU+2 countries, and easy-to-understand front-of-pack labelling for food products in 12 countries. Given that population-level health promotion may be more effective among less vulnerable populations (e.g. those with higher education levels or native-born populations), several countries are tailoring communication to engage specific groups with relevant content, in the language and format that suits them, thereby reducing risk factors and improving health literacy.
- **Improving health literacy can help reduce some risk factors for cancer.** However, nearly half of the respondents to the European Health Literacy Population Survey 2019-21 had insufficient levels of health literacy, and those with lower socio-economic characteristics scored lower on average. To reach vulnerable populations, increasing attention is given to the role of healthcare organisations in facilitating understanding and use of health information via training staff on health literacy and communication techniques; dedicating sufficient time to patient communications; providing translated materials; and using plain language and visual materials created in partnership with their target patient populations.
- **As vulnerable groups may be less likely to benefit from measures targeted at the whole population, many countries develop specific interventions adapted to reach at-risk groups.** Using mobile vaccination buses, delivering vaccines in school settings and allowing vaccinations by non-physician healthcare professionals can help HPV vaccination programmes reach people who may be missed in the healthcare system. To prevent transmission of hepatitis B and hepatitis C, most at-risk groups – including migrants, people who inject drugs and men who have sex with men – can be reached with hepatitis B vaccination, harm-reduction programmes and testing and treatment for hepatitis B and C.
- **Co-operation between countries in areas such as taxation, product formulation, advertising and labelling can add to the effectiveness of these measures.** Large differences in tobacco taxation and pricing across countries, and continuous output of new products by the industry reduce the benefits of existing EU-wide tobacco directives. Co-ordination of alcohol taxation or reformulation of food across European borders is limited. In many cases, media transcend borders, and while EU-wide advertising rules restrict alcohol marketing to minors, they do not limit advertising to general audiences. Furthermore, advertising of alcohol and unhealthy food through social media is at best only partially or voluntarily restricted at the country level, while international co-operation on such restrictions is lacking.
- **Policies and interventions to target cancer risk factors must be implemented across various settings where people spend time – in schools, workplaces and healthcare facilities, among others.** Schools are a key setting for reducing disparities in exposure to risk factors, as they can reach and educate students, informing them about risks, and facilitating HPV vaccinations and a healthy food environment. Primary care can connect smokers to cessation support services, conduct screenings and brief interventions on alcohol and reduce overweight and obesity through counselling on nutrition or prescription of physical activity. Some of the most effective evidence-based practices for HPV vaccination involve healthcare providers offering recommendations, reminders and information on safety and effectiveness.
- **An effective approach for addressing each cancer risk factor requires a multi-component policy package tailored to reach its target populations.** Integrated approaches between sectors aid development and implementation of comprehensive and effective policy packages tailored to target populations.

3.1. The impact of risk factors on cancer burden is substantial

Given the high and increasing burden of cancer (Chapter 2), it is important to consider that a large proportion of cancer cases could be prevented through action on modifiable risk factors. This section discusses the leading risk factors for cancer in the 27 European Union Member States (EU27) plus Iceland and Norway (EU+2 countries), using attributable deaths and disability-adjusted life-years (DALYs) to quantify the cancer burden. One DALY represents the loss of the equivalent of one year of full health (Box 3.1). As such, DALYs extend the measures of mortality to include poor health, providing insight into the impact of each risk factor on the population by considering both deaths and the experience of those living with cancer.

3.1.1. Over half of cancer deaths among men and one-third of cancer deaths among women are attributable to modifiable risk factors

Worldwide, 50.6% of cancer deaths among men and 36.3% among women in 2019 were attributable to risk factors, including behavioural, environmental and metabolic risks (GBD 2019 Cancer Risk Factors Collaborators, 2022[1]). The proportion of cancer deaths attributable to risk factors increased globally by 20.4% between 2010 and 2019. Table 3.1 shows the number of cancer deaths in 2019 in EU+2 countries attributed to the leading high-level risk factors for men and women.

Table 3.1. Significant numbers of cancer deaths were attributed to leading risk factors in EU+2 countries in 2019

Category	Tobacco	Alcohol	Dietary risk	Occupational risks	Overweight and obesity	High blood sugar	Air pollution	Physical inactivity	HPV infection (cervical cancer)	**All cancer deaths**
Men	266 398	60 718	46 429	69 733	39 087	41 910	19 191	6 140	N/A	773 124
Women	102 273	25 898	38 463	11 706	39 574	35 126	8 300	9 906	15 931	596 727
Total	368 671	86 616	84 892	81 439	78 661	77 036	27 491	16 046	15 931	1 369 851
Of all cancer deaths, percentage attributed to the risk factor	**26.9%**	**6.3%**	**6.2%**	**5.9%**	**5.7%**	**5.6%**	**2.0%**	**1.2%**	**1.2%**	

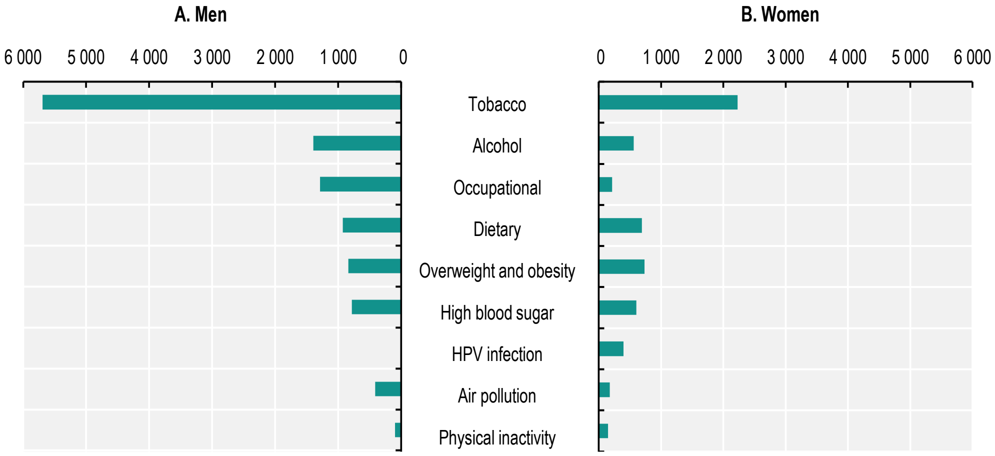
Note: N/A stands for not available. This table refers to estimated deaths due to neoplasms that are attributed to level-2 risk factors as defined by the Institute for Health Metrics and Evaluation (IHME) (see Box 3.1). All cancer deaths include both risk-attributable and non-risk-attributable cancer deaths. Deaths can be attributed to more than one risk factor, and thus the numbers and percentages are not summative. The burden of deaths from HPV infections shown in the table is an underestimate, as it only includes deaths from cervical cancer, while HPV can also cause anal, penile, vaginal, vulval and oropharyngeal cancer.
Source: GBD Compare Data Visualisation (IHME) (2023), http://vizhub.healthdata.org/gbd-compare.

In 2019, the estimated global burden of cancer attributable to all risk factors, measured in DALYs, reached a total of 105 million healthy life-years lost due to cancer, for men and women combined. This figure accounts for approximately 42.0% of all cancer-related DALYs. Figure 3.1 shows the DALYs attributable to each of leading risk factors for cancer in the EU+2, by sex.

Notably, tobacco emerges as the largest risk factor for both sexes, contributing significantly to cancer-related deaths and DALYs, and surpassing other risk factors by a significant margin. For men, other major risk factors include alcohol consumption, occupational and dietary risk, high body mass index (BMI), high blood sugar and exposure to air pollution. For women, tobacco use is followed by high BMI, dietary risk, high blood sugar, alcohol use, HPV infection and occupational risks. Air pollution, insufficient physical activity and other environmental risk factors are also among the top ten risk factors for women, as are other environmental risks, drug use and physical inactivity for men (IHME, 2019[2]). The proportional burdens from deaths and DALYs do not match in all cases. For example, for men, occupational risks were attributed to the second highest number of deaths; however, alcohol came in as the second biggest risk factor for DALYs. This is likely to be influenced by the types of cancer associated with each risk factor.

Figure 3.1. The leading risk factors for cancer burden led to high numbers of DALYs in the EU+2

Age-standardised cancer DALYs (in thousands) for leading cancer risk factors, by sex, 2019



Note: Other risk factors include other environmental risks and drug use for both sexes.
Source: GBD Compare Data Visualisation (IHME) (2023), http://vizhub.healthdata.org/gbd-compare.

Box 3.1. Definitions used in section 3.1

DALY is a measure of overall disease burden, expressed as the loss of an equivalent of one year of full health, combining years lost due to premature mortality and due to living in states of less than full health.

Attributable burden is the reduction in current disease burden that would have been possible if past population exposure had shifted to an alternative or counter-factual distribution of risk exposure. Deaths and DALYs can be attributed to several risk factors at once and are not summative.

Risk factor estimates defined by the IHME model the risk factor attributions (used in Section 3.1):

- Tobacco use includes estimates about smoking (current and former), second-hand smoke (at home, at work and in other public places) and chewing tobacco (use of primary chewing tobacco, non-chew smokeless tobacco and all other smokeless tobacco).
- Alcohol use includes indicators of the proportion of current drinkers, alcohol consumption by current drinkers (in grams per day) and alcohol litres per capita stock, adjusted for the number of tourists in the location, their average length of stay and unrecorded alcohol stock.
- Dietary risk includes factors that have associations with cancer such as diets low in fruit, vegetables, whole grains, milk and fibre, and high in red meat and processed meat. For policy

measures (discussed in Section 3.3), other nutrients with health risks aside from cancer are included as a part of comprehensive efforts to improve diets.

- Occupational risks include exposure to occupational carcinogens, with nearly 90% of deaths and 84% of DALYs in this category attributed to occupational exposure to asbestos.
- Air pollution includes exposure to particulate matter that are 2.5 microns or less in diameter ($PM_{2.5}$), including ambient (outdoor) and household (indoor) exposure.
- Overweight and obesity – called "high BMI" in the Global Burden of Disease Study data – refers to BMI above 25 kg/m^2.
- High blood sugar – called "high fasting plasma glucose" (levels recorded after no eating or drinking for 8 hours) – is associated with several types of cancer through diabetes mellitus. It is defined as any level above the theoretical minimum risk exposure level of 4.8-5.4 mmol/L.
- Physical inactivity includes estimates of physical activity across all domains of life (leisure/recreation, work/household and transport).
- Human papillomavirus (HPV) infection in the cervical area is caused by sexual contact, so in the IHME estimates, all cervical cancer cases are attributed to unsafe sex.

Note: The risk factors addressed in this report were chosen on the basis of the Global Burden of Disease Study 2019. Data on other known factors – e.g.; exposure to sunlight (ultraviolet radiation), infection with *Helicobacter pylori* and other well-known risks – are not available.
Source: For more detailed methodology, refer to the supplementary material in GBD 2019 Cancer Risk Factors Collaborators (2022[1]), www.thelancet.com/journals/lancet/article/PIIS0140-6736(22)01438-6/fulltext.

3.1.2. Nearly 27% of all cancer deaths were attributed to tobacco use and 6.3% to alcohol use, most of which were among men

For both men and women, tobacco poses by far the largest risk for cancer DALYs and mortality (see Figure 3.1; Table 3.1). The majority of the cancer burden attributed to tobacco is from lung cancer, with the rest divided between various cancers, including digestive and reproductive system cancers. In EU+2 countries, tobacco smoking was attributed to 266 398 deaths among men and 102 273 deaths among women in 2019 (IHME, 2019[2]). Deaths from second-hand smoke exposure, however, were higher among women than men: almost one-third of tobacco-related deaths in women were attributed to second-hand smoke exposure (WHO, 2023[3]).

Although the most common mode of tobacco consumption is smoking, newer and emerging tobacco and nicotine products that are marketed as alternatives or supplementary to cigarettes are raising concerns. Smokeless tobacco use – such as oral use of snus common in Nordic countries – could increase the risks of some cancer types and of mortality after diagnosis compared to no tobacco use (Valen et al., 2023[4]). In recent years, use of e-cigarettes has been increasing; this is a particular concern among young people (WHO, 2023[3]). Marketed as an alternative to tobacco, e-cigarettes contain a variety of compounds with inconclusively characterised health effects. Given lag times in tobacco smoke data, not enough time has passed since market entry for clear evidence to emerge. An opinion statement published by the European Commission in 2021 concluded that strong evidence exists on the role of e-cigarettes as a gateway to smoking, particularly among young people, while the addictive potential of the products is high because many of them contain nicotine (SCHEER, 2021[5]).

Despite recent reductions in many countries, Europe has historically had the highest level of per capita alcohol consumption in the world, which is reflected in a high burden of cancer attributable to alcohol. An estimated 4.1% of all new cancers globally in 2020 (and 5.6% in Central and Eastern Europe) were attributable to alcohol consumption (Rumgay et al., 2023[6]). In EU+2 countries, alcohol accounted for an estimated 86 616 cancer deaths in 2019, representing 6.3% of all cancer deaths, over 70% of which were among men (60 718 deaths) (see Table 3.1). Among women, 11% of all breast cancer deaths were attributable to alcohol consumption (IHME, 2019[2]). While there is no safe level of alcohol consumption with regard to cancer risk, the likelihood of developing alcohol-related cancers is influenced by various factors, including the quantity and frequency of alcohol consumption, individual susceptibility, and interaction with other risk factors such as smoking and genetic predisposition (Clinton, Giovannucci and Hursting, 2020[7]).

3.1.3. Dietary risk and physical inactivity are interconnected with metabolic cancer risk factors of overweight and obesity and high blood sugar

Diet is the third leading risk factor for cancer deaths in Europe, and is particularly associated with colon and rectum cancers (see Table 3.1). In EU+2 countries, 46 429 cancer deaths (6.2% of all cancer deaths) were attributed to dietary risk in 2019. Additionally, diet presents the third largest risk factor for cancer DALYs for women and the fourth largest for men (see Figure 3.1). Dietary factors with established links to certain types of cancer include low consumption of fibre, fresh fruit, vegetables and whole grains (Kerschbaum and Nüssler, 2019[8]). The International Agency for Research on Cancer (IARC) has classified consumption of processed meat as carcinogenic and unprocessed red meat as probably carcinogenic to humans, additionally noting inter-relationships between diet, overweight and obesity, and diabetes (IARC, 2018[9]). High sugar consumption, including in the form of sugar-sweetened beverages, is known to increase the risk of cancer indirectly through its associations with overweight and obesity.

In EU+2 countries, 16 046 cancer deaths (1.2% of all cancer deaths) were attributed to physical inactivity in 2019. Regular exercise has been heavily implicated in maintaining a healthy body weight, boosting the immune system and reducing systemic inflammation, all of which contribute to cancer prevention. Physical activity helps to regulate hormones like insulin and oestrogen that contribute to the growth of cancer cells, and enhances the efficiency of the digestive system, reducing the time it takes for the body to eliminate harmful substances (McTiernan, 2008[10]). Physical inactivity interacts with dietary factors such as consumption of red meat, contributing to an increased risk of overweight and obesity and high blood sugar, augmenting the risk of cancer.

Although also affected by the behavioural risk factors described above, overweight and obesity is classified as a metabolic risk factor for cancer and is affected by genetic predisposition and environmental influences. Overweight and obesity was attributed to 78 661 cancer deaths (5.7% of all cancer deaths) in 2019; it is the fourth leading risk factor for cancer deaths among women and the fifth among men. It is associated with a wide range of cancer types including breast and uterine cancers in women and oesophageal, colon and rectum cancers in both sexes. Overweight and obesity leads to cancer through various pathways – including systemic hormonal and inflammatory changes mediated by high adiposity (body fat) – which lead to an environment that favours tumour initiation and progression. Metabolic factors associated with obesity include increased levels of insulin and insulin-like growth factor, which promote development of cancer at several sites before the development of diabetes (Sami et al., 2017[11]; Gallagher and LeRoith, 2015[12]).

High blood sugar is a risk factor to which 77 036 cancer deaths (5.6% of all cancer deaths) were attributed in EU+2 countries in 2019. It is particularly associated with breast, pancreatic, lung and colorectum cancers. Various pathways have been implicated for the role of blood sugar in cancer initiation and progression, including increased availability of glucose for tumour growth. Diabetes, addressed in the Global Burden of Disease Study estimates through its associations with high blood sugar, is associated with both greater cancer incidence and cancer mortality through channels such as chronic inflammation and high insulin levels (due to insulin resistance) (Wang, Yang and Liao, 2020[13]) (Safiri et al., 2022[14]).

3.1.4. Around 2% of all cancer deaths were attributed to air pollution, while 5.9% were attributed to occupational exposures – mainly to asbestos

Chronic exposure to air pollution, particularly in the form of particulate matter (PM), can cause lung cancer. PM can be classified by size: $PM_{2.5}$ refers to particles that are 2.5 microns or less in diameter and can enter deep into the respiratory tract to cause damage to the lungs. PM_{10}, particles that are 10 microns or less in diameter, cause damage as well, but cannot penetrate as deep into the lung tissue (OECD/EU, 2020[15]). Ammonia emissions should also be considered, as ammonia undergoes chemical reactions in the atmosphere that lead to formation of $PM_{2.5}$ particles. While around 1% of cancer cases are attributed to indoor and outdoor air pollution, this figure rises to more than 7% for lung cancer (EEA, 2022[16]). Among EU+2 countries, air pollution contributed to 27 491 cancer deaths in 2019 (2% of all cancer deaths) (see Table 3.1).

Exposure to air pollution can take place outdoors (ambient air pollution) and in indoor environments (household air pollution) due to use of solid fuels. Although the estimates in this chapter (see Box 3.1) refer to both indoor and outdoor pollution, the impact on population health in Europe from exposure to ambient air pollutants is much greater than that from household air pollutants; thus, this report focuses on discussion of exposure and policy options targeting outdoor air pollution (OECD/EU, 2020[15]).

Cancer is the main cause of work-related deaths. The International Labour Organization (ILO) has identified more than 200 substances – including chemicals, metals, dust, radiation and biological agents – as probable human carcinogens (ILO, 2021[17]). In 2019, 81 439 cancer deaths in the 29 EU+2 countries were attributed to occupational risks (see Table 3.1), while around 78% of occupational cancers were specifically related to asbestos – a naturally occurring fibrous substance widely used in industry in the past (European Commission, 2022[18]). Inhalation of small asbestos fibres is associated with a high risk of lung cancer and mesothelioma (a cancer almost always caused by exposure to asbestos), with an up to 30-year delay between exposure and development of cancer.

3.1.5. Around 1.2% of all cancer deaths are due to cervical cancer attributed to human papillomavirus infections

HPV infection is an important cancer risk factor. According to 2019 estimates, 15 931 cervical cancer deaths attributable to HPV infections represented 1.2% of all cancer deaths among both sexes in EU+2 countries. The figure amounts to 2.7% of cancer deaths among women – excluding deaths in men, who are not considered at risk of cervical cancer (IHME, 2019[2]). This remains an underestimate of the total burden associated with HPV infections, as it does not include anal, penile, vaginal, vulval and oropharyngeal cancer associated with HPV among both women and men. The European Cancer Organisation estimates that 2.5% of cancer cases in Europe are attributable to HPV, up to 20-30% of which are among men (European Cancer Organisation, 2020[19]).

HPV viruses are highly contagious, and more than 80% of the sexually active population could be exposed to this family of viruses during their lives (Chesson et al., 2014[20]). Most HPV-related cancer can be prevented by vaccination against the main HPV strains associated with cancer. Vaccinating both men and women against HPV provides protection for everyone by preventing transmission between sexual partners (Colzani et al., 2021[21]). Vaccination is a key recommended method for prevention due to its high efficacy and the possibility of targeting specifically carcinogenic HPV strains (Kamolratanakul and Pitisuttithum, 2021[22]). Ideally, vaccination should be offered before initial exposure to HPV, meaning before the onset of sexual activity (Meites et al., 2019[23]). As such, vaccination is generally targeted at children shortly after the age of 10, although older individuals can also benefit.

A meta-analysis covering 40 studies from 14 countries suggested an 83% reduction in prevalence of the two most carcinogenic HPV types in girls aged 13-19 when at least 50% vaccine coverage is achieved (Drolet et al., 2019[24]). According to the European Centre for Disease Prevention and Control (ECDC), reductions in prevalence of HPV strains covered by vaccines have been observed in vaccinated women in Australia, Belgium, Finland, France, Germany, Japan, the Netherlands, Spain, Sweden, Uganda and the United Kingdom (England and Scotland separately) (ECDC, 2020[25]). The two-strain and four-strain HPV vaccines currently licensed in Europe can potentially prevent 71% of cervical cancer cases, while the nine-strain licensed vaccine can prevent up to 89% of cases (European Cancer Organisation, 2022[26]).

3.1.6. Liver cancer due to hepatitis B and hepatitis C is attributed to several risk factors

In 2019, hepatitis C virus (HCV)-related liver cancer accounted for around 16 400 deaths in EU+2 countries, and hepatitis B virus (HBV)-related liver cancer for around 4 600 (Cortesi et al., 2023[27]). Risk factors for contracting the viruses include high-risk sex, which is considered the leading risk factor for acute HBV in EU+2 countries (ECDC, 2022[28]) and the second leading risk factor for HCV after drug injections (ECDC, 2022[29]). Based on the IHME classification (see Box 3.1), some deaths and DALYs from HBV- and HCV-related liver cancer are attributable to risk factors that increase the probability of developing liver cancer following an acute viral infection, including tobacco, overweight and obesity and alcohol. HBV and HCV together account for about 55% of liver cancer deaths in EU+2 countries (ECDC, 2022[30]). Age-standardised rates of HBV-related and HCV-related liver cancer remained relatively stable between 2010 and 2019, although incidence and prevalence of both HBV and HCV infections fell (Cortesi et al., 2023[27]). However, risk of HBV- and HCV-related liver cancer is unequally distributed across population groups (see Section 3.2.3).

3.2. Risk factors are inequitably distributed across and within countries

3.2.1. Behavioural and lifestyle-associated risk factors vary widely between countries

> *Smoking rates vary almost three-fold across countries, while education- and income-related inequalities play a significant role in shaping within-country variations*

Prevalence of self-reported daily smoking decreased in the EU27 from an average of 22.5% in 2011 to 18.7% in 2021 (or nearest years), yet the reduction was marked by inconsistencies across countries and population groups[1]. Norway and Iceland had the greatest reductions – of 50% or more – in overall daily smoking rates (falling from 17% to 8% of the population in Norway and from 14.3% to 7.2% in Iceland). Prevalence of daily smoking also decreased greatly in Estonia, Denmark, Finland, Germany and Ireland (by 30% or more). In Bulgaria, Luxembourg, Malta and the Slovak Republic, however, smoking rates increased slightly over the past decade. In 2021, the proportion of daily smokers varied almost three-fold across countries: it was highest in Bulgaria (28.7%) and lowest in Iceland, Norway and Sweden (less than 10%). According to the Health Behaviour in School-aged Children (HBSC) study, tobacco experimentation among adolescents in Europe had fallen in 2022: 17% of 15-year-olds in 2022 reported smoking at least once in the previous 30 days compared to 18% in 2018 and 22% in 2014. The proportion was slightly higher among girls than boys (HBSC, 2023[31]).

A higher proportion of men report smoking cigarettes daily compared to women in nearly all countries: across the EU27, the proportion of daily cigarette smokers is 51% higher among men than women. The gender gap is widest in Lithuania and Romania, where daily smoking is more than three times more common among men, and in Cyprus, Latvia and Portugal, where it is more than twice as common. By contrast, in Denmark and Sweden, the proportion of daily smokers is slightly higher among women. Between 2014 and 2019, the average gender gap across the EU27 in smoking rates remained unchanged (with a 7.5 percentage point difference in smoking prevalence rates between men and women).

Across the EU27, people with low levels of education are 46% more likely to smoke daily than those with high levels, and the social gradient is present in most European countries (Figure 3.2). On average in the

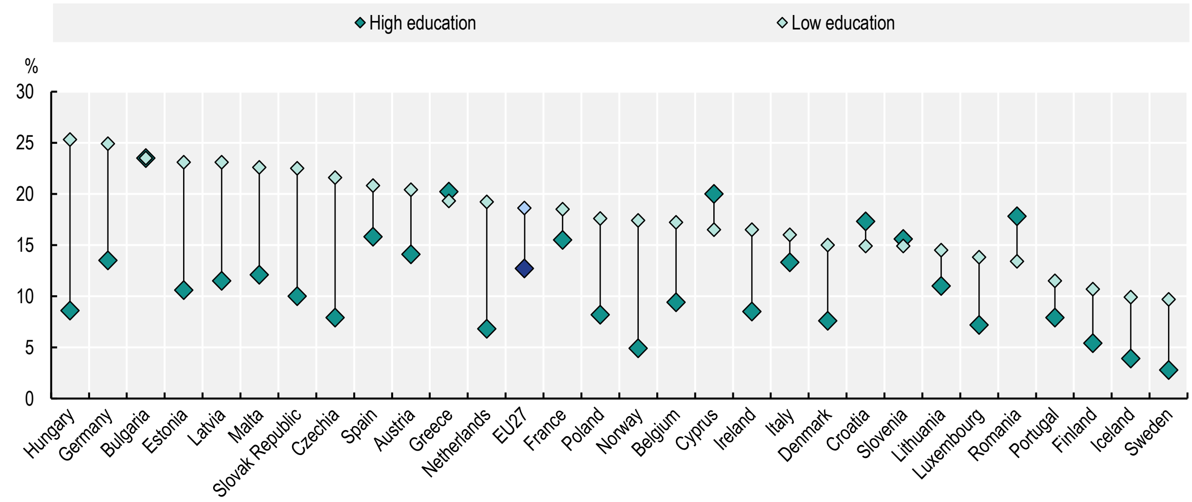
EU27, the prevalence of daily cigarette smoking was highest among those with medium education levels. The largest education gaps in smoking rates are found in countries with a low prevalence of smoking among those with high levels of education, such as Norway (4.9% among those with high education levels vs. 17.4% among those with low education levels), Sweden (2.8% vs. 9.7%) and Iceland (3.9% vs. 9.9%). In absolute terms, Hungary, Czechia, Estonia, the Slovak Republic, Norway and the Netherlands all have an education gap of more than 12 percentage points. Education-related inequalities in cigarette smoking increased by 13% between 2014 and 2019. This is the result of smoking rates declining faster among people with high education levels (-6% during 2014-19) than low education levels (-1% during 2014-19).

Similarly, on average across the EU27, the proportion of daily cigarette smokers is 50% higher among individuals in the lowest (22.4%) than those in the highest income quintile (14.9%). Proportionally, the highest income-related inequalities are found in the Netherlands (7% among those in the highest income quintile vs. 24.4% among those in the lowest quintile) and Sweden (3.4% vs. 11.5%), where smoking rates are more than three times higher among low-income than high-income groups. In absolute terms, the Netherlands, Hungary, Belgium and Germany all have income gaps of more than 12 percentage points. Overall, between 2014 and 2019, income-related inequalities in smoking rates across the EU27 increased by 9%, as higher-income groups saw a faster decline in smoking (-8% during 2014-19) than lower-income groups (-3% during 2014-19).

While daily smoking rates continue to fall, concerns are emerging around the increasing use of e-cigarettes (see Section 3.1.2), especially among adolescents and young people: 6.1% of those aged 15-24 reported that they had used vaping products in 2021 on average across OECD countries, which is almost double the overall average of 3.2% among all those aged 15 and over (OECD, 2023[32]). In 2019, around 7% of 15-16-year-olds in Portugal and Sweden reported using e-cigarettes in the last 30 days, while in Poland and Lithuania that figure was around 30% (ESPAD Group, 2019[33]). In 2021, the overall proportions of the population aged 15 and over who reported regular use of vaping products were highest in Czechia at 7.4% and Estonia at 10% (where the rate among young people reached more than 20% in 2022).

Figure 3.2. The proportion of daily cigarette smokers is 46% higher among people with low levels of education compared to those with high education levels

Percentage of people aged 15+ who smoke cigarettes on a daily basis, 2019



Note: EU27 is a weighted average. Low education is defined as people who have not completed secondary education (International Standard Classification of Education (ISCED) 0-2), whereas high education is defined as people who have completed tertiary education (ISCED 5-8).
Source: Eurostat (2023), “Daily smokers of cigarettes”, European Health Interview Survey.

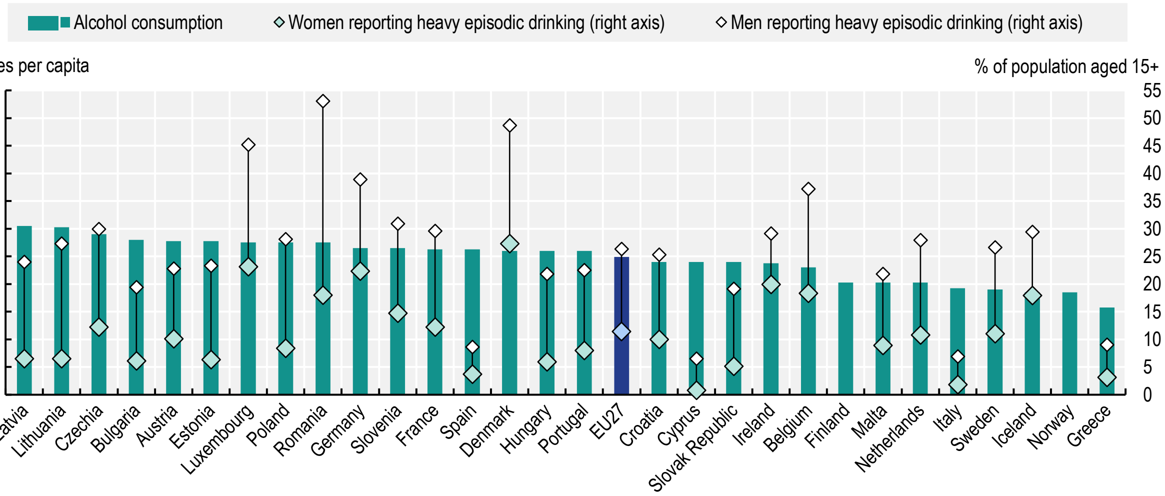
Alcohol consumption varies about two-fold between the highest and lowest consuming countries

Overall recorded alcohol consumption, measured through sales data, stood at almost 10 litres of pure alcohol per capita on average across the EU27 in 2021 (Figure 3.3). Recorded consumption was highest in Baltic countries (Latvia and Lithuania) and Central and Eastern European countries (Czechia and Bulgaria), at more than 11 litres per adult. By contrast, Greece, Norway, Iceland, Sweden and Italy had relatively lower consumption, at 7.7 litres or less. Over the past decade, alcohol consumption has decreased in most EU27 countries, with the largest reductions (by more than 15%) in Finland, France, Greece, Ireland and Lithuania. However, per capita consumption increased by more than 10% in Bulgaria, Latvia, Malta, Norway and Romania, although in Malta and Norway it remained well below the EU27 average.

In addition to total alcohol consumed, it is relevant to look at drinking patterns. In 2019, countries in Northern and Western Europe (Denmark, Luxembourg, Germany and Belgium) and Romania reported more heavy episodic drinking (defined as six or more standard drinks per drinking session at least once per month). Patterns of alcohol consumption vary across population groups. Men drink more than women in all EU27 countries: 26.3% of men and 11.4% of women reported heavy episodic drinking at least once a month in the EU27 in 2019. The largest gender gaps were reported in Romania (53.1% vs. 18.0%), followed by Luxembourg, Denmark and Lithuania (all with over 20 percentage point gaps). On average across the EU27, the gender gap decreased between 2014 and 2019 due to a slightly larger reduction among men (-1.6 percentage points) than women (-0.5 percentage points). Reductions in the gap by more than 10 percentage points were observed in Ireland and Estonia, where decreases in heavy episodic drinking were larger among men. The proportion of 15-year-olds who reported having been drunk more than once in their life decreased between 2018 and 2022 for both genders. Among boys, the reduction was larger, resulting in similar proportions among girls (17%) and boys (18%) (HBSC, 2023[31]).

Figure 3.3. Alcohol consumption varies across countries and population groups

Alcohol consumption (2021), Percentage of people aged 15+ reporting heavy episodic drinking (monthly or more, 2019)



Note: Alcohol consumption is based on annual sales data in 2019 for Belgium, Bulgaria, Croatia, Germany, Greece, Italy, Luxembourg, Portugal and Romania, and in 2020 for Iceland. For alcohol consumption, the EU27 average is unweighted. For the percentage of heavy episodic drinking, the EU27 average is weighted.
Source: OECD Health Statistics 2023, https://doi.org/10.1787/health-data-en; Eurostat (2023), "Frequency of heavy episodic drinking", European Health Interview Survey.

Socio-economic status has been associated with differences in alcohol-related health effects. However, a clear and consistent pattern in self-reported heavy episodic drinking does not emerge: on average across the EU27, both men and women with medium levels of education report heavy drinking most often, and people in the highest income quintile are more likely to report heavy episodic drinking at least once a month than those in the lowest income quintile. Nevertheless, studies have consistently shown that groups with lower socio-economic characteristics suffer greater harms from drinking, such as higher risk of alcohol-related mortality and greater likelihood of alcohol dependence, as well as comorbid psychiatric disorders – possibly due to compounding and comorbid vulnerabilities (Collins, 2016[34]).

More than half of adults were living with overweight and obesity in 2019, with rates growing by 3.2% during 2014-19

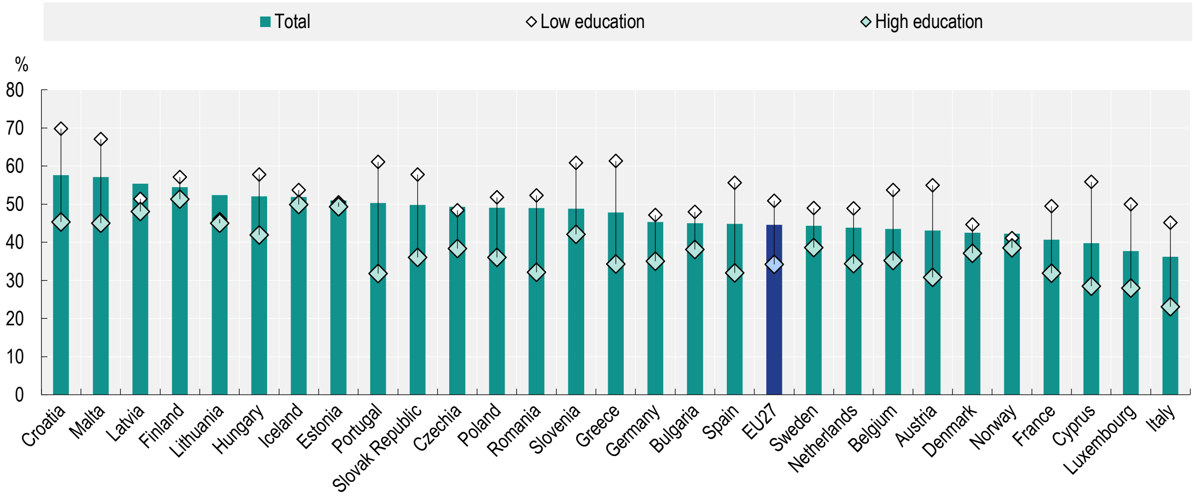
The prevalence of overweight and obesity (BMI >25) has substantially increased in recent decades due to increases in the consumption of calorie-dense and processed food, as well as increasingly sedentary lifestyles (OECD, 2022[35]). In 2019, more than half of adults in EU27 countries were living with overweight and obesity – a 3.2% increase compared to 2014. In Malta, Croatia and Iceland, the proportion exceeded 60%. Men are more likely than women to be living with overweight and obesity in all EU+2 countries. The gender gap is particularly large in Czechia and Luxembourg (with a difference of over 18 percentage points), and smallest in Latvia, Lithuania, Finland and Estonia. Among adolescents, the proportion reporting overweight increased by more than 12% between 2018 and 2022, remaining higher among 15-year-old boys (26%) than girls (16%).

People with lower socio-economic characteristics, such as lower income or education levels, are more likely to experience obesogenic environments, characterised by limited access to healthy foods or affordable healthy food options, living in neighbourhoods with limited spaces for physical activity and widespread advertising of unhealthy products. Moreover, stressors associated with lower socio-economic conditions – such as financial strain, food insecurity and psychosocial stress – can contribute to unhealthy eating behaviours and hinder weight management (OECD, 2022[35]).

Although prevalence of overweight and obesity is increasing in all population groups, the proportion living with overweight and obesity in 2019 was higher among those with low (53.8%) than high education levels (44.3%). The education gap is uneven between genders. Women with low education levels are more likely to be living with overweight and obesity in all EU+2 countries, with an average difference of 16.7 percentage points (Figure 3.4). In contrast, prevalence of overweight and obesity among men with low education levels was only 2.1 percentage points higher than among men with high education levels, and about half the countries had a reverse gradient. Compared to 2014, the average education gap across EU+2 countries in 2019 remained at a similar level for men but decreased for women.

Figure 3.4. In all EU+2 countries, prevalence of overweight and obesity is higher among women with low education levels than high education levels

Percentage of women aged 15+, 2019



Note: The EU27 average is weighted. Low education is defined as people who have not completed secondary education (ISCED 0-2), whereas high education is defined as people who have completed tertiary education (ISCED 5-8).
Source: Eurostat (2023), "Body mass index", European Health Interview Survey.

Only one in eight Europeans reported eating the recommended five portions of fruit and vegetables per day

Despite diet being an important risk factor for cancer (see Section 3.1.3), only about two-thirds of the population across the EU27 reported consuming at least one portion of fruit or vegetables on a daily basis. Only 12.4% reached five portions per day, in line with WHO's recommendation of a daily minimum of 400 g of fruit or vegetables (WHO, 2023[36]). The proportion eating five portions was lower among people living with overweight and obesity. Differences between countries emerge, as low consumption (less than five portions) was reported by 67% of the population in Ireland, but by more than 95% in Romania and Bulgaria.

Disparities in nutrition exist not only across but also within countries, where people with lower-income populations have more limited access to healthy food options (OECD, 2022[35]). Across the EU27, a higher proportion of women than men (14.9% vs. 9.8%) report consuming the recommended five portions of fruit and vegetables. Both men and women with high education levels are more likely to meet the recommendation, and those in the highest income quintile report meeting the recommendation more often.

A third of people in the EU27 (33.9%) report consuming sugar-sweetened beverages on a weekly basis, and a tenth do so daily. The share of people drinking soft drinks (many of which are sweetened with sugar, while others may contain artificial sweeteners) at least once per week is higher among men (41.2%) than women (27.1%). Importantly, more than 60% of teenagers aged 15-19 report consuming soft drinks weekly or more, and 16.2% drink them daily, with the proportion declining with age. This highlights the importance of policy levers focusing on young people (see Section 3.3.3).

Rates of physical activity vary widely across Europe

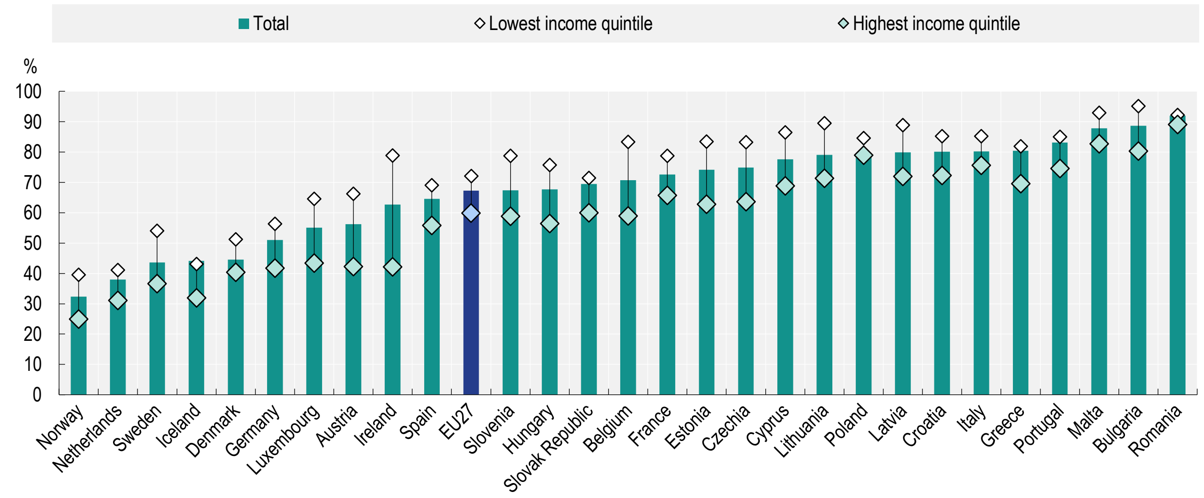
On average across EU+2 countries, 67% of people report engaging in less than the recommended 150 minutes of health-enhancing (non-work-related) physical activity per week. Stark disparities can be seen between countries. Northern Europeans are most likely to meet the recommendation, with rates of people not meeting the recommendation below 50% in Norway, the Netherlands, Sweden, Iceland and Denmark, while the figure rises to more than 80% for some Southern, Central and Eastern European countries (Figure 3.5). Among 15-year-olds, boys are twice as likely to engage daily in 60 minutes of moderate-to-vigorous physical activity as girls (20% vs. 10%). These patterns persist to adulthood as across EU+2 countries a lower proportion of women than men meet the WHO recommendation.

Key drivers of physical inactivity are urbanisation and the increasing prevalence of sedentary lifestyles, including in occupational settings such as office work. Socio-economic characteristics have also been found to be consistently associated with levels of physical activity: individuals with low income levels often face barriers such as limited access to recreational facilities, living in unsafe neighbourhoods and time constraints due to demanding work schedules, which prevent them from engaging in regular leisure physical activity (OECD/WHO, 2023[37]). It should be noted, however, that some low-income jobs may be more manual, involving physical activity throughout the day. Nevertheless, work-based physical activity is not always health-enhancing and can affect the individual's capacity for physical activity outside working hours.

The average proportion not meeting the weekly physical activity recommendation was higher among those with high levels of education (by 31%) and income (by 17%), and this pattern persisted across all EU+2 countries. In Ireland, Belgium, Austria, Luxembourg and Estonia, the difference between those in the lowest and highest income quintiles was more than 20 percentage points (Figure 3.5). The level of inequality in physical activity between both education and income groups remained at similar levels between 2014 and 2019.

Figure 3.5. Proportions of the population meeting the recommendation of 150 minutes or more per week on physical activity vary by income level

Percentage of people aged 15+ spending <150 minutes or more per week on physical activity, 2019



Note: The EU27 average is weighted.
Source: Eurostat (2023), "Health-enhancing (non-work-related) physical activity", European Health Interview Survey.

3.2.2. Environmental and occupational exposure to carcinogens is substantial

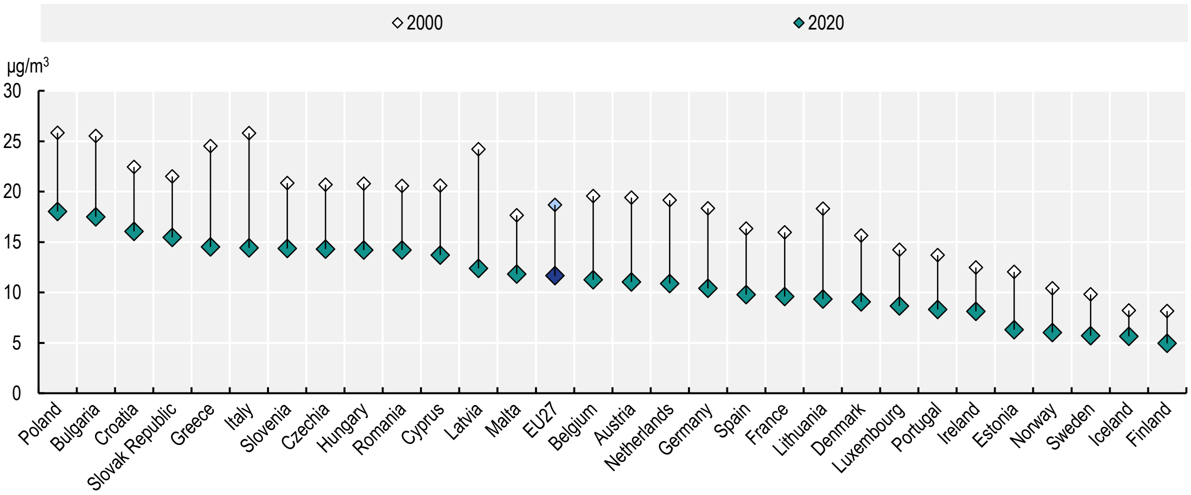
Average outdoor air pollution has decreased over time, but varies almost four-fold across EU+2 countries

The 2021 WHO Global Air Quality Guidelines, a set of evidence-based recommendations of pollutant limits, lowered annual air pollution limits for $PM_{2.5}$ to 5 µg/m^3 and for PM_{10} to 15 µg/m^3 (WHO, 2021[38]). In 2020, all EU+2 countries except Finland exceeded the WHO limit threshold set for $PM_{2.5}$, although Iceland, Sweden, Norway and Estonia were very close to this level. Poland, Bulgaria, Croatia and the Slovak Republic had the highest annual average exposure – three times higher than the WHO recommendation. In 2021, 97% of the EU27 urban population was exposed to $PM_{2.5}$ and 76% to PM_{10} levels exceeding WHO's recommendations (EEA, 2023[39]).

Population exposure to $PM_{2.5}$ decreased by 38% between 2000 and 2020 across the EU27 (Figure 3.6). The largest reductions were seen in Baltic countries (Estonia, Latvia and Lithuania), with an almost 50% drop in exposure during 2000-20. The lowest reductions – of around 30% – were in the Slovak Republic, Croatia and Poland. It should be noted that cancer can develop decades after the initial exposure to air pollution, meaning that historical exposure continues to affect incidence of cancers now and in the years to come.

Figure 3.6. Mean population exposure to $PM_{2.5}$ in 2020 was 38% lower than in 2000

$PM_{2.5}$ exposure in micrograms per cubic metre (µg/m^3), in 2000 and 2020



Note: The EU27 average is unweighted.
Source: OECD Environmental Database, Exposure to $PM_{2.5}$, https://stats.oecd.org/Index.aspx?DataSetCode=EXP_PM2_5.

Exposure to outdoor air pollution is not equally distributed among population groups. A systematic review of available evidence in European countries suggests that higher socio-economic deprivation is generally associated with higher levels of exposure to $PM_{2.5}$ and nitrogen oxides (Fairburn et al., 2019[40]) Minority ethnic groups, immigrants and foreign-born populations also have higher exposure to air pollution in some European countries, including France, Spain, Sweden and Switzerland. Greater exposure to pollution among children with lower socio-economic status arises from living in higher-traffic areas, nearer to waste sites and in poorer-quality housing (Bolte, Tamburlini and Kohlhuber, 2009[41]). Additionally, vulnerability to issues exacerbated by air pollution differs between population groups owing to differences in the prevalence of pre-existing health problems, capacity and access to coping mechanisms, and complementary risks via other channels such as occupation or housing (Fairburn et al., 2019[40]).

Differences in historical use of asbestos between EU+2 countries continue to affect current cancer incidence and potential future exposure

Europe has some of the highest historical prevalence of exposure to asbestos worldwide owing to widespread use in manufacturing and construction, peaking in the 1950s to 1970s (Eurogip, 2006[42]). Although use of asbestos has been banned in European countries since the early 2000s, historical exposure continues to affect disease incidence decades later, and 60% of worldwide deaths from asbestos-related diseases (excluding lung cancer) between 1994 and 2010 were in Europe (Kameda et al., 2014[43]). Additionally, asbestos remains present in a large share of the 220 million buildings built in Europe before 2001; thus, workers engaged in demolition, construction, and building finishing (including plumbers, electricians, painters, carpenters and appliance specialists) remain at risk of exposure to asbestos during renovation efforts (Eurogip, 2006[42]; European Council, 2023[44]). As part of the European Green Deal, asbestos presence – along with other relevant factors such as age, energy savings potential and seismic risk – is a relevant factor in renovation prioritisation.

Total per capita asbestos use (defined as production plus import minus export) was highest in Cyprus, Luxembourg and Belgium during 1920-70, and in Slovenia, Croatia, Luxembourg and Belgium during 1971-2000 (Kameda et al., 2014[43]). Use of asbestos in residential buildings between 1920 and 2003 was highest in the Baltic countries, followed by Belgium and Cyprus. Presence of asbestos in residential buildings contributes to increased risk of future exposure as the buildings age or are exposed to natural disasters such as earthquakes in some regions (Kakoulaki et al., 2023[45]).

Among EU+2 countries, Belgium and the Netherlands were found to have the highest mortality rates from mesothelioma. However, it should be noted that owing to incomplete diagnostics and reporting of occupational diseases, the mortality in some countries may be underreported (Wilk and Krówczyńska, 2021[46]). Within-country patterns of disease can correspond to the use of asbestos, however. For example, in Slovenia, which had high use of asbestos during 1970-2000, temporal and spatial trends in mesothelioma correspond to a 30-year delay after peak use of asbestos (Zadnik et al., 2017[47]). Men are much more likely than women to experience asbestos exposure because of higher engagement in employment in sectors that use asbestos, such as construction and manufacturing. An estimated 85% of occupational cancer deaths in 2019 in the 29 EU+2 countries were among men (see Table 3.1).

3.2.3. Cancers caused by viral infections require targeted action

While human papillomavirus vaccination has been introduced in all EU+2 countries, coverage rates are well below the EU target

Prevalence of HPV infection varies greatly by country, but is estimated at about 14.4% for women in the European countries. It is slightly lower in Northern, Western and Southern Europe and substantially higher in Central and Eastern European countries (about 23.4%). Prevalence of HPV infection at any anogenital site is about 18.5% among men in the WHO European Region, and prevalence of high-risk HPV strains (those most likely to cause cancer) is slightly higher among men than women (European Cancer Organisation, 2022[26]).

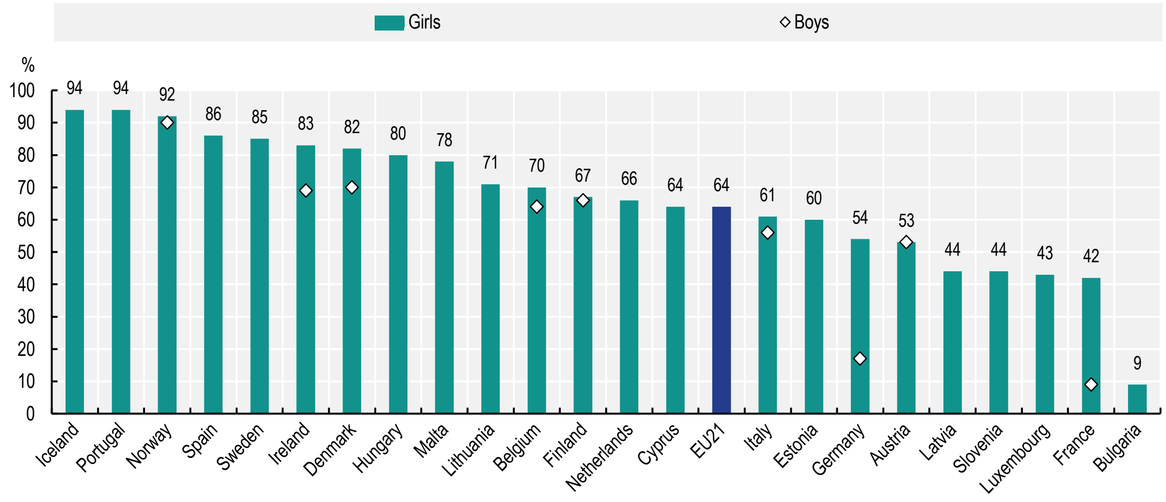
Vaccination against HPV is included in national immunisation programmes in all EU+2 countries (see Section 3.3.5). Nevertheless, on average in 2022, 64% of girls had received all required doses by age 15, and in Latvia, Slovenia, Luxembourg, France and Bulgaria, the proportion was below 50%. Only Iceland, Portugal and Norway reached coverage of 90% among girls – the target set by WHO for all countries by 2030 (WHO, 2023[48]). As introduction of HPV vaccination for boys is more recent in most countries, coverage by age 15 was lower than that among girls, and only Norway had reached 90% (Figure 3.7). Additionally, the national estimates conceal regional inequalities in HPV vaccination coverage, as important variations may exist. For example, in Belgium, regional coverage estimates in 2016 ranged from 36% in the Brussels-Wallonia region to 91% in the Flemish region (Vermeeren and Goffin, 2018[49]; Vandermeulen et al., 2017[50]).

Coverage with HPV vaccination is affected by programme design, but also by beliefs, attitudes and confidence about vaccines. Compared to 2018, 2022 survey results indicate that the proportion of people reporting positive perceptions about the importance, safety and effectiveness of HPV vaccines had decreased in the majority of EU+2 countries. Differences between countries exist, however: around 90% of respondents agreed with the statements that the HPV vaccine is important, safe and effective in Portugal and Spain, while the lowest proportions were in Latvia, the Slovak Republic and the Netherlands. Given their role in prescribing, administering and advising on vaccines, perceptions of healthcare workers play a role in uptake. Among healthcare workers, confidence in HPV vaccines is generally high across the EU27 (de Figueiredo et al., 2022[51]).

Compared to other vaccines, uptake is also challenged by the lack of an immediate threat to adolescents from HPV (as cervical cancer can take a decade to develop after persistent infection), as well as by parental belief that vaccination against a sexual transmitted disease is not relevant for their young children, or that vaccination implies tacit approval for sexual activity (Jacobson et al., 2016[52]). As such, HPV vaccination coverage is often lower than that for other vaccines provided to adolescents, such as the combined tetanus, diphtheria and whopping cough and the meningococcal vaccines, according to the United States Centers for Disease Control and Prevention (CDC) (2021[53]).

Figure 3.7. Coverage of HPV vaccination varies across countries and by sex

Proportion of 15-year-olds who received the last dose of HPV vaccine, by sex



Note: The EU21 average is unweighted.
Source: WHO Global Health Observatory (2023), HPV vaccination coverage by age 15, last dose, https://immunizationdata.who.int/pages/coverage/hpv.html.

Several studies across EU and OECD countries have provided evidence of inequalities in uptake of HPV vaccination by socio-economic status and migration background (coming from a family where at least one of the parents has migrated into the country). In the Netherlands, low uptake was found to be associated with living in an area with lower socio-economic status (37% compared to 55% of those living in areas with high socio-economic status) and having one or both parents born in Morocco or Türkiye (de Munter et al., 2021[54]). In Denmark, factors associated with lower HPV vaccination coverage for both boys and girls were migration background, and having an unmarried or unemployed mother with lower education and income levels (Slåttelid Schreiber et al., 2015[55]; Bollerup et al., 2017[56]). In France, survey data suggest that young women not vaccinated against HPV are more likely to be of low socio-economic status (Guthmann et al., 2017[57]). Recent surveys in Sweden show that confidence around HPV vaccination is lower among people with lower education and income levels (Wemrell and Gunnarsson, 2022[58]), and those with migrant backgrounds (Wemrell, Perez Vicente and Merlo, 2023[59]). In Poland, parents' positive attitudes towards HPV vaccination were found to be associated with higher education level and having had a conversation with a doctor about vaccination (Sypień and Zielonka, 2022[60]).

Risk of liver cancer due to hepatitis B and hepatitis C infection is concentrated among vulnerable groups

Transmission of HBV and HCV, which can lead to chronic hepatitis infection and liver cancer, has declined across EU+2 countries on average. Nevertheless, the ECDC estimates that population-level prevalence varies between countries, and is highest in Romania for both HBV surface antigen (4.5% of the population) and HCV ribonucleid acid (RNA) (2.3%). Based on available data, the most common known route of transmission for HBV in 2021 was sexual contact (heterosexual or sex between men), while for HCV it was injection drug use (followed by sex between men). Populations particularly at risk include people engaged in high-risk sex, people who inject drugs, prisoners and people who have migrated from endemic areas (ECDC, 2022[30]; WHO, 2017[61]). Although availability of data on imported cases greatly varies across countries, the ECDC (2022[28]) reports that migrants are particularly vulnerable in European countries. For example, migrant populations account for 80% of HBV cases in Germany, the Netherlands, Norway and Sweden, of which 68% are chronic cases presumed to be contracted before arrival. Chu et al. (2013[62]) found prevalence of HBV infection to be substantially higher among migrant populations than the general population in Western and Northern European countries.

A 2017 internet survey of European men who have sex with men (MSM) revealed that half of respondents had never been vaccinated against HBV. Similarly, vaccination coverage for other at-risk groups needs improvement. For example, the estimated percentage of people who inject drugs who had been vaccinated against HBV was less than 50% in Austria, France, Germany and Poland (ECDC, 2022[30]). These findings demonstrate that the burdens of HBV and HCV fall disproportionately on at-risk groups, and call for more targeted approach to prevention, detection and treatment strategies.

3.2.4. Health literacy levels influence preventive behaviours across risk factors

Health literacy encompasses the personal knowledge and competencies, mediated by organisational structures and availability of resources, that enable individuals to access, understand, assess and use information and services that enhance and sustain good health and well-being. (WHO, 2022[63]). Directly linked to health behaviour, low levels of health literacy are associated with higher prevalence of tobacco use, low levels of physical activity and consumption of unhealthy food. Health-literate organisations can help bridge the gap to make health knowledge more accessible and actionable (see Section 3.3.6).

The results of the European Health Literacy Population Survey 2019-21, based on respondents from 17 countries (including 15 EU Member States), estimated that general health literacy was associated with more physical activity and fruit and vegetable consumption. However, the Survey found that nearly half of respondents had insufficient levels of health literacy. The proportion with low health literacy ranged from 25% in Slovenia to 72% in Germany. A social gradient emerged in all countries: on average, financially deprived groups and those with a low self-perceived role in society had 8% lower mean health literacy scores, while those with low education levels had 6% lower mean scores than those with higher levels. (M-POHL, 2021[64]). An analysis of the Survey results in Norway found that some groups of migrants are more likely than the general population to score the lowest level on health literacy, while migrants' low health literacy related to health promotion and disease prevention was associated with their financial situation (low ability to pay bills and meet their expenses) (Le et al., 2021[65]). Health literacy is important across the cancer spectrum: among people diagnosed with cancer, lower health literacy is associated with greater difficulties in understanding and processing cancer-related information, poorer quality of life and poorer experience of care (Holden et al., 2021[66]).

3.3. Policy action is needed to reduce risk factors for cancer and target at-risk population

3.3.1. Measures to reduce tobacco use are in place in many countries

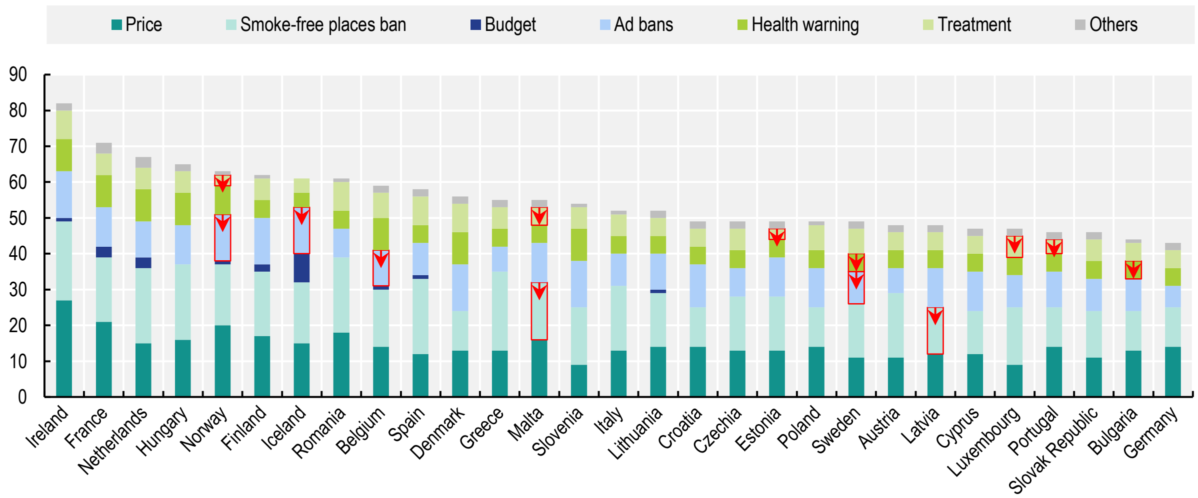
Europe's Beating Cancer Plan aims to create a "tobacco-free generation" by 2040, with the goal to reduce use of tobacco to less than 5% of the population (European Commission, 2021[67]). This commitment, often presented in Member States alongside a national aspirational target for decreasing prevalence of smoking, is important for leveraging political, public and social support around specific tobacco control policies. The Netherlands and Portugal have set a goal that, from 2040, no new generations will smoke (Government of the Netherlands, 2019[68]; GECP, 2022[69]; Government of Portugal, 2023[70]). Other countries have set goals for a tobacco-free future, such as reducing the proportion of adolescents smoking to less than 3% (England, United Kingdom) or the proportion of adults to less than 5% (France) (Been et al., 2021[71]; Public Health France, 2023[72]). In the Netherlands, the framework of protecting future generations has been successful in driving stricter tobacco control policies (Willemsen and Been, 2022[73]).

> *Since 2010, most countries have strengthened their tobacco control policies, utilising a range of policy levers to reduce smoking prevalence*

In 2003, the Framework Convention on Tobacco Control – the first international treaty under the auspices of WHO – was adopted (WHO, 2023[74]). This aims to facilitate demand-based reduction of tobacco consumption and to set the stage for a broad understanding that tobacco policies should be comprehensive and implemented as a package of different approaches. WHO's MPOWER framework helps countries gauge their implementation of known cost-effective tobacco-related policies (Joossens and Raw, 2006[75]) by monitoring progress on tobacco usage; protecting people from smoke by regulating smoke-free environments; offering help to quit tobacco use via access to cessation programmes; warning about the dangers of tobacco through prominent package labelling; enforcing bans on tobacco advertising, promotions, product placement and sales channels; and raising taxes on tobacco (WHO, 2021[76]). The Tobacco Control Scale (TCS) examines several policies, including those in the MPOWER framework, across a range of countries over time, weighting them on a total scale of 100 according to the known effectiveness of each of the measures. Figure 3.8 shows the 2021 country scores on the TCS (total and in the various policy categories) for EU+2 countries, and indicates their evolution since 2010.

Figure 3.8. Most countries have strengthened tobacco control policies since 2010

Tobacco Control Scale (TCS) scores by category in 2021, red arrows indicating a decline from 2010



Note: The methodology to compute the score by policy domain is described in the TCS reports. “Others” includes the elimination of illicit trade and an alignment with Article 5.3 of the WHO Framework Convention on Tobacco Control. The maximum scores are 30 (Price), 22 (Smoke-free place ban), 10 (Budget), 13 (Ad bans), 10 (Health warning) and 10 (Treatment).
Source: Tobacco Control Scale, www.tobaccocontrolscale.org/the-reports/.

Ireland has the highest score on the 2021 TCS, at 82 points out of 100, with France in second place at 71 points. Ireland scores by far the highest on pricing (taxation) policies, and the maximum possible on comprehensive smoke-free bans and advertising bans. Six other countries (the Netherlands, Hungary, Norway, Finland, Iceland and Romania) score over 60 points, while Germany (43 points) and Bulgaria (44 points) are at the bottom of the list. All EU+2 countries except Iceland – which already had a very high score – and Sweden, increased tobacco-related restrictions between 2010 and 2021. It is important to note that the score for smoke-free places ban only relates to a specific selection of indoor bans that do not include recent outdoors bans. In Sweden, for example, new tobacco-related legislation came into force from 1 July 2019, covering smoke-free outdoor environments; this applies to areas relating to public transport, play areas, sport activities and other public facilities, as well as serving areas of restaurants and cafés. On average, TCS scores increased by 24% between 2010 and 2021 among the 29 EU+2 countries.

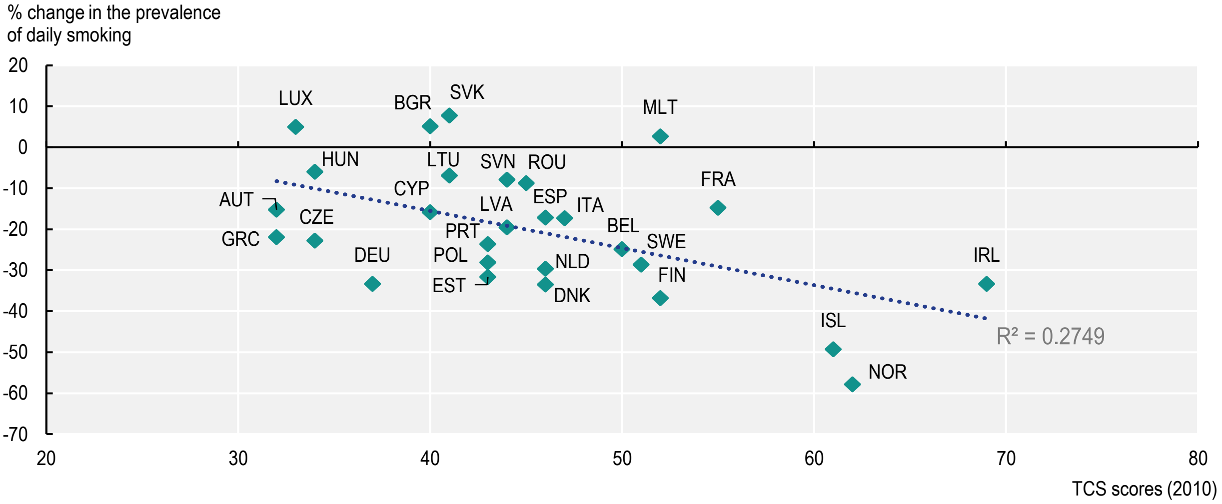
Most TCS categories saw improvements across most countries during 2010-21:

- All countries had stronger product labelling requirements about the dangers of smoking.
- Of the EU+2 countries, 22 strengthened bans on advertising cigarettes across different media.
- Protection from tobacco smoke was increased in 21 countries by mandating more smoke-free environments in places such as healthcare facilities, educational establishments, restaurants and public transport.
- Countries are also increasingly offering more assistance to smokers looking to quit, by providing cessation programmes in a range of community or healthcare settings, nicotine replacement medications and/or a phoneline assisting people with quitting: 19 more countries offered cessation support in 2021 than 2010.

It is important to implement tobacco control policies as a comprehensive package, as France did with its 2016-20 tobacco control interventions; these included a substantial tax increase, plain packaging for tobacco packages, a mass yearly cessation campaign and reimbursement of nicotine replacement products. Over 2023-50, these combined interventions are expected to prevent 4 million cases of chronic disease, save EUR 578 million in healthcare expenses and return EUR 4 for each euro invested (Devaux et al., 2023[77]). As policy changes take time to take effect and influence population behaviour, Figure 3.9 plots countries' scores on the TCS in 2010 and the change in smoking prevalence to 2021, finding a correlation between a higher TCS score – denoting stronger tobacco control policies – in 2010 and a reduction in adult daily smoking rates over the following decade.

Figure 3.9. A higher Tobacco Control Score in 2010 is associated with a larger reduction in daily smoking rates among adults during 2010-21

Correlation between the 2010 Tobacco Control Scale score and the prevalence of daily smoking of cigarettes for those aged 15 years and more in 2010-21



Note: Changes in the prevalence of daily smoking are based on the period from 2010 to 2021 (or the latest available data point).
Source: OECD Health Statistics 2023, https://doi.org/10.1787/health-data-en; Eurostat (2023), "Daily smokers of cigarettes", European Health Interview Survey, Tobacco Control Scale (2021), www.tobaccocontrolscale.org/the-reports/.

EU+2 countries are increasingly regulating e-cigarettes and other electronic delivery systems via similar – though often weaker – policies to those used for tobacco, which are not reflected in the TCS scale (WHO, 2023[3]). Policy efforts include minimum age sales restrictions, taxes on electronic cigarettes, bans on smoking in indoor spaces, sales regulations and advertising restrictions (OECD, 2023[32]). In the EU27, e-cigarettes are regulated by the 2014 Tobacco Products Directive. However, disposable e-cigarettes, which are popular among younger people and are associated with substantial health and environmental impacts, are expected to be further restricted via national bans or EU-level legislation to ban single-use disposable batteries (European Parliament, 2023[78]).

Tobacco taxation policies are cost-effective, but the tax level needs to be updated and aligned across categories of products and countries

Taxing tobacco is considered the most cost-effective tobacco control policy – especially among young people and low-income groups (Joossens and Raw, 2006[75]). On average, a 10% price increase will reduce consumption by 4% in high-income countries, while increasing tax revenues that can be used for tobacco control. In France, a 31% price increase in cigarettes in 2003 corresponded with a decrease in smoking prevalence by 5 percentage points that year. In the Netherlands, an 18% price increase in February 2004 was aligned with a drop in cigarette sales of almost 13% that year (Joossens and Raw, 2006[75]).

In 2022, excise duties and value added taxes on cigarettes in the EU27 ranged from less than EUR 3.00 in Bulgaria, Poland, Romania and the Slovak Republic to more than EUR 6.00 in Denmark, Finland, France and the Netherlands, to above EUR 11.00 in Ireland (Enache, 2022[79]). Estonia, Denmark and Finland have the highest taxes as a share of retail selling price, at over 85%. Luxembourg, Germany, Romania and Sweden have taxes below the 75% minimum level recommended by the WHO (2023[3]), (Enache, 2022[79]).

Ireland, Norway and France had the highest pricing scores in 2021.There have been some tax increases in EU+2 countries since the 2021 TCS score was assessed, but only the 1 January 2022 tobacco excise tax increase in Lithuania has been substantial in terms of its share of retail price (WHO, 2023[3]). While tobacco taxation is common, only a few EU+2 countries (Estonia, France, Iceland, Ireland, Lithuania and Romania) have earmarked a portion of tobacco taxes to go directly to tobacco control or other public health purposes (Campaign for Tobacco-Free Kids, 2021[80]).

An evaluation of the EU's Tobacco Taxation Directive showed that major differences in taxation (and thus pricing) across Member States limit the benefits to public health – in particular, where cross-border sales are substantial. The evaluation also noted that newer products such as e-cigarettes and heated tobacco were testing the limits of the existing Directive (European Commission, 2020[81]). In line with Europe's Beating Cancer Plan, the Commission is reviewing not only the Tobacco Taxation Directive and the legal framework on cross-border purchases of tobacco by private individuals but also the Tobacco Products Directive. The Plan refers to the need to work in full transparency towards plain packaging and a full ban on flavours, using existing EU agencies to improve assessment of ingredients, extending taxation to novel tobacco products, and tackling tobacco advertising, promotion and sponsorship on the internet and social media (European Commission, 2021[67]).

Smoke-free environments, information and advertising restrictions are of major importance in affecting individuals' choices around tobacco consumption

Restrictions of smoking in public places including workplaces, public transport, restaurants and bars – along with policies covering outdoor locations such as playgrounds and public parks – are another very effective tool at reducing tobacco usage. A study from the United States found that comprehensive indoor smoking bans (restaurants, bars and workplaces) reduce smoking prevalence by 2-3%. Furthermore, bans on smoking in bars were found to be particularly influential in reducing smoking among women, low-income groups, those under age 30 and heavy episodic drinkers (Carton et al., 2016[82]). A 2023 study that took advantage of the three-year gap between implementation of indoor smoking bans in Denmark (2007) and Switzerland (2010) found that Denmark's ban decreased smoking prevalence and that lung function improved among both non-smokers and smokers after implementation (Strassmann et al., 2023[83]).

Mass communication on tobacco control – entailing information, media campaigns and school-based programmes, depending on duration and scale – has been shown to reduce tobacco consumption. The 2021 TCS report recommends that governments spend at least EUR 2 per capita annually on anti-tobacco campaign efforts (TCS, 2022[84]). Iceland is the only country that came close to spending that amount in 2021: all other EU+2 countries except France and the Netherlands had low spending in this area. Iceland's approach stems from its history of strong tobacco control policy, which has included use of earmarked tobacco taxes for tobacco prevention and education (WHO, 2016[85]). In recent years, Iceland has moved towards a holistic "Health-promoting Community" approach in municipalities and schools that includes tobacco education, with a larger focus on creating healthy lifestyles and overall well-being. Furthermore, since the "wake-up call" peak in 1998 of 23% of adolescents reporting daily smoking and 42% reporting being drunk in the past month, Iceland initiated a major "Drug-free Iceland" intervention to improve the overall environment in which adolescents are raised. The research-driven approach focuses on parental monitoring, involvement, quality family time and adolescent participation in youth activities and sports. By 2006, rates among adolescents of daily smoking had fallen to 12% and of intoxication in the last month to

25%, alongside reported increasing rates of protective factors. Localities with the most interventions saw the greatest decreases in substance use (Sigfusdottir et al., 2008[86])

While three major EU-wide anti-tobacco campaigns took place between 2005 and 2016, the focus in recent years has been on more targeted and country-specific initiatives, such as efforts in Germany to make smoking cessation information available to specific population groups (European Commission, 2023[87]). The anti-tobacco and public health websites developed by Germany target migrants, providing information booklets in Russian, Turkish and Arabic on tobacco addiction support and services offered. In France, the TABADO Programme develops information materials and resources tailored to young populations. The Programme supports vocational high school students and apprentices with quitting smoking (Box 3.2).

Box 3.2. The TABADO Programme in France aims to reduce social inequalities in smoking among young people

France's TABADO Programme, co-ordinated by the National Institute against Cancer, aims to help students in vocational high schools and apprentices – populations with high prevalence of smoking – to quit. The Programme aims to reduce inequalities through inclusion and outreach to particularly vulnerable populations. It consists of raising awareness of the health risks associated with tobacco use, and provides support in quitting smoking. The Programme offers a three-part intervention: a whole-class information session on smoking and cessation; one or more individual counselling sessions with a tobaccologist/addictologist; and up to four motivational group workshops for young people enrolled in the Programme. It was found to be effective during its pilot phase in 2009, and was rolled out in 142 schools in 2019-20.

Source: Cathelineau, F. et al. (2021[88]), "TABADO, un programme pertinent d'accompagnement des lycéens professionnels et apprentis à l'arrêt du tabac développé en milieu scolaire", https://beh.santepubliquefrance.fr/beh/2021/8/pdf/2021_8_3.pdf.

Comprehensive bans on advertising and promotion of tobacco across all media have been shown to be effective at reducing demand, while partial bans (e.g. only on television or radio without addressing other media) have not (National Cancer Institute, 2008[89]). Northern European countries, which have the lowest smoking prevalence rates, have the highest possible 2021 TCS scores in this category, with bans on advertising across all media, sponsorships, points of sale and product displays, and on indirect advertising such as cigarette-branded clothing. Germany had among the lowest scores in this area in 2020, but a new law was introduced in 2021 banning cigarette advertising on billboards and bus stops and in movies rated for under age 18 (alongside long-existing bans on television, radio and internet advertising), and prohibiting free cigarette samples (outside specialty stores). In 2022, following increases in use of tobacco-free nicotine products such as nicotine pouches, Iceland restricted their sales to minors as well as the advertising and marketing of such products (Government of Iceland, 2022[90]).

Large, visual health warnings covering most of the cigarette package have also been shown to discourage non-smokers from starting smoking and to encourage smokers to stop (Joossens and Raw, 2006[75]). Recent developments have centred around standardised cigarette packaging with no branding or logos to lower consumer interest: all cigarettes are sold with plain packaging, standardised visual warnings and the brand name written in plain text. Among EU+2 countries, Belgium, Denmark, Finland, France, Hungary, Ireland, the Netherlands, Norway and Slovenia have introduced standardised packaging. There are differences in standardised packaging requirements: all countries require it for cigarettes and some require it for all legal tobacco products. A few OECD countries also require standardised packaging for rolling paper (Belgium, Canada, and Israel) and for e-cigarettes and e-liquids (Denmark, Finland, Israel, the Netherlands and the Canadian province of British Columbia), whose visuals have tended to attract interest among young people (Moodie et al., 2022[91]; Campaign for Tobacco-Free Kids, 2023[92]). In 2023, Canada became the first country to take the concept to the next level, mandating that warning messages be printed on each cigarette, with the idea that the messages will reach newly initiating smokers who are handed a single cigarette (Government of Canada, 2023[93]).

Access to smoking cessation support, associated with actions in primary care settings, should be strengthened

Another WHO-recommended policy is increasing access to and financial coverage of smoking cessation aids, as many smokers report wanting to quit but finding it challenging to do so (El Asmar et al., 2022[94]). According to the TCS reports, most of the EU+2 countries have a national "quitline" that is widely available, and free network cessation support covering at least the major cities. However, in 2021, only three countries (Cyprus, Ireland and Romania) had full coverage of tobacco replacement medications, and about half do not provide any coverage (TCS, 2021[95]).

Healthcare professionals' advice and aid in providing smoking cessation treatment has been shown to be cost-effective in helping smokers quit; however, there is an "evidence-practice" gap, as physicians are too often not engaged in such efforts. A Dutch study showed that hearing about smoking cessation support from a healthcare provider in the previous year significantly increased the likelihood of a smoker using such services in their most recent cessation attempt (van Westen-Lagerweij et al., 2022[96]). One review examined 49 studies on implementation strategies to increase primary care engagement with smoking cessation. It included evidence that increasing insurance coverage for smoking cessation services in the United States corresponded with an increase in providers recording smoking status in the health record, providing cessation advice and prescribing cessation medications. Furthermore, financial incentives granted for "meaningful use" of health information technology in the United States and a pay-for-performance scheme in the United Kingdom showed that, under these incentive programmes, general practitioners (GPs) increased their recording of smoking status, and were more likely to report giving smoking cessation advice, although evidence regarding increases in prescription of cessation medications was mixed (Tildy et al., 2023[97]).

School-based programmes to prevent smoking and workplace interventions to offer cessation support have also been instrumental in reducing smoking prevalence. For example, a pooled analysis of 49 randomised controlled trials (RCTs) of school-based interventions showed a 12% statistically significant reduction in smoking rates at the longest available follow-up compared to controls (Thomas, McLellan and Perera, 2013[98]). A 2014 study that examined 31 moderate-to-high-quality studies on workplace interventions provides strong evidence that individual therapy, group therapy, pharmacotherapy and multi-component interventions aimed specifically at smoking cessation were more successful than no or minimal intervention (Cahill and Lancaster, 2014[99]). A French study comparing free smoking cessation support to the existing EUR 50 coverage found that free cessation access was very cost-effective, with a base estimate of EUR 3 868 per life-year gained (Cadier et al., 2016[100]).

Tobacco policies need to be implemented in ways that ensure they do not exacerbate existing socio-economic gaps

Although countries have strengthened tobacco control policies and made headway at reducing overall prevalence, in many cases there are large inequalities in smoking rates across socio-economic groups (OECD, 2019[101]). Thus, in addition to considering effective tobacco policies for the overall population, it is important to prioritise approaches that can be particularly effective among vulnerable subgroups. Of the 26 EU+2 countries that responded to the 2023 OECD Policy Survey on Cancer Care Performance,[2] only 10 (Bulgaria, France, Germany, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Poland and Spain) reported having specific policies in place to address lifestyle risk factors among those with low socio-economic status.

A 2019 meta-analysis of the impact of interventions for reducing tobacco disparities between socio-economic groups showed that 17 interventions reduced socio-economic gaps, 16 increased gaps and 1 was neutral, while the majority of studies (48) showed mixed or unclear results (Smith, Hill and Amos, 2021[102]). Higher tobacco pricing due to increased tobacco taxes is the main intervention that has consistently proved effective in reducing tobacco demand, particularly among vulnerable people – including young people and low-income groups, who tend to be more responsive to price increases (WHO, 2023[103]). Smoking cessation support and services also provide the necessary support for vulnerable individuals who may be looking to quit (Greenhalgh, Scollo and Winstanley, 2022[104]). Individual-level interventions, including quitlines, counselling and nicotine replacement therapy, have also been shown to be effective among vulnerable groups.

It is also important to adapt smoking cessation interventions to ensure their efficacy in all groups, accounting for cultural and linguistic differences. In a study on Bosnian and Turkish migrants in Austria who smoked, 78% preferred smoking cessation counselling in their native language. Furthermore, more migrants than non-migrant Austrians indicated a preference for the church or mosque as a location for receiving cessation support (Urban et al., 2015[105]). In the Netherlands, the Smoke-free Living for Everyone Programme takes a local, tailored approach to reducing smoking in vulnerable communities. Integrated interventions are designed with local residents' involvement, wherein smoking is tackled alongside other community challenges (Pharos, 2023[106]). In its Smokefree Aotearoa 2025 Action Plan, New Zealand has stated goals of providing tailored support for smoking cessation to its Pacific communities, and of ensuring co-engagement via Māori leadership and involvement in the overall Plan (Ministry of Health, 2023[107]). In the United States, smoking cessation interventions in San Diego are conducted by community health workers (paraprofessionals working in primary healthcare with strong links to the community) to create supportive environments and address cultural-linguistic barriers for Latino communities, thereby helping to improve access to healthcare resources in the area of public health and cancer risk reduction programmes (Woodruff, Talavera and Elder, 2002[108]).

In contrast to taxation and smoking cessation programmes, studies found that smoke-free regulations can increase inequalities in smoking. This is particularly the case where such bans are voluntary, partial or implemented in selected geographical locations (Brown, Platt and Amos, 2014[109]), as places with more vulnerable populations are less likely to adopt or enforce such bans. Comprehensive national bans that apply across the board are thus necessary to prevent widening inequalities in smoking. Mass media campaigns have shown mixed results in terms of equity, as groups with higher socio-economic charcteristics may act more effectively on health information.

As such, policies applied in isolation may not be sufficient to reach all population groups and result in the highest possible health benefits. Recognising the benefits of a comprehensive approach over a narrow one, Hungary has taken multiple actions ranging from regulatory to counselling to reduce the prevalence of smoking (Box 3.3).

Box 3.3. Hungary is tackling high prevalence of smoking via strong tobacco control policies

Given its high prevalence of smoking and burden of tobacco-related diseases, Hungary has taken stringent action on tobacco control, ranking fourth among the EU+2 countries on the 2021 TCS thanks to the 1999 Anti-Smoking Law, a 2011 ban on smoking in workplaces and public spaces, a 2013 reduction of tobacco sales sites, and the introduction of uniform cigarette packaging in 2019. Smoking prevention efforts in Hungary start early: since 2018, about half the country's kindergartens have participated in a programme that helps young children develop negative perceptions on smoking and take action to reduce exposure to second-hand smoke. A school-based "No Smoking" Programme reinforces the message via interactive videos, gaming tools and discussions, as well as a "smoking is bad" website with targeted materials for different age groups. The efforts are paying off: 74% of children aged 13-15 were non-smokers in 2016 compared to 62% in 2008 (Demjén, Kimmel and Kiss, 2018[110]).

In terms of smoking cessation, Hungarians can visit lung clinics for cessation services without a referral, and there is a national quitline where callers are assisted via evidence-based multi-session counselling (Demjén, Kimmel and Kiss, 2018[110]). In 2019, a new app called "Facing a problem? Don't reach for the stick!" was introduced, which aims to sustain motivation by highlighting the health improvements and cost savings for former smokers. In 2021, a stop-smoking campaign was initiated, employing press releases, online advertisements and social media initiatives (European Commission, 2023[111]).

3.3.2. Policies to address harmful alcohol consumption vary across EU+2 countries

> *A comprehensive package of prevention policies is necessary to address harmful alcohol consumption, but implementation differs across EU+2 countries*

The WHO Global Action Plan for the Prevention and Control of Noncommunicable Disease 2013-20 (WHO, 2013[112]) aims to reduce harmful alcohol use by 10% through 11 policy interventions. Among these, taxation, restrictions on alcohol advertising and restrictions on the physical availability of alcohol are classified as "Best Buys" – policies considered the most cost-effective and feasible for implementation (WHO, 2021[113]).

Other interventions with potential to reduce alcohol consumption include blood alcohol concentration limits for drivers and penalties for driving under the influence of alcohol, brief interventions to detect and provide counselling to people who drink heavily, and other emerging policy interventions such as minimum unit pricing, labelling methods to communicate health warnings and nutritional content of alcohol, and mass media campaigns (WHO, 2017[114]). An OECD report using simulation models shows that investing in a comprehensive policy approach helps address harmful use of alcohol, reducing the burden of diseases and generating savings in health expenditure. While all policy interventions have a positive effect on population health, the results show that greater impact is achieved by combining established policy interventions (alcohol taxation, regulation of alcohol advertising, sobriety check points and alcohol counselling in primary care) and newer interventions (such as minimum unit pricing and bans on alcohol advertising targeting children); this is predicted to result in a gain of up to 4.6 million life-years per year across all 48 countries examined. A comprehensive policy package is expected to reduce the number of alcohol-related cancer cases by 2 million by 2050, and to have a significant economic impact through healthcare expenditure savings and labour market outcomes. Overall, for each USD 1 invested in this comprehensive alcohol policy package, up to USD 16 is returned in economic benefits. The estimations also show that the impact of a comprehensive policy package on DALYs and life-years gained would be greatest in the Baltic and Central and Eastern European countries (OECD, 2021[115]).

In 2021, all European countries had a series of policy actions in place to reduce harmful alcohol use. Using the categories of WHO's Global Strategy to Reduce the Harmful Use of Alcohol, the OECD report reveals cross-country variation in the level of implementation of alcohol control policies. The clustering of countries shows that Finland, France, Italy and Sweden tend to have the highest levels of implementation, while Austria, Belgium, Croatia, Cyprus, Denmark, Greece, Hungary and Luxembourg show the lowest level of implementation for at least three policy areas. Table 3.2 highlights select alcohol policies, indicating scope in various countries to increase implementation of policy interventions to address harmful use of alcohol.

The remainder of the section presents some established and innovative policies to reduce alcohol consumption, including the three WHO Best Buys, minimum unit pricing and health warning labels. Particular attention is given to policies with potential to affect vulnerable or high-risk populations.

Table 3.2. Various alcohol interventions have been implemented across EU+2 countries

Country	Pricing policies		Availability restrictions			Marketing regulations		Consumer information	
	Taxation adjusted for inflation	Minimum unit pricing	Minimum legal age for purchasing	Restrictions on sales by premise type (on- or off-premise)	Restrictions on density of alcohol outlets	Advertising on national television	Advertising on social media	Health warning labels	Guidelines for school-based prevention
Austria	✗	✗	16-18[1]	Both types	None	Partial	Voluntary	✗	✗
Belgium	✓	✗	16-18[1]	None	Off-premise	Partial	Voluntary	✗	✓
Bulgaria	✗	✗	18	None	Off-premise	Partial	Partial	✗	✗
Croatia	✗	✗	18	None	None	None[2]	None	✗	✓
Cyprus	✗	✗	18	Both types	Both types	Partial	Voluntary	✗	✓
Czechia	✗	✗	18	None	None	Partial	Partial	✗	✓
Denmark	✗	✗	16-18[1]	None	None	Partial	Voluntary	✗	✗
Estonia	✗	✗	18	Off-premise	None	Ban	Partial	✗	✗
Finland	✗	✗	18	Both types	Off-premise	Partial	Partial	✗	✗
France	✓	✗	18	Both types	On-premise	Ban	Partial	✓	✓
Germany	N/A	✗	16-18[1]	None	None	Partial	Voluntary	✗	✗
Greece	✗	✗	18	None	None	Voluntary	Voluntary	✓	✗
Hungary	✗	✗	18	None	None	Partial	Partial	✗	✓
Iceland	✗	✓	20	Both types	Off-premise	Ban	None	✗	✓
Ireland	✗	✓	18	Both types	Both types	Partial	Voluntary	✗	✓
Italy	✓	✗	18	Both types	None	Partial	None	✗	✓
Latvia	✗	✗	18	Off-premise	None	Partial	Partial	✗	✗
Lithuania	✗	✗	20	Both types	None	Ban	Ban	✗	✓
Luxembourg	✗	✗	16	On-premise	On-premise	Partial	Partial	✗	✗
Malta	✗	✗	17	Off-premise	None	Partial	None	✗	✓
Netherlands	✗	✗	18	None	None	Partial	Voluntary	✗	✗
Norway	✗	✗	18-20[1]	Both types	Off-premise	Ban	Ban	✗	✗
Poland	✗	✗	18	None	None	Partial	Partial	✗	✗
Portugal	✗	✗	18	Both types	None	Partial	Partial	✓	✓
Romania	✓	✗	18	None	None	Partial	Partial	✗	✗
Slovak Republic	✗	✓	18	None	None	Partial	Voluntary	✗	✗
Slovenia	✗	✗	18	Off-premise	None	Partial	Partial	✗	✓
Spain	✓	✗	18	Both types	None	Partial	None	✗	✗
Sweden	✗	✗	18-20[1]	Both types	Off-premise	Ban	Partial	✗	✗

Notes: N/A stands for not available. Minimum unit pricing sets a mandatory floor price per unit of alcohol or standard drink. Minimum legal age for purchasing only concerns the age at which a young individual can purchase alcohol without parental supervision. On-premise refers to restaurants or bars; off-premise refers to establishments such as liquor stores. Partial regulations on advertising may refer to time and/or place and/or content.

1. In Austria, there are regional variations in minimum legal ages. In Belgium, Denmark and Germany, only drinks with low alcohol content can be sold to those aged 16-17. Similarly, only low-alcohol products can be sold to those aged 18-19 in Norway and Sweden.

2. Croatia has no restrictions on advertising on national television (except for beer).

Source: OECD (2021[115]), *Preventing Harmful Alcohol Use*, https://doi.org/10.1787/6e4b4ffb-en; OECD (2022[116]), Consumption Tax Trends 2022: VAT/GST and excise, core design features and trends, https://doi.org/10.1787/6525a942-en; European Commission (2021[117]), Excise Duty tables: Part 1 - Alcoholic beverages, https://taxation-customs.ec.europa.eu/system/files/2021-09/excise_duties-part_i_alcohol_en.pdf; Cyprus Bar Association (n.d.[118]) Law on the Sale of Alcoholic Beverages of Cyprus, https://www.cylaw.org/nomoi/enop/non-ind/0_144/full.html; Le service public fédéral (SPF) Santé publique, Sécurité de la Chaîne alimentaire et Environnement (2016[119]), Alcohol, https://www.health.belgium.be/fr/sante/prenez-soin-de-vous/alcool-et-tabac/alcool; WHO Global Health Observatory Database.

Taxation and minimum unit pricing are key levers to reduce alcohol consumption among low-income groups

Higher prices of alcoholic drinks have been shown to reduce alcohol consumption. A recent literature review shows that the mean of the elasticities varies from -0.5 for beer to -0.8 for spirits, meaning that a 10% price increase will reduce consumption by between 5% and 8% (Clements et al., 2022[120]). Despite clear evidence of the price elasticity of demand, 8 of the 29 EU+2 countries tax only beer and spirits, while 21 tax all beverage types (OECD, 2021[115]).

Beyond taxation, minimum unit pricing (MUP) is a policy intervention that sets a mandatory floor price per unit of alcohol or standard drink. While increasingly implemented globally, only three EU+2 countries have implemented MUP: the Iceland, Ireland and the Slovak Republic (WHO, 2022[121]). The Slovak Republic was the first EU27 country to implement a minimum pricing regulation on alcoholic beverages, forbidding sales of spirits at a price cheaper than the sum of value added tax (VAT), excise tax and the minimum unit price of EUR 0.86. Ireland implemented MUP in 2022 on all alcoholic products, making the lowest price that can be charged for a gram of alcohol EUR 0.10. Similarly successful examples were seen in the United Kingdom: MUP was introduced in Scotland in 2018, and in Wales in 2020, setting a floor price per unit of pure alcohol at GBP 0.50. In Scotland, this was associated with a 7.6% reduction in weekly purchases of alcohol, with a larger impact among low-income groups (O'Donnell et al., 2019[122]). Particularly targeting low-cost high-strength alcohol, the Scottish policy was associated with a 13% reduction in deaths wholly attributable to alcohol in nearly three years, with a particularly marked reduction among people living in the most socio-economically deprived areas (Wyper et al., 2023[123]).

A systematic review of evidence from Australia, Canada and the United Kingdom similarly shows that taxation and MUP led to a reduction in overall alcohol consumption, with larger impacts among low-income populations (Kilian et al., 2023[124]). In Lithuania, the marked increase in alcohol excise taxation resulted in a decrease in education-related inequalities in mortality, driven by a stronger reduction of mortality rates among men with lower education levels (Manthey, Jasilionis and Jiang, 2023[125]). In Finland, a time-series analysis found a negative association between higher minimum prices and alcohol-related mortality (Herttua, Makela and Martikainen, 2015[126]). It is important to note that the impact of taxation and MUP among socio-economic groups varies according to the socio-economic proxy used. Additionally, measures affecting the price of alcohol should be accompanied by measures to raise awareness of the change and support for decreasing consumption for heavy drinkers and those living with alcohol dependence, to prevent disproportionate financial strain from increased spending on alcohol.

Further restrictions on physical availability of alcohol and on alcohol advertising help to reach vulnerable populations

Restrictions on alcohol availability limit the opportunity for people to purchase and consume alcohol. According to the 2021 OECD report, 12 EU+2 countries restrict the hours and days for both on-premise (restaurants and bars) and off-premise (liquor stores) alcohol sales, and all countries set a minimum age at which people can purchase or consume alcohol legally (OECD, 2021[115]). While four EU+2 countries have set the minimum legal age at which people can purchase or consume alcohol with low alcohol content at 16, most allow purchasing of all alcohol at 18. The exceptions are Luxembourg and Malta, where all types of alcohol purchases are allowed at ages 16 and 17, respectively, and Iceland, Lithuania, Norway, and Sweden, where they are only allowed at age 20 (see Table 3.2).

Restrictions on the number and density of outlets in a given area are also an effective policy intervention to reduce alcohol consumption, although less extensively implemented. Only four EU+2 countries have set on-premise outlet restrictions (Cyprus, France, Ireland and Luxembourg), while eight have off-premise outlet restrictions (Belgium, Bulgaria, Cyprus, Finland, Iceland, Ireland, Norway and Sweden). The remaining 19 EU+2 countries have no restrictions on the number or density of any alcohol outlets. Evidence suggests a positive association between alcohol outlet density, alcohol consumption and related harm and violence – particularly among young drinkers and those with lower socio-economic characteristics. Reduction of outlet density has been found to decrease socio-economic inequalities in alcohol consumption (Roche et al., 2015[127]). There is, however, large heterogeneity in policy design according to outlet type (such as bars, restaurants or liquor stores), alcoholic beverages and implementation level (national or local), for example. Nordic countries (Finland, Iceland, Norway, and Sweden) have a state monopoly to sell alcoholic beverages above a certain alcohol content that limits availability through lower retail outlet density and shorter opening hours (Box 3.4). Other OECD countries such as Australia, Canada, and the United States also have interesting examples of restricting outlet density, with implementation at the local level. All provinces of Canada (except Alberta), for example, have a retail alcohol monopoly (Room, 2021[128]).

Box 3.4. State alcohol retail monopolies are in place in Nordic countries

The Nordic countries (Finland, Iceland, Norway and Sweden) have implemented retail monopoly systems that are government-owned, allowing to control when, where and at what price alcohol is sold. The overarching objective is to limit the negative effects of harmful alcohol consumption on the population and society, and to reduce harm from alcohol.

- In Iceland, access to alcohol is controlled through a state-owned monopoly chain of liquor stores, which are the only retail sites allowed to sell alcoholic beverages containing more than 4.75% alcohol by volume.
- The Norwegian Government has adopted policies that impose high prices, limit access and have a non-profit distribution model of alcohol containing more than 4.75% alcohol by volume through the Wine Monopoly.
- Sweden restricts availability through the retail monopoly of state-owned Systembolaget, which controls the sales of all alcoholic beverages containing more than 2.25% alcohol by volume, except beer with a maximum of 3.5% alcohol by volume. Systembolaget is also tasked with informing people about the risks of alcohol. It operates on a not-for-profit basis, and has limited operating hours. A modelling study estimated that dismantling the Swedish monopoly would increase alcohol consumption by up to 31% per year, which would lead to 1 234 more deaths each year compared to a 2014 baseline (Stockwell et al., 2018[129]).
- Finland had granted a monopoly to a government-owned company for retail sales of alcohol products above 5.5% alcohol by volume, and limited opening hours. However, the government's programme in 2023 has proposed changes to the policy, increasing the permissible alcohol content for alcohol sold in other stores. A modelling study (Sherk et al., 2023[130]) found that abolishing the state monopoly on alcohol sales would lead to a 9% increase in alcohol consumption and significant increases in alcohol-related economic costs and mortality compared to a 2018 baseline.

Source: OECD (2023[131]), *EU Country Cancer Profiles*, www.oecd.org/health/eu-cancer-profiles.htm.

Another effective policy intervention to target high-risk populations is reducing marketing that promotes favourable attitudes to alcohol. A handful of studies have shown a positive association between alcohol advertising and consumption (both initiation and hazardous drinking), which is particularly pronounced among young people. A recent systematic literature review confirmed the causal relationship between alcohol marketing and subsequent drinking behaviour among young people (Sargent and Babor, 2020[132]). While the European Audiovisual Media Services Directive sets restrictions on the content of alcohol advertising to televisions, radio and video-sharing platforms, EU+2 countries restrict alcohol marketing to varying degrees. In 2020, only six EU+2 countries had bans on national television advertising for beer and wine (Sweden, Norway, Lithuania, Iceland, France and Estonia) (see Table 3.2). In Sweden, advertising bans target television and radio, while marketing through other media (such as billboards or newspapers) needs to follow strict criteria on content, placement and inclusion of warning labels. For example, advertising cannot be aimed at or portray people aged under 25, cannot be shown in places where these groups are the main ones present, and can only portray the product and the produce used (e.g. grapes).

In addition, as both adults and children spend a significant amount of time on social media and other digital platforms, they are increasingly exposed to targeted alcohol advertising leading to drinking behaviour. The positive association between the amount of time spent on social media and alcohol use by young people has been reported in several countries. In Australia, a cross-sectional study suggested a significant association between interaction with alcohol content on three leading social networking sites and drinking levels (Gupta et al., 2018[133]). In the United Kingdom and Norway, social media use has been associated with more frequent alcohol consumption among young people (Ng Fat, Cable and Kelly, 2021[134]; Brunborg, Skogen and Burdzovic Andreas, 2022[135]). Those aged 10-15 with four hours of social media use per day are twice more likely to drink at least monthly than those with less than one hour of social media use. Similar associations were found between greater use of social media and heavy episodic drinking among those aged 16-19 (Ng Fat, Cable and Kelly, 2021[134])).

Despite such growing evidence on the increased risk of alcohol consumption associated with social media, very few countries have comprehensive bans on alcohol marketing on social media or other digital platforms. In 2020, only Lithuania and Norway had bans to restrict alcohol advertising via social media (see Table 3.2). By contrast, five EU+2 countries had no social media advertising restrictions (Croatia, Iceland, Italy, Malta and Spain). The remaining countries had partial (i.e. the restriction applies during a certain time of day or for a certain place, or to the content of events) or voluntary restrictions (i.e. the alcoholic beverage industry follows its internal voluntary rules). More effective regulation and international co-operation are needed to implement and enforce further social media advertising restrictions.

Alcohol health warning labels have shown encouraging results to increase consumer awareness of the risks associated with drinking

Consumer knowledge of disease or injury risks due to alcohol consumption and behaviour change is mostly enhanced through mass media campaigns. These are common policy tools in all EU+2 countries, targeting driving under the influence of alcohol, awareness of the health risks associated with alcohol consumption and "dry month" campaigns promoting not drinking during one month (OECD, 2021[115]). However, labelling alcoholic beverages with health warnings is rarely implemented across EU+2 countries, although it provides further opportunities to increase awareness.

The literature on the impact of warning labels provides evidence of their effectiveness in increasing awareness. Effectiveness of reducing the level of alcohol consumption is still inconclusive, however, and depends on the evaluation method, the design and format of the labels and the timeframe of observation (WHO, 2021[136]). In Canada, a real-world experiment in the Province of Yukon provided evidence that exposing people to cancer warnings on alcohol containers was associated with a 7% reduction in per capita alcohol use (Zhao et al., 2020[137]). The labels were colourful, had multiple messages warning about the links between alcohol and selected conditions – including cancer – and provided information on the number of standard drinks and the Canadian low-risk drinking guidelines.

Based on key lessons from the use of health warning labels to address tobacco consumption and unhealthy diets, alcohol health warning labels could be an effective tool in the package of national prevention policies to address harmful alcohol consumption. In 2020, only three EU+2 countries used health warnings on alcohol products (France, Greece and Portugal). In Luxembourg, a warning label for pregnant women is used on alcoholic beverages produced nationally, but application is not mandatory. More recently, Ireland passed the Public Health Alcohol Act in 2018 and, in May 2023, became the first country in the world to mandate comprehensive health labelling for alcohol products, including cancer warnings (Government of

Ireland, 2023[138]). Effective from May 2026, the new legislation requires alcohol product labels to specify calorie content, grams of alcohol, the risks associated with consuming alcohol during pregnancy and the risks of developing liver disease and fatal cancers from alcohol consumption. Australia, New Zealand and South Korea are examples of other OECD countries that have mandatory alcohol label warnings.

Implementation of screening and brief interventions is needed to modify lifestyles through information and education

The European Framework for Action on Alcohol 2022-25 prioritises evidence-based workplace, school and community interventions, emphasising the importance of evaluation and adaptation to reach target populations (WHO, 2022[139]). Effective interventions can be targeted at specific sectors or subgroups of employees, be delivered in a face-to-face or web setting, and include dissemination of information or training. Overall, a review found that such workplace programmes are effective in reducing alcohol use – especially the quantity of drinking – including in European countries (Fellbaum et al., 2023[140])). Similarly, studies from Germany and Norway provide evidence on the efficacy of internet-based self-help alcohol interventions offered through the workplace (Boß et al., 2018[141]; Brendryen et al., 2017[142]). Interventions such as screening and brief interventions (SBIs) can also be delivered by independent healthcare professionals in the workplace, using tools such as the WHO Alcohol Use Disorders Identification Test-Concise (AUDIT-C) or Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) to identify employees at risk of harmful alcohol use (WHO, 2023[143])). Most countries have strict legislation on alcohol use by holders of specific jobs – such as drivers, physicians and construction workers, where being intoxicated can result in severe harm – while consumption of alcohol in other settings is often left up to employers (OECD, 2022[144]).

Beyond the workplace, SBIs could be implemented in primary healthcare settings. In Germany, for example, it is estimated that fewer than 3% of patients in primary healthcare are screened for alcohol use. Between 18% and 25% of individuals in Sweden and the Netherlands reported alcohol conversations in healthcare in 2017 (Abidi et al., 2020[145]). Survey data suggest that alcohol prevention efforts should be improved, including SBIs to reduce alcohol consumption and related harm in risky drinkers. A simulation model shows that large-scale implementation of SBIs and referral to treatment in primary healthcare settings could yield large reductions in alcohol consumption in Germany. Accordingly, if one-quarter of patients or more are screened once a year, a significant reduction in drinking levels among men and in the youngest age groups could be achieved (Manthey et al., 2021[146]). In Europe, SBIs in primary healthcare were found to be cost-effective in 24 out of 28 countries by reducing alcohol-attributable morbidity and deaths (Angus et al., 2017[147]). However as of 2020, Romania, Malta, the Slovak Republic and Greece had not developed or implemented national guidelines and standards of care for SBIs (OECD, 2021[115])).

Schools can also act as excellent locations for interventions to prevent alcohol use, traditionally by focusing on imparting knowledge about alcohol. However, more recent interventions take a more interactive approach, taking into account the social and cultural factors influencing students' alcohol consumption (OECD, 2021[115]; Lee et al., 2016[148]). Although some studies show positive effects, evidence on the effectiveness of school-based intervention programmes is mixed (OECD, 2021[115]). The Unplugged Programme (Box 3.5), which is implemented in several European countries, was found to be effective in reducing alcohol-related behavioural issues, especially among children who had begun drinking before the intervention (Lee et al., 2016[148]).

Box 3.5. The Unplugged programme has been implemented in several EU27 countries

Unplugged is a school-based programme, designed for children aged 12-14 and their parents, and delivered by trained teachers, that incorporates components focusing on coping with emotions and stress, normative beliefs and knowledge about the harmful health effects of alcohol use, illicit drugs and smoking. The curriculum consists of 12 one-hour units taught once a week by class teachers who have attended a training course in the lessons and materials, and in how to teach them using methods that encourage interaction among pupils and between pupils and teachers, such as role-play and giving and receiving feedback in small groups. This basic curriculum is ideally supplemented either by meetings led by pupils selected by their classmates, or by workshops for the pupils' parents. As of 2023, the Unplugged Programme is implemented in ten EU27 countries, including Belgium, Croatia, Czechia, Germany, Greece, Italy, Romania, Slovenia, Spain, Sweden. Several studies have pointed to the effectiveness of the programme in different countries, while a systematic review of school-based prevention programmes concluded that the Unplugged Programme has the best evidence of effectiveness in Europe in prevention of alcohol use.

Source: EMCDDA (2023[149]), "Unplugged - a Comprehensive Social Influence programme for schools: life skills training with correction of normative beliefs," www.emcdda.europa.eu/best-practice/xchange/unplugged_en; Agabio et al. (2015[150]), "A Systematic Review of School-Based Alcohol and other Drug Prevention Programs", https://www.doi.org/10.2174/1745017901511010102.

3.3.3. Policies to improve diets, increase physical activity levels and address metabolic risk factors vary widely

Although unhealthy diet, physical inactivity and overweight and obesity constitute independent risk factors for cancer, efforts to address them are intertwined. Policies to tackle overweight and obesity must recognise it as a complex multi-faceted issue, while acknowledging that the primary mechanism leading to it relates to an imbalance between energy intake and expenditure. The evidence has catalysed most countries to develop initiatives to improve behavioural and metabolic factors related to diet and weight. All 29 EU+2 countries have implemented national dietary guidelines. All except Greece have an adult obesity strategy, and all except Austria, Croatia, France, Greece and Portugal have a child obesity strategy. Most EU+2 countries have guidelines on physical activity (OECD, 2022[35]). Table 3.3 outlines the national implementation status of selected policies on nutrition and physical activity. This table has been prepared using information from the World Cancer Research Fund International NOURISHING policy database, complemented by various alternative sources[3].

Table 3.3. National-level policy implementation status varies by country in selected nutrition and physical activity policy areas

	Economic tools	Marketing	Labelling	Schools		Healthcare	
	Health-related food taxes or tariffs	Regulation of direct advertising to young people (unhealthy food and beverages)[1]	Voluntary Front-of-Pack labelling (positive and/or negative)	Regulation of type of food and drink available in schools	Restrictions on SSBs in schools	Nutrition advice and counselling in healthcare , by target group	Physical activity counselling, assessment, and prescriptions in primary care
Austria	No	No	No	Voluntary	No	No	General public
Belgium	Excise tax soft drinks	Co-regulation	Both	Voluntary	No	No	General public
Bulgaria	No	Legislation	No	Mandatory	No	No	General public
Croatia	Excise tax SSBs	Legislation	Positive only	Mandatory	No	General public	General public
Cyprus	No [2]	N/A	No [2]	Mandatory [2]	No [2]	N/A	No [2]
Czechia	No	No	No	Mandatory	No	No	No
Denmark	Excise tax sugar	Self-regulation	Positive only	Voluntary	No	No	Targeted groups
Estonia	No	Self-regulation	No	Mandatory	No	Targeted groups	No
Finland	Excise tax soft drinks	Self-regulation [2]	Both [3]	Mandatory	Mandatory	General public	Yes
France	Excise tax SSBs	Legislation	Both	Mandatory	Mandatory	General public	No
Germany	No	No	Both	Voluntary	Voluntary	No	Targeted groups
Greece	No	No	No	Mandatory	Mandatory	General public	Yes
Hungary	Excise tax multiple [4]	Legislation	No	Mandatory	Voluntary	No	General public
Iceland	No [2]	N/A	Positive only [2]	N/A	N/A	N/A	N/A
Ireland	Excise tax SSBs	Self-regulation	No	N/A	Voluntary	Targeted groups	No
Italy	No	Self-regulation	No	Mandatory	No	Targeted groups	General public
Latvia	Excise tax SSBs	Co-regulation [2]	No	Mandatory	Mandatory	General public	No
Lithuania	No	Legislation	Positive only	Mandatory	No	General public	General public
Luxembourg	No [2]	N/A	Both [2]	Mandatory [2]	Mandatory [2]	N/A	N/A
Malta	No	Legislation	No	Mandatory	No	No	No
Netherlands	No	Self-regulation	No	Voluntary	No	Targeted groups	General public
Norway	Ad valorem tax sugar	Legislation	Positive only	Voluntary	Voluntary	Targeted groups	Targeted groups
Poland	Excise tax SSBs	Legislation	No	Voluntary	No	No	No
Portugal	Excise tax SSBs	Legislation	No	Mandatory	Mandatory	Yes	General public
Romania	VAT soft drinks [2]	Legislation	No	Mandatory	No	No	No
Slovak Republic	No	N/A	No	Mandatory	Mandatory	No	Targeted groups
Slovenia	No	Co-regulation	Positive only	Mandatory	Voluntary [2]	General public	General public
Spain	VAT soft drinks [2,5]	Co-regulation	No	Voluntary	No	General public	General public
Sweden	No	Legislation	Positive only	Mandatory	No	Targeted groups	General public

Notes: N/A stands for not available; SSBs stands for sugar-sweetened beverages; VAT stands for value added tax. Only policies that are implemented and endorsed at the national level are included, while policies organised locally on the level of municipalities or schools are excluded. Cells marked in teal signal national implementation of a policy in line with best practices, while light teal and light red indicate presence of a measure with some differences from best practice. Red indicates the absence of nationally implemented measures. Targeted groups for nutrition and physical activity counselling include children and adolescents or children and adolescents with obesity-related issues.

1. Legislation refers to mandatory legislation and regulation, co-regulation refers to shared regulation between the government and industry, and self-regulation means any regulation is up to the discretion of the food industry. Alcoholic beverages are excluded.
2. Based on various alternative sources used to complement the information (see endnote 3)
3. Finland uses the heart symbol, classified as positive only, however an additional high-salt label is in use to signal negative assessment.
4. Hungary applies a specific excise tax on the salt, sugar and caffeine content of various food and soft drinks.
5. The region of Catalonia in Spain has a specific excise tax on SSBs.

Source: Where not otherwise stated, this material has been reproduced from the World Cancer Research Fund International NOURISHING policy database https://policydatabase.wcrf.org and nutrition policy index https://www.wcrf.org/policy/nutrition-policy/.

Well-designed and balanced interventions related to food product prices can reduce inequalities in nutrition

Interventions on the price of products, such as taxes, subsidies and other economic incentives, affect consumer behaviours. Taxation of unhealthy food products – including sugar-sweetened beverages and food with high sugar, salt or saturated and total fat content – is less common than taxation of tobacco and alcohol products; however, evidence shows that consumption is similarly affected by price changes. A systematic review found that a 10% decrease in price was associated with 12% increased consumption of healthy foods, while a 10% increase in the price of unhealthy products led to a 6% reduction in their consumption (Afshin et al., 2017[151]). Importantly, evidence suggests that high consumers of unhealthy food products could be more affected by price increases (Taillie et al., 2017[152]; Capacci et al., 2019[153]). The impact varies depending on programme design, the size of the tax and the extent of its pass-through to consumers (i.e. the extent to which producers increase the price of the taxed product). Additionally, substitution effects should be accounted for, whereby people may opt for other similarly unhealthy options if measures are applied unevenly (OECD, 2019[154]).

There are differences in the use of financial tools across the EU+2 countries. Health-related excise taxes, applied in 10 countries, are generally considered most effective, as they are applied to specific products, decreasing their affordability relative to other similar products (see Table 3.3). Taxes affecting sugar-sweetened beverages or soft drinks (which may or may not include added sugars and sweeteners) are most common – present in 13 countries. Latvia has applied an excise tax on non-alcoholic beverages since 2000, refining it most recently in 2022 by charging an increased rate on beverages with a sugar content above 8 g/100 ml. Catalonia (Spain) implemented a tax on sugar-sweetened beverages in 2017, which led to a marked reduction in consumption of taxed beverages in low-income neighbourhoods and heightened awareness of their health effects (Royo-Bordonada et al., 2019[155]). In Europe, only Hungary applies a wider health-related excise tax on food and drinks high in salt, sugar or caffeine. This measure was initially associated with a 3.4% decrease in consumption of processed food, with particularly marked improvements among poorer households (Bíró, 2015[156]). As an added benefit, well-applied tax measures can act as incentive to the food industry for product reformulation, with potential benefits to population health that do not rely on consumer behaviour change (Rogers et al., 2023[157])

Interventions on product prices at the point of sale – including increases and decreases – have been found to modify the choices of people with lower socio-economic characteristics more than those with higher socio-economic characteristics (OECD, 2019[154]). To ensure ethical implementation of tax increases on unhealthy products, they need to be accompanied by proportional price decreases for healthy products or targeted subsidies such as vouchers or discounts to offset economic hardship potentially imposed on low-income individuals. Evidence suggests that a combination of taxes and subsidies is more effective than either alone, while maximum efficacy could be achieved if each amounts to at least 10-15% of the price of the product (Niebylski et al., 2015[158]; Saha et al., 2021[159]). To increase availability of healthy foods – such as fruit, vegetables and whole grains – and support a shift towards healthy proteins (including but not limited to plant-based ones), subsidies and food vouchers can act as an effective means to affect nutritional choices. Across Europe, targeted subsidies or initiatives to increase accessibility and affordability of healthy food are most commonly associated with school-based provision, remaining underutilised in other settings – such as targeting low-income areas or populations (WCRFI, 2023[160]).

Marketing restrictions affect nutrition throughout the life-course, and are particularly important to prevent exploitation of children's developmental vulnerabilities

Children and adolescents are exposed to a large amount of advertising for food and beverages, with child-oriented messaging commonly used to promote unhealthy products (Lavriša and Pravst, 2019[161]). Evidence shows a link between advertising exposure and short-term consumption, which is particularly strong in children under 12 and obese children (Delgado et al., 2022[162]). An Australian review concluded that regulation of television advertising of high-fat or high-sugar food and beverages to children was among the most cost-effective strategies to combat high BMI throughout the life-course (Magnus et al., 2009[163]).

Children from lower socio-economic groups have been shown to be more likely to follow an unhealthy diet, and to have high exposure to obesogenic marketing hazards, as well as higher responsiveness to advertising of unhealthy foods. Thus, interventions that reduce children's exposure to promotional marketing of unhealthy healthy foods and beverages can act to reduce inequalities, as their impact may be stronger on these children (Lobstein, 2023[164]).

Regulations typically focus on restricting television advertising at peak viewing times for young children. Policies that target food and beverage advertising are implemented in nearly all countries, although the World Cancer Research Fund International (WCRFI) (2023[160]) suggests that there are substantial gaps due to the voluntary nature of restrictions in many countries and the fact that the bans are often limited to young children. Across the 25 EU+2 countries with available information, 11 have implemented legislation to restrict advertising to young people, while 10 rely on co-regulation or industry self-regulation (see Table 3.3). The majority of advertising restrictions focus on children aged under 12, yet data on poor nutrition habits among adolescents (see Section 3.2.1) highlight a need to include older age groups (WHO, 2020[165]). Only six countries have extended measures to protect adolescents over 12. Norway has announced plans to take one of the most comprehensive approaches to regulate advertising by banning all forms of advertising of unhealthy food and beverages to children under 18. Outside Europe, Chile has similarly instated mandatory restrictions for marketing to younger age groups, with evidence of efficacy on targeted outcomes (Box 3.6).

Box 3.6. Norway and Chile have instituted strict regulations on advertising to minors

Norway

In 2023, Norway announced a plan to ban all advertising of food and beverages deemed unhealthy targeted at children under 18 via legislation going into effect in 2024. A previous self-regulation scheme was deemed insufficient, leading to a renewed effort to protect children from commercial marketing (Safe Food Advocacy Europe, 2023[166]). Although the details of the full ban were not public as of September 2023, the previous voluntary measure included regulation of advertising though various media channels, including online and broadcast advertising, direct marketing, product placement, sponsorship and marketing in/around schools – among the most comprehensive coverage in Europe (WCRFI, 2023[167]).

Chile

A policy package implemented in Chile included a restriction on child-directed marketing of unhealthy foods. A Chilean study examining cereal packaging following the ban found that cereals classified as unhealthy had accordingly reduced their use of child-directed marketing strategies, such as use of characters, children and child-like figures, cartoons or references to children's daily lives and games. Meanwhile, cereals not classified as unhealthy had, in contrast, increased such practices (Mediano Stoltze et al., 2019[168]). This finding indicates that the regulation was effective in favourably changing the types of products designed to appeal to children.

A recent review (Lobstein, 2023[164]) found that voluntary industry-driven limitations on advertising are challenging to oversee, are subject to swift changes or removal, and could exacerbate health disparities if weakened or eliminated. It suggested that statutory or coregulatory measures can be more effective. A WHO-UNICEF-Lancet Commission (Clark et al., 2020[169]) and a review (Galbraith-Emami and Lobstein, 2013[170]) also concluded that advertising restrictions relying on self-regulation by the industry can be insufficient to affect children's exposure to food advertising, largely due to a lack of compliance. The

WCRFI (2023[160]) suggests that enforcing mandatory regulatory measures that affect various media platforms could have a significant positive impact on health.

Comprehensive policy design should take a broader approach to marketing restrictions, and should address areas including sponsorships, point-of-sale settings, marketing through product design and packaging, and location – such as restricting advertising around schools. Claims made in advertisements should be regulated, requiring them to be based on evidence and led by health-promoting motives (WCRFI, 2023[160]). Given the range of marketing media used by young people, regulation of television advertising alone is insufficient to prevent exposure. To address targeted advertising, policies may need to restrict paid content in posts generated through web-based communities and influencers (Kelly, Bosward and Freeman, 2021[171]). A comprehensive approach should consider both the types of foods whose marketing should be restricted and the techniques and channels through which marketing can take place. The Joint Research Centre has developed a toolkit providing guidance to countries on implementing well-designed codes of conduct to restrict marketing of food and beverages, comprising a checklist of the main aspects and specific actions that a comprehensive marketing code should include, and emphasising the importance of addressing digital marketing due to its cross-border nature, which requires collaboration (Grammatikaki et al., 2019[172]).

Food labelling works to affect consumer choice, but is most effective across population groups when simple intuitive labels are used widely

Food labels inform buyers about the nutritional content of foods – commonly including energy content, salt, sugar and saturated or trans fat content, or healthy aspects like amount of dietary fibre. Empowering consumers to make well-informed decisions, labelling schemes for prepackaged foods and menus are effective to reduce consumption of unhealthy foods, leading to overall improvements in the nutritional quality of diets (WHO, 2015[173]; OECD, 2019[154]). Labelling can act as an incentive for food companies to reformulate their products through decreases in energy density or sugar and salt content, to fit into healthier categories (Ni Mhurchu, Eyles and Choi, 2017[174]; Nohlen et al., 2022[175]); this can be cost-effective as a measure to improve population health. Mantilla Herrera et al. (2018[176])suggest that gains can be substantially larger for mandatory than for voluntary programmes. Key policy levers include mandating back- or front-of-pack labelling; on-shelf labelling; calorie, nutrient and warning labels on menus; and regulations on nutrient and health claims. It is vital that health claims on packaging are evidence-based: evidence from Chile has found a higher prevalence of general health claims, child-directed characteristics and nature/fruit references on packaging of less healthy products (Stoltze et al., 2018[177]).

In the EU27, Regulation (EU) 1169/2011 on the provision of food information to consumers came into effect in 2014. An obligation to provide nutrition information has applied since December 2016, mandating energy value, fat saturates, carbohydrates, sugars, protein and salt content to be listed on prepackaged foods in a legible tabular format, often provided on the back of food packaging (OECD, 2019[154]; European Commission, 2023[178]). Nevertheless, the majority of consumers do not make optimal use of back-of-pack labels, as these can be hard to see and complex, and it takes time and effort to make informed choices (Nohlen et al., 2022[175]). The Regulation also allows countries to recommend front-of-pack (FoP) nutrition labelling to help consumers identify healthier foods – a key priority of the WHO Food and Nutrition Action Plan 2015-20 (WHO, 2015[173]). Simple intuitive FoP labelling is more effective than back-of-pack labels, and is estimated to decrease average daily caloric intake by 1.16% (OECD, 2019[154]). It is generally valued by consumers as a quick and easy way to acquire nutrition information when making purchase decisions (Nohlen et al., 2022[175]). Informative FoP food labels have been shown to regulate cognitive biases arising from health claims on packaging better than back-of-pack labels, which are only effective if the consumer chooses to take the time to view and interpret them (Talati et al., 2017[179]). The WCRFI (2023[160]) recommends that labels should contain both positive and negative information. Across EU+2 countries, none have mandatory FoP labelling schemes, though 12 apply voluntary ones (see Table 3.3). Further, Finland, Ireland and Slovenia have implemented menu labelling in restaurants (WCRFI, 2023[167]).

In the choice of a harmonised FoP labelling system, the European Public Health Association (EUPHA) and IARC recommend a simple graded traffic-light labelling system such as the Nutri-Score, which is in use in several European countries (Box 3.7) (EHPHA, 2023[180]; IARC, 2021[181]). The second most common labelling system in Europe is the Keyhole marking for healthy products, established in Sweden in 1989 and subsequently adopted in Denmark, Lithuania, Norway and Iceland. While evidence of the impact of food labelling on people with low socio-economic characteristics is scarce and inconclusive (Løvhaug, Granheim and Djojosoeparto, 2022[182]), some findings suggest that people from all socio-economic groups are more likely to pay attention to simplified, colourful and evaluative summary FoP labels such as Nutri-Score than to more complex back-of-pack labels (Nohlen et al., 2022[175]; Shrestha et al., 2023[183]).

Box 3.7. The Nutri-Score is used in various European countries

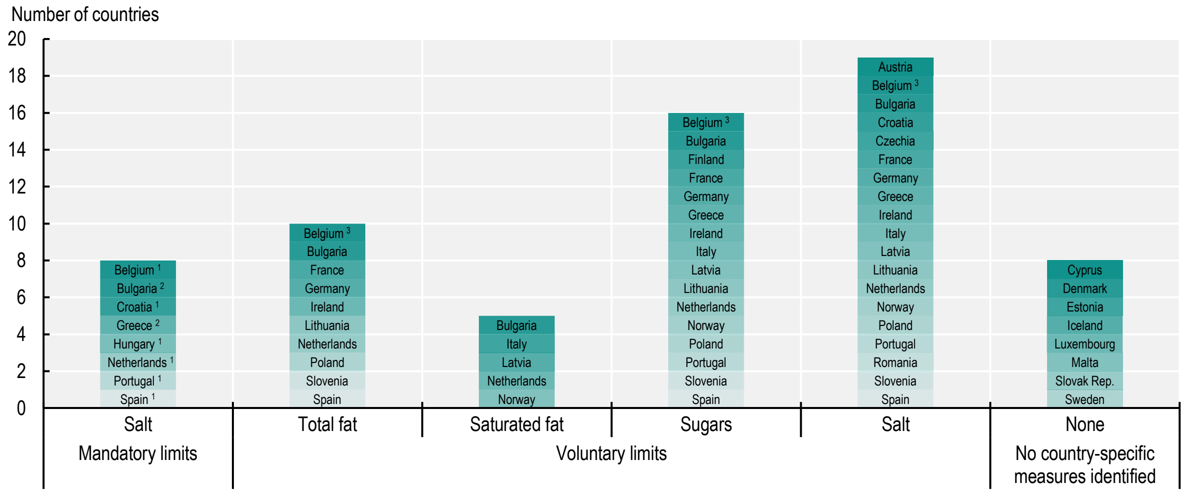
In 2017, Santé Publique France developed an official non-compulsory “Nutri-Score” food label, which provides easy-to-understand information on the overall nutritional quality of food products. In 2020, nearly 60% of people reported that they had modified aspects of their food purchasing behaviour with the help of the label (Santé Publique France, 2021[184]). Building on this experience, Belgium, France, Germany, Luxembourg, the Netherlands, Spain and Switzerland established a cross-country co-ordination mechanism in 2021 to adopt a single Nutri-Score label, although not all have implemented it at a national level. One of seven labelling programmes currently in use in the EU27, the Nutri-Score is the only programme meeting the recommendations for 1) use of colour to increase salience and draw attention; 2) simplicity for easy interpretation; and 3) a clear grading structure summarising information on both positive and negative nutritional aspects (EHPHA, 2023[180]). The nutrient profile system that underlies the Nutri-Score is considered to be the most validated and the easiest to compute. It takes into account several nutrients known to be involved in the development of obesity and chronic diseases, including cancer (IARC, 2021[181]). An experimental study found that in the 12 countries examined, the Nutri-Score was associated with the highest objective understanding by consumers (Egnell et al., 2020[185]), although there are calls to revise the Nutri-Score to ensure that the algorithms behind it place heavier penalties on ultra-processed foods (Eureporter, 2023[186]).

Reformulation can affect the whole food supply, but programmes need to contain sufficient (dis)incentives to induce compliance

The nutritional quality of foods available for sale forms the core foundation of the whole food environment. Reformulation through a variety of measures to create a healthier food environment is considered among the most cost-effective strategies to drive consumers to adopt healthy food choices, as it does not require behaviour change and simultaneously targets all consumers (Lehmann et al., 2017[187]). Many countries have instituted standards to regulate food composition, including mandatory or voluntary restrictions limiting or removing specific nutrients in food products. An EU-level pilot project to monitor the effectiveness and progress of reformulation efforts was implemented recently, resulting in the development of the EU Food and Beverages Labels Explorer (FABLE), which allows consumers and policy makers to monitor the nutritional quality of foods on the shelf easily across countries and over time (European Health and Digital Executive Agency, 2022[188]).

The only EU-wide mandatory regulation on nutritional content to date is Regulation (EU) 2019/649, which entered into force in 2021 and mandates limits on trans fat in foods. Eight countries also implement mandatory salt limits for bread – the most targeted food globally for salt reduction (Trieu et al., 2015[189]). In addition, Greece and the Netherlands extend mandatory salt limits to other selected products. The majority of limits and reduction targets in Europe, however, are voluntary: 21 of the EU+2 countries have voluntary agreements with industry on specific nutrients. Sodium (in salt) remains the most commonly targeted nutrient (19 countries), followed by sugar (16 countries) and total fat (9 countries). Eight countries have not implemented any nutrient limits or targets, apart from the Regulation on trans fat (Figure 3.10).

Figure 3.10. Country-specific limits or reduction targets have been set for food producers on selected nutrients



Note: The EU-level mandatory limit on trans fat, which applies in all EU+2 countries, is excluded. Most voluntary reduction targets apply to a specified range of products. [1] Policy applies to bread or cereal products. [2] Policy applies to a wider specified range of products. [3] Policy is implemented in the Wallonia region (Belgium) only.
Source: This material has been reproduced from the World Cancer Research Fund International NOURISHING policy database https://policydatabase.wcrf.org and nutrition policy index https://www.wcrf.org/policy/nutrition-policy/. Data for Cyprus, Iceland and Luxembourg data are cross-checked with the WHO Global Database on the Implementation of Nutrition Action (GINA), https://extranet.who.int/nutrition/gina/en.

A review suggests that the impact of reformulation policies is greater when they are mandatory, aligned with other regulations, and thoroughly monitored and evaluated to continuously engage the food and drinks industry (Vandevijvere and Vanderlee, 2019[190]). Similarly, studies have found that, to be effective, voluntary agreements may need to include ambitious targets, independent monitoring mechanisms, and disincentives for non-participation or non-compliance (Bryden et al., 2013[191]; Durand et al., 2015[192]). Further supporting the case for stronger agreements, Durand et al. (2015[192]) suggest that voluntary restrictions without appropriate measures to increase compliance may lead to competitive disadvantages for companies that apply them, whereas mandatory restrictions would level the playing field, removing a barrier to establishing a healthier food supply.

Public mass media campaigns promoting healthy nutrition target the whole population, but may fail to be effective across all population groups

While health-promoting mass media campaigns are effective to disseminate messages that help prevent non-communicable diseases – including cancer – they should go hand in hand with ensuring that sufficient healthy options are both financially and geographically accessible for those wishing to take advantage of them (WHO, 2023[193]). A review found that interventions aimed at affecting the individual, including educational campaigns, were most likely to be effective among people with higher levels of education and income, and were thus likely to contribute to widening inequalities, despite benefits at a population level (McGill et al., 2015[194]). Equity-promoting communication campaigns can thus be more effective if they specifically include avenues and measures to target at-risk populations (Box 3.8), and go hand in hand with measures that modify the food environment. Although mass communication campaigns on healthy nutrition have been implemented in most EU+2 countries, few include measures to reach specific population groups. Only seven countries have implemented measures to direct communication at young people. For example, using techniques from social marketing, in 2021 the Danish Veterinary and Food Administration collaborated with an influencer who shared sponsored content on YouTube to inspire young people to adhere to the Danish dietary guidelines (WCRFI, 2023[167]).

Box 3.8. Scotland (United Kingdom) and Oregon (United States) reach out to populations with lower socio-economic characteristics through communication campaigns

Scotland, United Kingdom

Scotland has developed a resource called "Eat Well Your Way", using methods derived from behaviour change techniques to help consumers make small manageable changes towards better nutrition. Designed to be accessible, the advice can be adapted to the user's circumstances, and is aimed at populations with lower incomes who need the most support. The materials developed consider possible increases in financial difficulties due to high inflation, providing advice on affordable ways to improve diets (Food Standards Scotland, 2023[195]; WCRFI, 2023[167]).

Oregon, United States

The state of Oregon in the United States uses a targeted social marketing campaign called "Food Hero" to help people with low incomes increase their consumption of vegetables, fruit and home-cooked family meals. Developed through a needs assessment using focus groups and phone surveys, Food Hero uses toolkits, a website (with recipes and culturally adapted resources to reach migrant populations), a newsletter, social media, traditional media and grocery store communications – all available in English and Spanish – to reach its target audience (Tobey et al., 2011[196]; Oregon State University, 2023[197]). Evaluations suggest favourable changes in perceptions of healthy food preparation as time-consuming and of a fruit- and vegetable-rich diet as expensive (Tobey et al., 2016[198]), and in practices in home-based meal preparation (Tobey et al., 2017[199]) and teaching about nutrition in schools (Kirk et al., 2020[200]).

Schools can set patterns for healthy nutrition across the life-course

Children spend a large proportion of their time in school, which provides an opportunity to improve nutritional habits and knowledge. Such efforts include providing healthy school meals and beverages free of charge or at affordable prices, distributing nutrition education materials and setting standards for food products available in or near schools (OECD, 2019[154]; WHO, 2020[165]). A systematic review found that school-based food interventions can result in a significant improvement in targeted dietary behaviours – such as fruit and vegetable intake, total and saturated fat consumption, and sodium consumption – both in and outside the school environment (Micha et al., 2018[201]). Interventions encompassing various strategies, including nutrition education and involvement of parents and teachers in promoting healthy eating habits, have been shown to improve students' dietary behaviours and knowledge significantly (Evans et al., 2012[202]).

All EU+2 countries with available information apply standards for school meals, and 19 have mandatory standards (see Table 3.3). Nevertheless, a Slovenian study found that although the country has mandatory guidelines for school meals, not all schools had adapted their menus to adhere to these. Better menus were linked to higher socio-economic status of the municipality and to larger schools, which found it easier to purchase high-quality products within their budgets (Gregorič et al., 2015[203]). This highlights the importance of programme evaluation and emphasises that guidelines alone may not be sufficient to result in changes in practice when financial barriers are not addressed. Additionally, as school meals may present a significant cost to families with lower incomes, it is important to ensure that all children benefit from the measures. Estonia, Finland and Sweden finance school meals from the state budget, making them free of charge in all primary and secondary schools; Hungary and Latvia do so in primary schools only. France and Germany implement universal subsidies, while ten other European countries provide free meals based on specific criteria, such as family income, or to specific target schools (WCRFI, 2023[167]).

Following best practices, Hungary and Romania regulate all food available in schools, including beyond school hours and at school events not held on school premises (WCRFI, 2023[167]). Only one EU+2 country has implemented national standards on food in the immediate vicinity of school (Romania, in 2020), while 12 have implemented voluntary or mandatory measures limiting sugar-sweetened beverage provision in schools (see Table 3.3). Since 2006, Latvia has prohibited distribution of soft drinks, sugar confectionery and salty snacks in schools; in 2012, the country set more in-depth criteria to determine which foods are prohibited, limited or encouraged in public institutions, according to nutrient content. These standards apply to foods and beverages served in schools, hospitals, social care and rehabilitation institutions, pre-school canteens and cafeterias.

Promoting physical activity in disadvantaged groups requires the use of school, work and leisure settings

Given the relevance of physical activity for cancer prevention – both independently and through associations with body weight and other risks – promotion of physical activity must take place through multiple channels. These include setting-specific programmes in schools, workplaces and the healthcare system; policies to increase access to sports facilities; urban design, environment and transport policies; and communication and information policies (see also discussion of active transport in Section 3.3.4).

Availability of and participation in physical education in school settings has been shown to make children more active in, outside and beyond school, and to contribute to healthy lifestyles that last into adulthood (Dohle and Wansink, 2013[204]; Black et al., 2019[205]). Particularly important given the rise of overweight and obesity among adolescents (see Section 3.2.1), school-based programmes promoting a healthier diet in conjunction with additional physical activity were found to lead to an overall mean reduction in children's BMI of 0.3 kg/m^2 (Wang et al., 2015[206]); this can also have beneficial effects for cancer prevention throughout the life-course. Physical activity can be promoted in the school setting through a whole-of-school approach, encouraging inclusion of physical activity lessons in curricula, active recess, active lessons and active transport to and from school – as in Estonia (Box 3.9). Although all EU27 countries mandate inclusion of physical activity classes in school curricula, there is considerable variation in how it is defined, quantified, perceived and assessed in schools (OECD/WHO, 2023[37]). Government-level support for active transport to and from school is available in 12 EU+2 countries (Section 3.3.4).

Given the large proportion of time most adults spend at their jobs, workplaces can similarly be effective settings to influence lifestyles (Proper and van Oostrom, 2019[207]). Workplaces across OECD countries have started to implement structural changes such as introduction of standing desks or incentives to take the stairs, as well as specific wellness programmes entailing health risk assessments, education materials, classes, seminars, group activities and counselling on healthy lifestyles (OECD, 2019[154]). These are particularly important for desk-based work, where employees are sedentary much of their day; for companies, the initiatives can reduce absenteeism and increase productivity at work (OECD, 2022[144]). Government-level support for active transit to and from work is provided in 12 EU+2 countries (Section 3.3.4), and Ireland collaborates with employers to promote active forms of transport (Box 3.9). However, equity impacts of workplace-based interventions should be considered to ensure that the benefits can be gained by workers with different roles and levels of education. A qualitative study about employees' interest in workplace programmes found that those with a medium level of education expressed higher levels of interest than those with low levels (Sponselee et al., 2022[208]). This highlights the importance of adapting interventions to specific settings and population groups to ensure equitable benefits, ideally taking into account the views and articulated needs of target groups and co-developing the interventions. High participation is crucial to maximise the effectiveness of interventions (OECD, 2022[144]).

Box 3.9. Initiatives in Estonia and Ireland take a comprehensive approach to engage schools and workplaces in physical activity

Estonia, Schools in Motion Programme

In Estonia, the Schools in Motion Programme takes a whole-of-school approach, covering physical education, active recess, active lessons and active transport to and from school. Participating schools, comprising 28% of all general education schools in 2021, are supported through seminars, workshops and skills training, and have access to easy-to-use materials and research – for example, tips on how to make the indoor and outdoor environment more physical activity friendly, and techniques for reducing sedentary time during classes. Using these resources, each school can develop and adapt their own action plan.

Ireland, promotion of sustainable travel to and from workplace

In Ireland, the National Transport Authority manages the Smarter Travel Workplaces and Smarter Travel Campus behavioural change programmes on behalf of the Department of Transport, Tourism and Sport. These initiatives collaborate with major employers and higher education institutions to promote sustainable commuting and travel choices through materials such as promotional posters on the benefits of walking and guidance on setting up initiatives, while larger organisations can qualify for development of specific action plans, using online travel surveys and analyses.

Source: OECD/WHO (2023[37]), *Step Up! Tackling the Burden of Insufficient Physical Activity in Europe*, https://doi.org/10.1787/500a9601-en.

It is important to note that a comprehensive package of policies is needed to target all drivers of physical activity across daily life, including school, work, transport and leisure. A comprehensive approach must consider the built environment that supports physical activity, drawing on synergies with air pollution policies, such as active transit interventions and infrastructure (see Section 3.3.4). Another important avenue for increasing physical activity is increasing access to sports facilities – particularly for disadvantaged communities or the elderly population (OECD/WHO, 2023[37]). Of the 29 EU+2 countries, 20 have specific physical activity policies that target groups with a particular need (e.g. children, elderly people, those with low socio-economic status, people with disabilities and ethnic minority groups). For example, in 2018, Hungary implemented an EU-funded project to set up 850 sports programmes nationwide, with a key aim to improve quality of life of the population in less developed regions. Similarly, Italy's Sport for All Project aims to guarantee access to sport for children and families experiencing economic disadvantage, to encourage children to engage in physical activity, and to support sports clubs and associations (WCRFI, 2023[167]).

The role of primary care and involvement of communities in promoting physical activity and healthy nutrition

Primary healthcare constitutes the first level of contact for most people with the healthcare system and brings healthcare closer to places where people live and work. It is key to improving population health and equity. By providing a wide range of services (including health promotion and disease prevention), estimates suggest that primary healthcare can address more than 80% of people's health needs, delaying the onset of diseases and reducing mortality rates (OECD, 2020[209]; OECD, 2022[210]). Promising strategies to support behaviour change include promotion of healthy nutrition and physical activity in primary healthcare though counselling or physical activity prescribing.

Physical activity on prescription programmes exist in 10 EU+2 countries, although policy design varies. Key healthcare-mediated interventions to promote healthy lifestyles include the EU Physical Activity on Prescription (EUPAP) model in Sweden (EUPAP Consortium, 2020[211]). Since the early 2000s, Sweden has been implementing this intervention programme, including person-centred individualised counselling, written evidence-based physical activity recommendations, follow-up and community support. All healthcare professionals are licensed to prescribe physical activity. The programme is considered a good way to increase levels of physical activity in the target population, reaching individuals from various socio-economic groups. In Slovenia, the Netherlands and Portugal, various programmes have been designed with the aim of improving lifestyles, including some that specifically do so through integration with community-based services (Box 3.10).

Box 3.10. Healthcare provider- and community-based initiatives are in place in Slovenia, the Netherlands and Portugal

Integration between primary care and community services, Slovenia

Slovenia took action in 2002 to integrate population and individual services by creating health promotion centres in all primary healthcare centres across the country. GPs were tasked with providing preventive check-ups and referring at-risk patients to health promotion centres for free lifestyle interventions against key risk factors. Owing to persistent inequalities between regions, genders and socio-economic groups, the centres' capacities were expanded during 2013-16, as cross-sectoral partnerships with various stakeholders were established, including social services and non-governmental organisations at the local/community level. This led to adoption of local health promotion strategies and action plans to target population groups and reduce health inequalities.

Through the programme, more than half of Slovenia's population had been screened for lifestyle and risk factors by 2019, while almost 50 000 patients take part in the lifestyle interventions run by the health-promotion centres annually. Rates of preventable mortality have declined at a population level. Slovenia's approach was enabled by strong public health and governance structures, along with accountability mechanisms that monitored outcomes and took corrective action when necessary. Building on this experience, the services could be used to advance health literacy (see Section 3.3.6), transferring skills and knowledge to patients via mechanisms including the introduction of lay educators, group workshops among patients with chronic diseases (supervised by members of the primary care team) and telemedicine, including webinars (Petric et al., 2019[212]; Susič and Klemenc-Ketiš, 2020[213]).

Combined Lifestyle Intervention, Netherlands

The Combined Lifestyle Intervention Programme is designed to help people living with overweight and obesity, and addresses risk factors such as stress or sleep disorders. Participants are referred by their GP to a local Programme, where they receive dietary advice, physical activity training and counselling on behavioural change over a period of two years. The intervention has been found effective and often cost-effective, with a strong evidence base. It demonstrates effectiveness among diverse socio-economic backgrounds, although noticeable variations in its implementation exist across regions (OECD, 2022[35]).

Nutrition and physical activity evaluation and promotion through primary care, Portugal

Portugal is leveraging its national healthcare system to deliver brief counselling on nutrition, and counselling and prescription of physical activity. Training is provided to health professionals, including an online course on communication, while the electronic health systems of the national health service are integrated with a brief nutrition counselling intervention to promote its effective implementation in primary care. Based on a brief assessment of levels of physical activity and sedentary lifestyle, the GP can give brief counselling on physical activity tailored to each patient, and a programme is implemented by trained GPs and exercise physiologists to create personalised prescriptions for people with certain chronic conditions. Portugal also participated in the pilot EUPAP project among ten countries aiming to transfer and adapt the Swedish model. The pilot will finish in 2024, after which next steps will be decided from evaluations. A new model for management of obesity in primary healthcare is being developed to complement current approaches of management integrated into hospital care (Ministry of Health, 2020[214]; 2022[215]).

3.3.4. Policies are required to reduce environmental exposure to carcinogens

Recognising its cross-border implications, the EU is co-operating to reduce particulate matter pollution

Air pollution constitutes an important cancer risk – the vast majority stemming from ambient PM (see Section 3.1.4). The EU has collaborated on reducing PM for decades, including measures such as the 2008 Air Quality Directives, the 2016 National Emissions Commitments and recently the European Green Deal. A range of EU-level source-specific emissions directives, policies and programmes are under way to help achieve the targets set; thanks to various regional, country and local initiatives, there was an overall reduction in emissions in the EU27 by 30% for PM_{10} and 32% for $PM_{2.5}$ between 2005 and 2020 (EEA, 2022[216]), corresponding to a reduction in pollution exposure estimates (see Section 3.2.2). In September 2023, the European Parliament voted to align air quality standards in the EU27 with WHO’s guidelines (5 ug/m^3 for $PM_{2.5}$ and 15 µg/m^3 for PM_{10}) to take effect in 2035, if approved by the European Commission and European Council. The new targets would be substantially stricter than the current (2023) standards of 25 ug/m^3 for $PM_{2.5}$ and 40 µg/m^3 for PM_{10}. In 2023, countries in the European region also adopted the Budapest Declaration, which emphasises inclusion of equity and sustainability in addressing environmental determinants of disease, and makes a commitment to strengthen inter-linkages between environmental and health policies (WHO, 2023[217]).

Under the 2016 National Emission Ceiling Directive, which sets country-specific $PM_{2.5}$ reduction targets, only Hungary and Poland failed to meet their requirements by 2021. To meet the country-specific 2030 $PM_{2.5}$ targets set in the Directive, 20 countries need a reduction in $PM_{2.5}$ of 10% or more – including Hungary, Poland and Romania, which must cut their $PM_{2.5}$ emissions by more than half to reach their targets. The main contributors to $PM_{2.5}$ pollution in Europe are residential heating and cooling, industry, road transport and agriculture.

Residential heating and cooling is the largest contributor to premature mortality from $PM_{2.5}$ pollution in European countries (Khomenko et al., 2023[218]). Thus, changes in the energy sector will be crucial for meeting the emission reduction commitments for $PM_{2.5}$, as burning of solid biomass and fossil fuels for residential heating constitutes a substantial part of emissions in some countries. The EU is using several tools to address the challenge of residential energy use, including regulating product emissions and requiring standardised energy efficiency labels on consumer appliances. It is also promoting more energy-efficient solutions, such as upgrading heating systems and improving insulation through renovations (European Commission, 2016[219]), and aims to renovate 35 million buildings by 2030 (European Commission, 2023[220]). Several EU-wide measures exist to address emissions and pollution from other sectors, including agriculture, industry, transport, energy and shipping.

Country and local-level policies promoting healthy living and active transport address particulate matter pollution and benefit health via other pathways

The European Commission's flagship campaign to promote sustainable urban transport and the European Mobility Week consists of a week-long annual event wherein cities and towns engage in initiatives to promote non-car transit. Beyond this critical EU-wide co-operation, individual countries are implementing their own initiatives to combat air pollution, including moves to make public transit more affordable or free in recent years (Table 3.4). Luxembourg and Malta offer free nationwide public transit, and Austria, Cyprus, the Netherlands and Germany offer affordable nationwide tickets, valid across most modes of transit. Some capitals have gone beyond national-level policies to offer free (Tallinn, Estonia) or very affordable (Prague, Bratislava, Madrid, Rome, Vienna and several others) public transit (Greenpeace, 2023[221]). In addition to reductions in air pollution, investment in public transit contributes to reductions in noise exposure, increases in safety for pedestrians and cyclists, and additional space for communities.

Table 3.4. Affordable public transit networks are in place in some EU+2 countries

Free nationwide public transit	Availability of long-term network tickets valid on all or most transit modes in the country	Good ticket affordability (less than EUR 3/day)	Capitals with lowest-cost public transit
Luxembourg	Luxembourg	Luxembourg	Tallinn, Estonia*
Malta[1]	Austria	Malta[1]	Luxembourg City, Luxembourg*
–	Cyprus	Austria	Valletta, Malta*
–	Netherlands	Germany[1]	**Prague, Czechia**
–	Malta[1]	Spain	Bratislava, Slovak Republic
–	Germany[1]	–	Madrid, Spain
–	–	–	Rome, Italy
–	–	–	**Vienna, Austria**

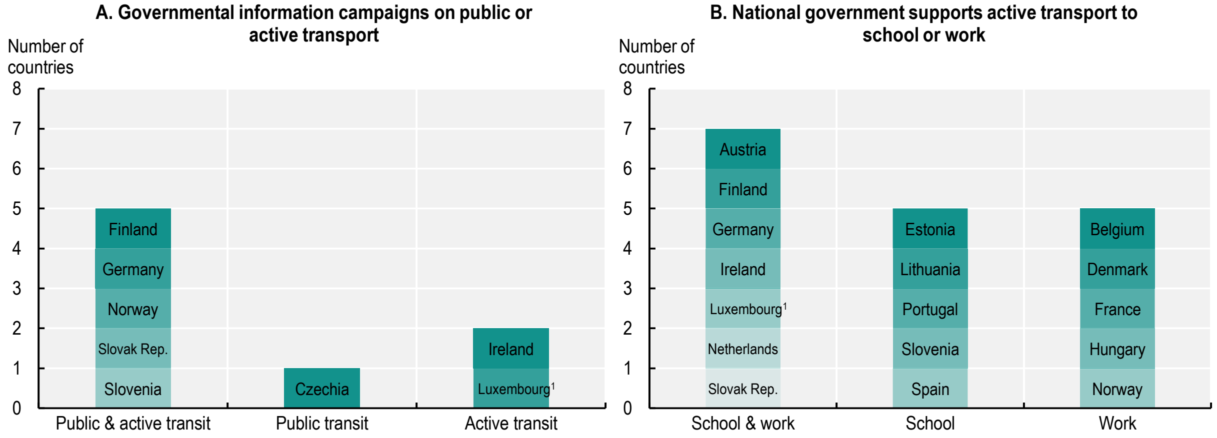
Note: Capitals with * represent those with free public transit. Capitals in bold represent those with free or substantially discounted fares specifically for lower-income individuals (discounts for students, elderly people and those with disabilities not shown). Cities scoring at least 50 out of 60 points on Greenpeace's scale of affordability of long-term tickets are included.

1. Malta's free nationwide public transit system does not include express buses or the ferry between the two main islands, while Germany's Deutschlandticket excludes long-distance trains.

Source: Greenpeace (2023[221]), "Climate & Public Transport Tickets in Europe", Greenpeace, Vienna, https://greenpeace.at/uploads/2023/05/report-climate-and-public-transport-tickets-in-europe.pdf.

Figure 3.11 contains selected categories of results of a comprehensive scan of implemented national-level policies that encourage physical activity, which have synergies with reducing air pollution (see also Section 3.3.3). Present in most EU+2 countries, these initiatives range from national policies on cycling routes, lanes and greenways to public transit campaigns and tax-deductible tickets. Some countries (Bulgaria, Germany, Hungary, Ireland, Lithuania, Portugal, Slovenia and Sweden) have national policies focused on teaching or improving cyclist or pedestrian safety, targeting people as young as pre-schoolers, schoolchildren and the general public (WCRFI, 2023[167]). Among EU+2 countries, 16 have national policies in place to support walking or cycling infrastructure, 6 of which do so via legislation or regulation, placing a legislative emphasis on their implementation. National governments have mass communication campaigns in place to promote public or active transit in 8 countries, and 17 have national programmes to support active transit to and from school or work, including financial incentives in some. Box 3.11 outlines some of the best practices in OECD countries.

Figure 3.11. Governments are taking action to support public and active transit



Note: Includes nationally implemented initiatives only. Cyprus and Iceland not included.
1. Based on sources from the Luxembourg Government (2023[222]; 2021[223]; n.d.[224]).
Source: Where not otherwise stated, this material has been reproduced from the World Cancer Research Fund International MOVING policy database https://policydatabase.wcrf.org and physical activity policy index https://www.wcrf.org/policy/physical-activity-policy/.

Box 3.11. Lessons learned on active transport from the OECD's Healthy Cities report

The OECD's *Healthy and Sustainable Cities – Best Practices in Public Health* report examines 13 case studies of urban initiatives that promote healthy lifestyles, some of which deliver additional benefits through synergies with air pollution. Associated with the lowest cost of cycling initiatives, the "CycleOn" bike safety education programme in the Netherlands targets the elderly population. Cycling infrastructure changes include Copenhagen's smart traffic signals that uses real-time information from commuters to prioritise cycling and buses, Île-de-France's bike sharing programme, and Denmark's Cycle Superhighways that develop safe biking routes between municipalities. Cycle Superhighways, which started in 2012 and currently form the largest network of cycling roads in Europe, have led to a substantial increase in bicycle traffic on specific highways.

Modifications to the urban environment such as Barcelona's "Superblocks" transform multi-block areas into communities promoting public space and mobility. "The People First Cities" initiative transformed Pontevedera, Spain into a pedestrian city and the Cycling Cities Programme redesigned urban space in Utrecht, the Netherlands to promote active transport. Other places are looking at making car transit more expensive (as Stockholm does with its congestion charge) or alternative transport more affordable, as done via Belgium's nationwide programme providing financial incentives to cyclists and Portugal's programme to reduce public transit costs.

The OECD estimates that scaling up of these interventions would result in major health and economic benefits to OECD countries, with much of that impact (between 60% and 99% depending on the intervention) arising from the decrease in air pollution rather than the increase in physical activity. Among these 13 interventions, five have been scaled up across different cities in the same country while two have been scaled up nationwide.

Source: OECD (forthcoming[225]), *Healthy and Sustainable Cities:* Best Practices in Public Health.

Cities have a major role to play in population health, particularly when it comes to reducing road transport pollution

With about half of the OECD population living in urban areas and the increasing trend towards urbanisation, the OECD has identified three major health-related challenges that cities must address: lower levels of physical activity (see Section 3.3.3), greater exposure to air pollution, and urban heat islands – referring to accumulation of heat in cities (OECD, forthcoming[226]), for which local-level policies are becoming particularly important.

The EU has worked to identify best practices as well as barriers and facilitators to improving air quality in cities. These include the Air Implementation Pilot Study on 12 cities and the Urban Innovative Actions Project, which funded the testing and implementation of new solutions to existing issues in cities. The Green City Accord is an EU initiative wherein cities commit to improving five areas of environmental management, including air pollution, reporting on their progress every three years (European Commission, 2023[227]).

European cities are implementing transport-related interventions, recognising this as a major pollution source. A database of peer-reviewed studies on urban interventions targeting road pollution includes 93 policy interventions studied in EU+2 countries (Khreis et al., 2023[228]). A review of the database shows that regulatory tools (such as speed limit reductions/regulations, low-emission zones, vehicle replacement programmes and vehicle use restrictions) and alternative fuel technology (such as promoting a switch to electric or compressed natural gas) are being considered to address air pollution. Studies that estimated the impact of interventions on either $PM_{2.5}$ or PM_{10} exhaust emissions from vehicles or traffic-related air pollution reported reductions.

It is important to select or design air pollution interventions conscientiously to make them equity-promoting

Groups with lower socio-economic characteristics may be more exposed to air pollution – as they have less access to cleaner fuel options for heating and transportation – and at greater risk of exposure to occupational hazards (see Section 3.2.2). On the other hand, as people with higher incomes often choose to live in city centres in many cities, they may also be more exposed to urban air pollution (OECD/EU, 2020[15]).

Certain air pollution reduction policies, such as subsidies for public transit and provision of school buses, can promote equity by reaching different populations (Public Health England, 2019[229]). School-related interventions can be targeted to reach either broad or specific population groups, given that children spend up to a third of their time in school. Interventions aimed at improving air quality for students during the school day include adding air purifiers in classrooms, implementing heating, ventilation and air conditioning systems with high efficiency filters, and using green infrastructure as physical barriers (Rawat and Kumar, 2023[230]).

Conversely, interventions such as increased taxes or fees, freight bans or subsidies on privately owned electric vehicles – which are generally owned by more affluent groups – can increase inequities. Low-emission zones, wherein more polluting vehicles are not able to enter certain areas, can also increase inequities: vulnerable groups are more likely to own such vehicles, while higher socio-economic groups may be more likely to live in areas that benefit most from the improvement in air quality. For example, a study on two low-emission zones in Rome showed that more of the benefit in reduced emissions accrued to the better-off population, as they lived closer to the city centre (Cesaroni et al., 2012[231]). In contrast, however, a study assessing equity impacts of low-emission zones in Brussels indicated that the policy had both environmental and equity-promoting benefits because areas with low socio-economic characteristics that were the most polluted were included inside the low-emission zone, and also had better public transit networks (Verbeek and Hincks, 2022[232]).

When specific policies are put in place that may be beneficial overall in terms of air pollution but have a risk of increasing inequities, proactive planning and adjustments can be made. Poland's programme to upgrade residential heating systems include subsidies of up to 90% for low-income households. A 2022 updated programme design also includes better outreach to low-income individuals, an easier application process, and greater technical and implementation assistance (Karver, Badiani-Magnusson and Carroll, 2022[233]). Czechia's new Green Savings Programme provides larger subsidies for low-income households – of up to 95% (as well as an advance) for households upgrading from solid fuel boilers to more sustainable solutions (IEA, 2022[234]).

The EU's asbestos-free future plan aims to reduce occupational risk via stricter exposure limits, pre-construction planning and increased awareness

The European Commission issued a communication on working towards an asbestos-free future in September 2022 that sets out a comprehensive, multi-pronged strategy to address risks arising from asbestos, to be implemented alongside Europe's Green Deal and Europe's Beating Cancer Plan. The pillars include enhancing cancer screening and diagnostics (Chapter 4) for people who may have been exposed to asbestos; preventing exposure through identification, logging and removal of asbestos in existing buildings; revising regulations around construction waste management; and providing financing to Member States to support these processes (European Commission, 2022[235]).

Furthermore, a major pillar of the Commission's asbestos strategy relates to reducing occupational exposure. The 2009 Asbestos at Work Directive put in place stringent regulations on employers regarding training, planning and protection against asbestos. In June 2023, the European Parliament and Council reached an agreement on strengthening this regulation, including training and protective equipment, and a transition period during which countries will need to shift to a more modern and sensitive method for counting asbestos fibres (European Commission, 2023[236]). The new regulation also requires work involving demolition or asbestos removal to receive a permit from national authorities, and companies must obtain information on materials that could contain asbestos before beginning work in older premises. Workers who may be exposed must wear appropriate protective equipment and receive specified training, and countries must maintain registries of occupational-related asbestos disease (Council of the EU, 2023[237]). It is estimated that the new occupational exposure limit, alongside accompanying measures, may result in a decrease in excess life-time cancer risk from 125 cases of cancer per 100 000 exposed workers (based on the current limits) to 12 cases per 100 000 (European Council, 2023[44]).

The European Commission's communication gives some examples of best practices on asbestos, such as France's legislative requirement that in cases of potential asbestos exposure, search and identification of materials that contain asbestos has to be undertaken prior to construction. Poland has maintained an asbestos database since 2013, and has a national programme for safe removal of asbestos, including information, training and monitoring. The Flemish Government in Belgium has undertaken various initiatives, including requiring owners of units built prior to 2001 to record any asbestos present, requiring asbestos removal as a precondition for solar panel installation and, from 2022, requiring certification detailing asbestos inventories and their safe management or removal prior to the sale of a building (European Commission, 2022[235]). Some countries have requirements around licensing or accreditation of asbestos-related work; for example, in June 2023, British Columbia became the first Canadian province requiring licensing for asbestos abatement contractors (Canadian Occupational Safety, 2023[238]). In geographical regions with higher asbestos presence (see Section 3.2.2), prioritisation should be given to identification and registration of asbestos stock prior to commencement of renovation work.

The EU Agency for Safety and Health at Work is undertaking a survey of workers to assess exposure to cancer risk factors in order to add to understanding of the burden of occupation-related asbestos diseases. Survey results will also help to inform an awareness-building campaign about safe removal of asbestos targeted at companies, workers, building owners and public administrators engaged in Europe's renovation wave (European Commission, 2022[235]).

3.3.5. Prevention of cancers caused by human papillomavirus and hepatitis B and C can be strengthened in EU+2 countries

Human papillomavirus vaccination is offered free of charge for both girls and boys in most EU+2 countries

Historically, HPV vaccination recommendations have primarily targeted girls. In recent years, however, for reasons of gender equity and to support population-wide immunity, nearly all EU+2 countries have adapted their recommendations to include boys too. In contrast to issues experienced in the past, current HPV vaccine supplies available to European countries are sufficient to support broader access (WHO, 2022[239]). All EU+2 countries provide HPV vaccinations for adolescents as part of the national programme, generally targeting children around the age of 12-13 (Table 3.5). Some programmes vaccinate from as early as age 9 (Austria, Germany, Greece, Malta and Poland). Catch-up vaccinations for older individuals are also provided in some countries, but coverage is generally limited by age, as the cost-effectiveness of HPV vaccination above age 26 has been found to be fairly low (Kim et al., 2021[240]). At least 19 of the 29 EU+2 countries have HPV vaccination registries, which support immunisation programme delivery with consistent and high-quality data (Table 3.5).

Although vaccination has been extended to boys in nearly all EU+2 countries, coverage remains lower than for girls owing to its relatively recent inclusion in many countries. In Iceland and Romania, vaccination was extended to boys in late 2023, while Bulgaria and Estonia have not yet extended their coverage to boys, although Estonia plans to do so in 2024. Certain at-risk populations may be targeted for vaccination as well, such as MSM (e.g. in France) (Petit and Epaulard, 2020[241]) or immunocompromised individuals (e.g. in Luxembourg and Spain) and sex workers (e.g. in Spain) (Colzani et al., 2021[21]).

Table 3.5. National HPV vaccination programmes differ across and sometimes within EU+2 countries

Country	All children included in vaccination strategy	Targeted age (primary vaccination)	Catch-up	Vaccine registry	National school-based vaccination programme
Austria	✓	9-12	Up to age 21	✗	✓
Belgium	✓	11-12 (Flanders) 13-14 (Wallonia, Brussels)	12-18 (in Wallonia and Brussels regions) [1]	✓	✗ (Flanders) ✓ (Wallonia, Brussels)
Bulgaria	Girls only	12-13		✗	✗
Croatia	✓	14-15		✗	✓
Cyprus	✓	11-12	Up to age 13	✗	✓
Czechia	✓	13-14		✗	✗
Denmark	✓	12	Up to age 17	✓	✗ [1,2]
Estonia	Girls only [3]	12-14		✓	✓
Finland	✓	10-12	13-16 (boys)	✓	✓
France	✓	11-14	Up to age 19; 26 for MSM	✗ [1]	✓
Germany	✓	9-14	Up to age 18	✗ [1]	✗
Greece	✓	9-12	Up to age 15	✗	✗
Hungary	✓	13		✓	✓
Iceland	✓	12		✓	✓
Ireland	✓	12	Up to age 25	✓	✓
Italy	✓	11-12	Differs by region	✓	✗
Latvia	✓	12-17		✓	✗
Lithuania	✓	11-12		✓ [1]	✗
Luxembourg	✓	9-14	Up to age 20	✓	✗
Malta	✓	9-14		✓	✗
Netherlands	✓	10	Up to age 26	✓	✗
Norway	✓	12-13	Up to age 20	✓	✓
Poland	✓	12-13		✗	✗
Portugal	✓	10	Up to age 17 (to initiate schedule) up do age 26 (to finalise schedule)[1]	✓	✗
Romania	✓	11-18		✓	✗
Slovak Republic	✓	12-15 [1]		✗	✗
Slovenia	✓	12-13		✓	✓
Spain	✓	11-12		✓	✓
Sweden	✓	11-12	Up to age 18 (girls)	✓	✓

1. Based on comments from the EU Expert Thematic Group on Cancer Inequalities Registry.
2. Some local and regional school-based vaccination programmes are implemented in Denmark.
3. Estonia plans to expand the vaccination programme to boys in 2024.

Source: 2023 OECD Survey on Cancer Care Performance, OECD (2023[131]), EU Country Cancer Profiles, EPF, (2023[242]), European Parliamentary Forum for Sexual and Reproductive Rights, Brussels, https://www.epfweb.org/sites/default/files/2023-06/HPV%20Atlas_EN%202023-JUN19.pdf; Colzani, E. et al. (2021[21]), "Human papillomavirus vaccination in the European Union/European Economic Area and globally: A moral dilemma", https://doi.org/10.2807/1560-7917.ES.2021.26.50.2001659; European Cancer Organisation (2022[26]), "Putting HPV on the Map: The state of HPV prevention programmes in the WHO European Region", https://www.europeancancer.org/resources/256:hpv-prevention-programmes.html; Likumi (2023[243]), *Amendments to the Cabinet of Ministers 2000. Regulation No. 26 of September 330 of "Vaccinations regulations"*, https://likumi.lv/ta/id/341661; Ministry of Health of Romania (2023[244]), Order no. 3120/2023 for the approval of the population segments that benefit from the prescription, release and settlement under the compensation regime of immunological drugs used to produce active immunity or used to prevent communicable diseases.

Two- or three-dose regimens are most common. In April 2022, the WHO Strategic Advisory Group of Experts – incorporating evidence on the effectiveness of a one-dose regimen from an IARC study of over 15 000 vaccinated girls – recommended that for girls under age 20 either one or two doses could be given (WHO, 2022[245]; IARC, 2023[246]). Among OECD countries, Australia, the United Kingdom (England), Ireland and Mexico have already adopted the change to a one-dose regimen, which greatly simplifies and lowers the cost of vaccination programmes (IARC, 2023[246]). This has potential to increase coverage, as coverage with the last dose of vaccine is typically lower than with the first. According to the 2023 OECD Policy Survey on Cancer Care Performance, other countries actively considering this change include Canada, Costa Rica and Slovenia. The potential transition to a one-dose regimen will facilitate reaching vulnerable populations for completing HPV vaccination, particularly for more rural populations or people with low socio-economic status, who have less access to or personal availability to attend preventive health visits.

The PartnErship to Contrast HPV (PERCH), a Joint Action Project funded by the EU, brings together 18 countries with the objective of raising vaccination rates in regions with low coverage by sharing knowledge and experience; improving data and monitoring systems; and improving knowledge, awareness and abilities of both the general public and healthcare professionals about HPV vaccination, aligning with WHO's strategy to achieve 90% HPV vaccination coverage by the age of 15 (PERCH, 2023[247]). With a strong regulatory commitment and high trust in the healthcare system, Portugal has achieved some of Europe's highest rates of HPV vaccination (Box 3.12).

Box 3.12. Portugal has achieved very high HPV vaccination coverage among girls

HPV vaccines have been included in Portugal's National Vaccination Programme since 2008. The Programme has achieved high vaccination rates among girls, reaching 94% coverage of the last dose in 2022 among 15-year-old girls according to data from the WHO (see Section 3.2.3). It was expanded to include boys in October 2020. Several factors have contributed to its success, including meticulous regulatory oversight and efforts to increase accessibility and affordability, supported by a strong foundation of trust within the healthcare system, as well as favourable perceptions about the importance, effectiveness and safety of the vaccine (see Section 3.2.3).

One of the key ingredients for this success is a high level of public commitment surrounding the National Vaccination Programme. The programme is overseen by the Directorate-General of Health, which provides technical guidelines, ensuring adaptability to new vaccines, evolving disease epidemiology and societal changes. Accessibility of HPV vaccination is another factor leading to the National Vaccination Programme's success: all vaccines are free of charge for target populations. National campaigns to disseminate and promote information about HPV vaccination have also helped to improve accessibility among the general population, further fostering a strong immunisation culture.

Source: EU Expert Thematic Group on Cancer Inequalities Registry.

Clinician recommendations and reminders from healthcare providers have an indispensable role in supporting human papillomavirus vaccination

One mode of HPV vaccination delivery is in facilities such as vaccination centres or primary healthcare centres. In all EU+2 countries, doctors and nurses can provide HPV vaccination. The crucial role of healthcare provider recommendations has been recognised as a key lever for parental decisions to vaccinate, as has the importance of provider communication regarding HPV vaccination. Available studies suggested that clinician recommendation is often the top reason parents choose to vaccinate their children (Polonijo, 2020[248]), even in cases of initial hesitancy (Public Health Agency of Canada, 2022[249]).

Ultimately, the CDC recommends that healthcare providers are well-informed to advise on and answer questions regarding the HPV vaccine. It also suggests that healthcare providers bundle vaccinations, offering HPV with other relevant adolescent vaccines such as whooping cough and meningitis (CDC, 2021[250]).

Reminders from healthcare providers (including via mail, phone or text messages to parents) regarding upcoming vaccinations and to reach those who have missed any is an effective strategy to support HPV vaccination (Jacobson et al., 2016[52]). Physician reviews of patient vaccination status prior to visits, alerts to physicians at the point of care and feedback to physicians about vaccination levels of their patient panel can also help to increase uptake. A randomised trial covering 22 primary care practices in Pennsylvania and New Jersey, the United States, examined a physician intervention comprising HPV vaccine education, point-of-care reminders and panel feedback. Results suggest that the most effective intervention for completion of all three HPV doses consisted of physician intervention combined with family-focused elements, including phone reminders for scheduled preventive visits. The joint physician/family intervention group had a 13 percentage point higher rate of receiving all recommended HPV vaccine doses than the control groups (Fiks et al., 2013[251]). As Germany considers vaccination to be physically accessible to all population groups, it is considering ways to increase acceptance and awareness of HPV vaccines, evaluating approaches such as patient reminders and training of healthcare professionals regarding the vaccine (Robert Koch Institut, 2023[252]).

School-based vaccination helps to increase human papillomavirus vaccination coverage and reduce socio-economic and geographical disparities

In addition to healthcare centre delivery, 14 of the 29 EU+2 countries have implemented school-based delivery programmes to increase HPV vaccination coverage, as many children do not attend regular preventive healthcare visits. Most Nordic countries have school-based programmes and some of the highest rates of HPV vaccine coverage. France has recently joined this group of countries: a new school-based vaccination programme targeted at children in grade 5e (around age 12) was introduced in September 2023 (Government of France, 2023[253]). School-based vaccination programmes facilitate wide reach across the entire age cohort and rapid vaccine delivery to a large population of students. They also help to raise awareness of the vaccine among children and parents (Brotherton et al., 2013[254]), increase vaccine uptake in underserved areas (Kaul et al., 2019[255]), and reduce the cost and burden of individual vaccination appointments. School-based vaccination has also been shown to increase parental acceptance of the HPV vaccine, as its inclusion in the national school vaccination programme carries scientific and medical endorsement (Davies et al., 2021[256]). In Sweden, a nationwide cohort study provided evidence that school-based vaccination led to higher uptake than out-of-school strategies, and led to lower inequalities in uptake across education and income groups, and by parents' country of birth – all key determinants of vaccine uptake (see Section 3.2.3).

The effectiveness of school-based vaccination programmes has also been demonstrated across other OECD countries such as Australia, Canada, New Zealand, and the United States. In 2006, the Australian Government launched a national HPV vaccination programme for girls, including both routine school-based vaccination and a time-limited catch-up programme: in 2009, 70% of girls aged 12-17 were fully vaccinated (Brotherton et al., 2013[254]). By 2012, prevalence of the four strains of HPV infections targeted by the vaccines had substantially decreased among sexually active women aged 18-24 in Australia while evidence of a decrease in men suggested presence of a herd effect even before the inclusion of boys in the programme (Patel et al., 2018[257]). Several organisational factors that facilitate school-based vaccination have been identified in the design of vaccination programmes, such as national and regional policy, programme management and leadership, organisational models and institutional relationships, infrastructure, workforce capacity and activity, programme financing, communication with parents and students, and clinic organisation and delivery (Perman et al., 2017[258]).

Targeted policies to communicate about human papillomavirus vaccination are critical to raise confidence around vaccines

HPV vaccination programmes in some countries have been affected by public distrust and low confidence around the vaccine (see Section 3.2.3). A systematic review of low trust in the HPV vaccine in Europe found that the most common themes entailed concerns about the adequacy of existing information about the vaccine; potential side effects; and general mistrust of new vaccines, healthcare professionals and health authorities (Karafillakis et al., 2019[259]). In Denmark, for example, HPV vaccination coverage rates in girls decreased from around 90% for the birth cohorts of 1998-2000 to only about 54% for those born in 2003 (Suppli et al., 2018[260]), following negative public and media attention.

In response, countries are making efforts to encourage HPV vaccination through education and information campaigns. At the national level, public health authorities often lead campaigns to promote national vaccine programmes, including HPV vaccination. Denmark, for example, undertook major efforts to address the decline in HPV vaccination following the negative public attention stemming from media stories about perceived side effects (Box 3.13). The information campaign helped to build public trust in HPV vaccination and inform parents that the risk of cervical cancer diagnoses outweighs the risk of adverse events related to vaccination. In the Netherlands, the national information campaign is combined with targeted initiatives to counter vaccine hesitancy. Various localities organise focus groups and discussions with minority groups and host information evenings (Budding-Hennink, 2021[261]). HPV vaccination education campaigns are most effective when used in conjunction with other policy levers to increase uptake, such as home visits, reducing out-of-pocket payments, school-based vaccination programmes and outreach programmes targeting low-income settings (CPSFT, 2019[262]).

Box 3.13. The Stop HPV – Stop Cervical Cancer campaign in Denmark has improved HPV vaccination rates

In May 2017, the Danish Health Authority, Danish Cancer Society and Danish Medical Association partnered on a campaign called "Stop HPV – Stop Cervical Cancer", which included accessible online and social media information targeted at parents. In addition, the Danish Cancer Society opened a hotline to answer parents' questions about the HPV vaccine. The campaign combined personal stories from women with cervical cancer and health professionals, and facts and evidence on vaccine safety and efficacy. Following the campaign, the percentage of parents who trusted the vaccination increased, and the number of vaccinated girls in Denmark doubled in 2017 compared to 2016 (HPV World, 2023[263]; Soborg and Jaconsen, 2019[264]).

Innovative delivery approaches help campaigns reach lower socio-economic groups

As stated in Section 3.2.3, in many countries, groups with lower socio-economic status or with a migration background tend to have lower HPV vaccination rates than the general population. Adapted delivery approaches have been developed to reach populations that face cultural, geographical or other structural barriers in access to vaccination. These include expanding the scope of practice of some health professionals to improve vaccination rates in remote areas. In Denmark and Iceland, for example, pharmacists are allowed to administer HPV vaccination. Expanding the location of HPV vaccination sites to pharmacies or mobile clinics is another option for consideration. HPV vaccination buses were deployed in 2023 in the Netherlands by the National Institute for Public Health and the Environment (RIVM) and the Municipal Public Health Service. The bus visits several locations designated as HPV stops throughout the country, and pop-up vaccination stops are installed temporarily in locations that many young people pass through, such as educational institutions and train stations. Australia has developed transport services, including HPV bus vaccination teams, to visit remote areas. HPV vaccination vans also exist in the

United States, where an extra measure has been proposed to include dental practices in vaccination efforts (Vanderpool, Stradtman and Brandt, 2019[265]). The RIVER-EU Project is also developing interventions to increase HPV vaccine uptake among underserved groups (Box 3.14).

Box 3.14. Countries are learning from best practices in human papillomavirus vaccination for underserved groups in Europe

The EU-funded RIVER-EU Project, running from 2021 to 2026, is developing interventions to increase HPV and measles, mumps and rubella vaccine uptake among underserved groups. For HPV, the Project has assessed barriers to vaccination among five selected target communities: migrants and refugees in Greece, Ukrainian migrants in Poland, adolescent girls of Turkish and Moroccan descent in the Netherlands, and Roma populations in the Slovak Republic. To identify best practices and translatable lessons, the Project has examined selected migrant communities in Europe with particularly high vaccination rates. Using this acquired knowledge, the Project develops and adapts interventions together with the target communities, which are then implemented and evaluated. It has also developed an online system with content for healthcare professionals (RIVER-EU, 2023[266]). Key drivers for increasing uptake of vaccines include ensuring accessibility of vaccines in schools and clinics, framing of vaccination as the norm, and ensuring high trust in local healthcare providers from the same community – those with shared native language, culture and perceived trustworthiness (Essa-Hadad et al., 2023[267]; Schloemer, de Zeeuw and van Enter, 2023[268]).

Preventing liver cancer due to hepatitis requires more targeted policies

To reduce incidence of HBV and HCV, the WHO (2017[269]) Action plan for the health sector response to viral hepatitis in the European region lays out policy targets including childhood vaccination, antenatal screening and syringe distribution. Hepatitis B immunisation coverage among 1-year-olds is generally high in the EU27, ranging in 2021 from 84% in Estonia and 85% in Austria to 99% in Portugal and Malta (WHO, 2023[270]). Nearly all EU+2 countries have a national policy of universal vaccination against HBV, except Denmark, Finland and Iceland. Hungary has a nationwide school-based vaccination programme that targets adolescents (ECDC, 2022[30]).

Meanwhile, ensuring the 90% screening coverage of pregnant women laid out by WHO Action plan (2017[269]) remains important to prevent chronic cases of HBV as, although perinatal transmission accounts for a small proportion of HBV infections, 90% of these lead to chronic infections (ECDC, 2020[271]). Mother-to-child or vertical transmission accounted for 52% of HBV transmission for chronic cases in 2020 (only reported by Denmark, Greece, the Netherlands and Slovenia). Risks of transmission could be reduced through universal antenatal screening, in place in 25 EU+2 countries. Ten of the 13 countries with data available achieved the antenatal screening target of 90% in 2020 (ECDC, 2022[30]).

Vaccination programmes alone are, however, inadequate to eliminate HBV infections, since they do not prevent transmission through drug injections, sexual activity or others. The ECDC considers distribution of clean syringes and opioid substitution therapy to reduce drug use via injections particularly effective methods to address transmission of HCV, and strengthening of harm-reduction programmes is recommended in most countries to reduce transmission of HBV and HCV (ECDC, 2022[30]). Promotion of safer sex is also important for prevention of HBV and HCV. For MSM, for example, the latest available results from the European MSM Internet Survey 2017 demonstrate that only 41% of those who had had sexual intercourse with non-steady partners over the last 12 months reported that they always used condoms (ECDC, 2020[271]). Sexual health programmes are thus an important means to prevent infections, including with HBV and HCV, for the general population as well as risk groups (ECDC, 2022[28]).

Due to increased risk of exposure to hepatitis viruses in vulnerable groups such as people engaging in high-risk sex, migrant populations and people who inject drugs – as well as estimations of low vaccination coverage among them (see Section 3.2.3) – a targeted approach is worth consideration. For instance, the Netherlands is a low-endemic country with universal childhood vaccination, which maintains a targeted programme to provide complimentary vaccination to MSM and sex workers (RIVM, 2023[272]). Some EU+2 countries also have targeted vaccination programmes for people who inject drugs, MSM, people in prison settings and healthcare workers, although monitoring challenges persist because of significant data gaps across countries (ECDC, 2020[273]). Prevention of liver cancer due to HBV and HCV additionally entails early identification and treatment of acute infection cases. It is important that these reach vulnerable populations, which is more effective if strategies are devised in a targeted manner such as in Greece and France (Box 3.15).

Box 3.15. Countries are employing targeted strategies to test and treat specific vulnerable populations for hepatitis B and C viruses

Screening and linkage to services for people who inject drugs in the Thessaloniki metropolitan area in Greece

The ALEXANDROS Programme in the Thessaloniki metropolitan area is a community-based programme using peer-driven recruitment of people who inject drugs, conducting screening and linking them to healthcare services. The Programme aimed to reach those most in need – i.e. predominantly active injectors who are not linked to harm-reduction programmes, as this population is considered to be at the core of the HCV epidemic (ongoing transmission, high prevalence), and has limited opportunities for HCV testing and care as it is not linked to other services. The Programme achieved high coverage among the target population, finding a high prevalence (63%) of HCV antibodies, indicating exposure. Of those who had HCV antibodies, less than 10% reported any previous treatment with direct acting antivirals. Of those with chronic HCV monoinfection, 97% were entered into the national HCV treatment registry to apply for free treatment, 62% were referred to HCV care and more than half were identified as having initiated treatment at a follow-up point. People who inject drugs that had HCV and HIV co-infection were linked with HIV services.

The Scanvir Programme targets hard-to-reach groups in several regions in France

As part of France's HCV elimination strategy, the Scanvir Programme is implemented in several regions in France. The intervention entails specific testing days with innovative methods in institutions interacting with vulnerable populations such as people who use drugs, prisoners and migrants. Institutions (addictology departments, risk-reduction centres for drug users, communal centres for social action and detention centres) identify and refer patients for Scanvir sessions on dedicated days for screening for HIV, HCV, HBV and liver stiffness. The method is considered efficient, providing multidisciplinary service while saving human care resources and targeting settings where vulnerable populations can be found. After screening, treatment is offered. Initial results suggest high rates of uptake of screening in referred patients and high rates of treatment initiation (79% of those with HCV detected in bloodstream).

Source: Submissions to the European Commission Best Practice portal; Debette-Gratien, M. et al. (2023[274]), "Towards hepatitis C elimination in France: Scanvir, an effective model to test and treat drug users on dedicated days", https://doi.org/10.1111/jvh.13798.

3.3.6. Promoting health literacy in individuals and organisations can promote control over cancer risk factors

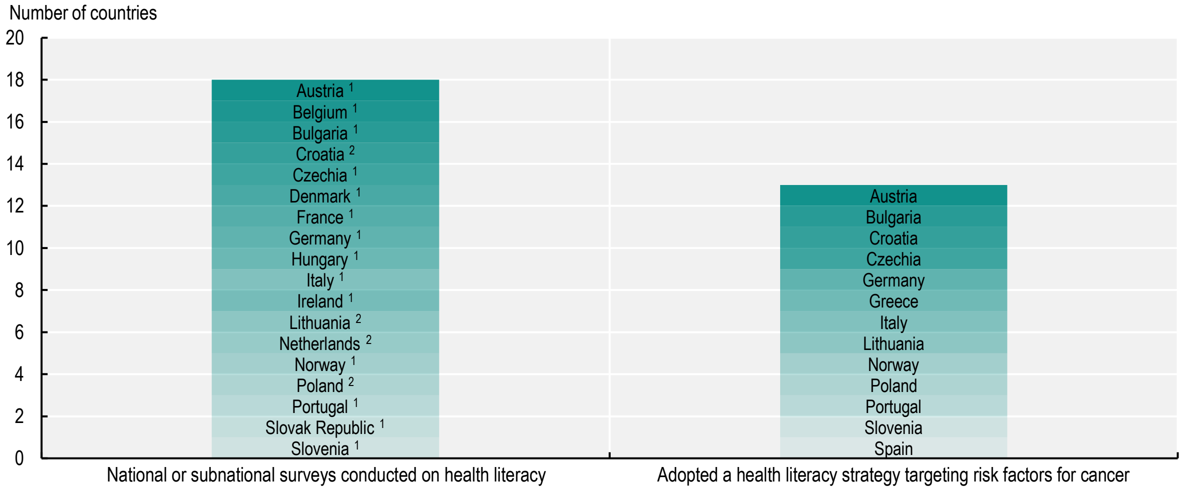
Efforts to improve population health literacy have historically focused on the abilities of individuals to find, understand and use information in health decision making. In recent decades, health literacy has increasingly been viewed as an interaction between the individual and their environment. It is considered to be content- and context-specific, and related importantly to whether systems facilitate the task of accessing and taking action on health information (Sørensen et al., 2012[275]). As such, there has been increased interest in health literacy on an organisation level, leveraging health systems to make health-related tasks less demanding. Health literacy-responsive organisations compensate for gaps in individual health literacy through organisational structures, policies and processes that make it easier to find, understand, appraise and use information and services to improve and maintain good health (M-POHL, 2023[276]). Investing in health literacy contributes to effectiveness of care and quality of healthcare received by the population, which is particularly important for those with low socio-economic characteristics who may face more barriers to care and experience more health risk factors (see Section 3.2). It can act as a cost-effective mechanism to ensure provision of people-centred care and the competencies required to navigate it.

Measuring the state of health literacy in the population guides development of an overarching strategy

National surveys on health literacy allow countries to understand challenges and needs among their populations. Across the 29 EU+2 countries, 18 were identified as having launched a national or subnational survey to assess population health literacy levels (Figure 3.12). In addition to the use of survey results as a supporting argument for taking action, these efforts build awareness of health literacy, identify at-risk populations and share best practices. The WHO Action Network on Measuring Population and Organisational Health Literacy (M-POHL) was founded in 2018 with the aim of collaborating to measure, understand and improve health literacy across European countries (M-POHL, 2023[277]). M-POHL launched the European Health Literacy Population Survey 2019-21 (HLS$_{19}$), which resulted in data from 14 EU+2 countries on health literacy, identifying vulnerable groups and aspects of health literacy that were most challenging.

Among the 26 respondents to the 2023 OECD Policy Survey on Cancer Care Performance, 13 countries reported that they have adopted a health literacy strategy that addresses cancer risk factors, the majority of which reported that the strategy includes cancer awareness and self-efficacy to address cancer risk factors. Some – such as Austria, Norway, Portugal and the United Kingdom (Scotland) – have adopted nationwide health literacy action plans. The Norwegian strategy aims to increase health literacy in the population during 2019-23, incorporating it into all planning, development, implementation and evaluation of health and care services, and public health work, and at all service and administrative levels (Council of Europe, 2023[278]). Other countries – such as Belgium and Germany – include health literacy in their national cancer control plans (Sørensen, 2020[279]). Germany's National Cancer Plan includes a goal of ensuring access to high-quality information, counselling and support for cancer patients, strengthening patient literacy, and improving provider communication and patient-centred discussion (Federal Ministry of Health, 2023[280]). Similarly, in Poland, the Ministry of Health finances information, education and promotion activities under its National Oncology Strategy, such as the information and educational campaign "I am planning a long life", dedicated to lung, colorectal, malignant skin, prostate, breast and cervical cancer prevention and screening (Ministry of Health, 2023[281]). In Luxembourg, the National Cancer Plan includes a key objective to disseminate information about risk factors. Events are also organised to increase awareness and improve health literacy – for example, "Octobre rose" and "Broschtkriibslaf" for breast cancer, "Mars bleu" for colorectal cancer, "Relais pour la vie" for all cancers and "Lëtz Go Gold" for paediatric cancer.

Figure 3.12. National and subnational surveys on health literacy have been conducted in 18 EU+2 countries



Note: 26 EU+2 countries responded to the 2023 OECD Policy Survey on Cancer Care Performance. Information for Belgium on health literacy strategies is not available.

1. Data derived from country participation in the HLS19.

2. Data derived from country responses to the 2023 OECD Policy Survey on Cancer Care Performance.

Source: International Report on the Methodology, Results, and Recommendations of the European Health Literacy Population Survey 2019-21 (HLS19) of M-POHL, Austrian National Public Health Institute, https://m-pohl.net/sites/m-pohl.net/files/inline-files/HLS19%20International%20Report.pdf; 2023 OECD Policy Survey on Cancer Care Performance.

Interventions to improve health literacy should be multi-faceted and adapted to the needs of the population

To improve health literacy, personal competences need to be strengthened and situational demands reduced. Some individual health literacy interventions such as cell phone-based health education messages, animation or informative videos, use of audio or illustrations alongside text, small-group education, and use of simplified language can improve health literacy and lead to changes in health behaviours (Walters et al., 2020[282]). Abilities to assess the validity of health-related information can be developed from a young age through the school curriculum, helping to narrow disparities emerging later in life (Council of Europe, 2023[278]). Europe's Beating Cancer Plan includes improving health literacy on cancer risk by updating the European Code Against Cancer (ECAC) as a flagship initiative on prevention, promoting co-operation between health and social services to give people the necessary information and tools to make healthier choices (Schüz et al., 2015[283]). The ECAC is a health education tool aimed at raising awareness about evidence-based cancer prevention actions among EU citizens. It is currently being updated, co-ordinated by the IARC/WHO, to provide a 5th edition, following recommendations issued under the last EU Joint Action on Cancer (Espina et al., 2021[284]). In relation to this, an EU mobile application for cancer prevention is being developed under the EU4Health Programme to support dissemination of the messages from the ECAC. A health literacy for cancer prevention and care programme will also be launched to develop and share best practices to strengthen health literacy in cancer prevention and care programmes, with a focus on disadvantaged groups (European Commission, 2022[285]).

Among adults, health literacy is often lower among those from groups with low socio-economic status (see Section 3.2.4), while efforts focused on individual behaviour change may be more effective in higher socio-economic groups. This highlights a need for complementary policies that make it easier for people of all socio-economic groups to access, comprehend, appraise and apply health information (Gibney et al., 2020[286]). Vulnerable populations such as people with low levels of education or migrants may particularly benefit from organisational measures that create health literacy-enabling environments. Putting essential information first, using videos alongside written materials, and using pictographs alongside numerical information improved understanding among people with low health literacy (Housten et al., 2020[287]).

Healthcare organisations can create environments that make navigating choices within health and healthcare easier for people with low health literacy. To improve organisational health literacy, strong leadership is necessary in healthcare organisations to integrate it into planning, structure and operations; prepare the workforce; monitor progress; and ensure co-creation by including populations served in the design, implementation and evaluation of health information and services (Brach et al., 2012[288]). Multi-level interventions – with a mix of elements such as patient education and mobilisation, communication training for clinicians, and support with navigation within the healthcare system – have been found to be most effective (Housten et al., 2020[287]). An assessment tool recently developed in Switzerland for health-literate primary care settings includes a range of indicators such as training staff on health literacy and good communication techniques; dedicating sufficient time to patient communications; providing translation where necessary; using plain language and clear visual materials; and providing assistance to patients in completing forms and evaluating health information (De Gani et al., 2020[289]). The United States-based Agency for Healthcare Research and Quality (2020[290]) highlights good practices such as training clinicians in communication techniques including teach-back (wherein patients explain in their own words what they need to know or do), show-me (wherein patients demonstrate an action to the clinician, such as how to use an inhaler) and chunk-and-check (wherein clinicians break down information into smaller pieces and then confirm patient understanding) methods.

Collaboration between government stakeholders, healthcare providers, organisations and civil society is necessary to develop comprehensive and effective strategies

A health literacy alliance launched by the German Ministry of Health in 2017 includes 14 partners, such as the German Hospital Association, the German Medical Association, the Association of Private Health Insurance and government stakeholders, who each committed to action to improve health literacy within their areas of responsibility (Federal Ministry of Health, 2017[291]). Germany has also created a unified national health portal where people can access reliable, high-quality and easily understandable information on all areas of health and healthcare (Federal Ministry of Health, 2020[292]). The Austrian Health Literacy Alliance has undertaken activities such as establishing a working group on organisational health literacy and developing health literacy assessment tools for various types of organisations (The Austrian Health Literacy Alliance, 2023[293]).

System-level changes require partnerships across all sectors, involving various levels and departments within governments, the private sector and the populations affected, while meaningful engagement with civil society is needed to ensure co-creation of solutions that adapt to local needs (Sørensen et al., 2021[294]). Box 3.16 highlights selected actions on health literacy in Portugal, Slovenia and the Netherlands. It is important to note that in addition to activities focusing on prevention of cancer, health literacy has further implications for cancer screening (Chapter 4) and treatment (Chapter 5).

Box 3.16. A number of actions related to health literacy have been implemented in EU Member States

Portugal

The Portuguese Health Literacy and Behavioural Sciences Plan 2023-30 aims to contribute to the creation and implementation of ecosystems that lead to recognition of the benefits of adopting a healthy lifestyle, appropriate use of the National Health Service and the importance of disease management. The Plan focuses on individuals, communities, health systems and policies, supporting a lifecycle approach aimed at promoting well-being at school and in retirement and an active lifestyle. Training courses to address the needs of migrant populations have been developed for health professionals, and local communities (for example, in Lisbon) work with migrant groups and refugees to design fit-for-purpose solutions and create enabling environments (WHO, 2022[295]; Ministry of Health, 2023[296]).

Slovenia

In 2019, Slovenia carried out a health literacy survey of the population, held interviews with patients and professionals, and reviewed government and health organisation websites to assess whether information is understandable and useful for individuals. The country also developed a health literacy plan which contains seven strategies to: 1) improve access to health information; 2) improve individuals' understanding of health information; 3) promote patient-centred care; 4) reduce healthcare inequalities through targeted interventions; 5) strengthen the ability of individuals to navigate the health system; 6) promote health literacy as a public health strategy; and 7) measure and evaluate impact (Kolnik, Ljubič and Kmetič, 2023[297]; Kolnik and Ljubič, 2023[298]).

The Netherlands

The Netherlands is yet to launch a comprehensive plan on health literacy. Pharos, the Dutch Centre of Expertise on Health Disparities, works with local governments to adapt and implement actions to improve health literacy. It develops specific tools to ensure that the healthcare system is understandable for everyone, through accessible information materials; training programmes; and guidance for GPs, pharmacies and municipalities in dealing with reduced health literacy. Several courses are available for health professionals – for example, on culturally sensitive communication with migrants – and education materials are developed and tested among target population groups (Pharos, 2023[299]). Additionally, the Dutch Health Literacy Alliance involves 130 organisations engaged in promoting health literacy, and in prioritising and developing both quantitative and qualitative measures.

3.4. Conclusion

Preventing cancer by addressing preventable risk factors is one of the most cost-effective and efficient ways to reduce the burden of cancer in the population (WHO, 2023[300]). Given the high burden of cancer attributed to risk factors in the 29 EU+2 countries, all countries have scope to prioritise prevention policies and learn from best practices in other countries. Spending on prevention is generally considered insufficient across EU+2 countries, as it made up an average of 2.5% of health expenditure in 2019. Estimates from 2021 amount to 5.1%, marking a significant increase, however, this is mostly due to increased spending related to infection prevention and control of the COVID-19 virus (Chapter 1). Countering alarming trends in cancer burden and inequalities requires key prevention policies to address cancer risk factors, but no policy is sufficient to prevent cancer on its own. A comprehensive package of prevention policies is necessary to tackle different risk factors and target at-risk population groups – including fiscal and regulatory measures; improving availability and accessibility of information in the community; involving primary healthcare, schools and workplaces; and promoting awareness of risks across population groups, among others.

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Notes

[1] Where not stated otherwise, the data and information used in Section 3.2 are based on national official statistics provided to Eurostat and the OECD, which were validated to ensure the highest standards of data comparability. The sources and methods underlying these data are available in the Eurostat Database and the OECD Health Database.

[2] Countries that responded to the 2023 OECD Policy Survey on Cancer Care Performance include: Austria, Belgium, Bulgaria, Croatia, Czechia, Cyprus, Denmark, Estonia, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain and Sweden. Information from Belgium is not available about risk factors.

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4

Improving early diagnosis and screening programmes

This chapter provides an overview of current screening programmes for various types of cancer, including their governance, operationalisation and recent developments. It reviews the relevance of evidence-based cancer screening programmes to tackle the burden of cancer among EU countries. The chapter also delves into the policies and innovations aimed at enhancing awareness of, access to and quality of early diagnosis and cancer screening, with a focus on vulnerable populations. The overarching objectives are to share evidence-based guidance and good practices, to highlight promising innovations being tested across countries to improve cancer care screening and early diagnosis, and to close inequalities across and within EU countries.

Key findings

- In December 2022, a new EU Council Recommendation on Cancer Screening was adopted. It replaces and extends the scope of the previous Council Recommendation 2003/878/EC adopted in 2003, which encompassed recommendations for breast, colorectal and cervical cancer screening. The new Recommendation aims to ensure that 90% of the EU population who qualify for breast, cervical and colorectal cancer screening are offered these by 2025. It furthermore calls for extending screening programmes for prostate, lung and – under certain circumstances – gastric cancer, in a stepwise approach and based on further research.
- For breast cancer screening, the Recommendation recommends mammography for women aged 50-69, and suggests it for women aged 45-74; for cervical cancer screening, it recommends testing for human papillomavirus (HPV) as the preferred tool for women aged 30-65, with an interval of five years or more; for colorectal cancer screening, it recommends quantitative faecal immunochemical testing as the preferred screening method before referring individuals aged 50-74 for follow-up colonoscopy.
- Most EU+2 countries (the 27 European Union Member States, Iceland and Norway) have implemented population-based screening programmes at the national or regional level for breast, colorectal and cervical cancers. These programmes were introduced at different times, and exhibit varied governance, implementation models and coverage. Some countries have yet to establish national population-based screening programmes.
    - Breast cancer screening is implemented in 26 of the 29 EU+2 countries, with slight variations in age ranges and screening intervals. Personalised risk approaches to breast cancer screening are a major area of research in Europe, with results from large trials expected in the coming years.
    - A population-based colorectal cancer screening programme is in place, organised at the national or regional level, in 22 EU+2 countries. These programmes also vary in terms of target age and invitation practices. Half of EU+2 countries offer the option of self-sampling at home.
    - Cervical cancer screening is implemented in 21 EU+2 countries, organised at the national or regional level, with wide variation in target age ranges. EU+2 countries are increasingly shifting from cervical smear tests to high-risk HPV testing. Self-sampling is offered in only 7 EU+2 countries and only a few utilise risk-tailored strategies.
- There is wide variation in participation in cancer screening among EU+2 countries. For example, the proportion of women aged 50-69 who had a mammography examination varies nine-fold across countries, with the highest participation rate in Denmark (83%) and the lowest in Romania (9%). Implementation of population-based screening programmes, access to preventive services, awareness of the eligible population, level of social protection and the degree of out-of-pocket payments are all relevant factors to explain such disparities.
- People with low education levels are less likely to participate in screening activities than those with high education levels. In breast cancer screening for example, the likelihood of having received a mammogram is 54% among women aged 50-74 with low education levels, which is 15% lower than that among highly educated women. Similarly, for colorectal cancer screening, only 31% of people with low education levels reported having received preventive tests compared to 38% of people with high education levels.
- Cancer awareness influences access to early diagnosis and screening programmes. Factors such as socio-economic status, education level, ethnicity and age can affect cancer awareness. Lower socio-economic groups in Spain and France have been found to have lower cancer

awareness and delayed help-seeking behaviour, for example. Of the 29 EU+2 countries, 21 reported having initiatives to raise public awareness of screening and early detection of cancer, and more than half (18 countries) have initiatives to reach vulnerable populations.

- Many countries are developing migrant-sensitive health services – for example, by providing information in multiple languages to improve health literacy and access to screening services (e.g. Belgium, Finland, Germany, Ireland and Slovenia).
- Primary healthcare has a key role to play in early detection of cancer. General practitioners (GPs) are best placed to clarify questions and remind eligible populations about screening programmes, and to refer symptomatic patients to specialist care following a positive result or for suspected cancer. Only half of EU+2 countries reported considerable reliance on primary healthcare providers to deliver cancer screening activities for colorectal (12 countries) and cervical (15 countries) cancers.
- Delivery of screening close to home or at the community level is also increasing, with common use of mobile screening units for breast cancer (in Croatia, Cyprus, Estonia, France, Iceland, Ireland, Norway, Slovenia and Sweden) and increased use of self-sampling tests for colorectal and cervical cancer screening, sent by post or delivered in local pharmacies or by GPs.
- To reduce the time between cancer suspicion and diagnosis, fast-track pathways or fast-track referral mechanisms are a positive development implemented in a few countries (in Denmark, Ireland, Latvia, Lithuanian, Poland, Slovenia, Spain and Sweden).
- Use of screening data to inform quality improvement cycles and develop targeted actions could be further encouraged to reduce inequalities. Collection of and linking screening data with socio-economic data is reported by Denmark, France, Germany, Italy, the Netherlands, Slovenia and Sweden.
- There are several promising innovations in the field of early cancer detection, although many are still in the research phase:
    - Research on risk-stratified screening is expected to yield results in the coming years; it has the potential to personalise screening programmes, thereby improving their cost – effectiveness and benefit – harm ratios.
    - Biomarkers represent another area of research. Despite the lack of solid evidence for their use in population-based cancer screening at present, European countries are participating in various ongoing research and pilot projects.
    - Artificial intelligence (AI) is being investigated for multiple applications in early cancer detection. Several European countries are participating in clinical trials involving AI, with a focus on enhancing prevention and cancer care. This includes creation of imaging repositories and improvement of non-invasive testing options for colorectal cancer screening.

4.1. Cancer screening and early diagnosis are essential components of an effective cancer control strategy

Primary prevention aims at avoiding the manifestation of diseases; it is connected to health improvement and preventive services such as vaccination (WHO, 2023[1]). Secondary prevention involves early detection and treatment of diseases; this includes preventive measures taken during the initial stages of disease and timely medical intervention, which can lead to improved outcomes. Screening and early diagnosis are two crucial components of secondary prevention, and are key to an effective comprehensive cancer control strategy (WHO, 2017[2]), which is highly relevant to tackling the high burden of cancer in EU+2 countries (the 27 European Union Member States, Iceland and Norway).

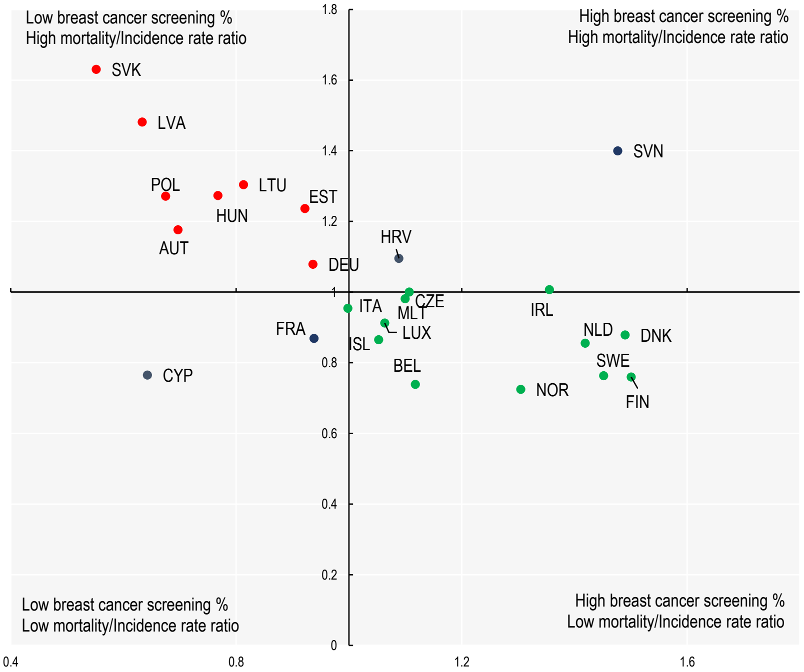
Early detection of cancer comprises two key aspects: screening that focuses on testing asymptomatic and apparently healthy individuals to identify a precursor or early-stage cancer lesion in people without symptoms, and early diagnosis that focuses on detecting symptomatic people as early as possible. Screening involves systematic testing of the at-risk population to "sort out apparently well persons who probably have a disease from those who probably do not" (Wilson and Jungner, 1968[3]), enabling detection of the disease at an early stage. Early diagnosis involves awareness among citizens of symptoms potentially related to cancer, as well as timely access to medical care for diagnosis, identification of the stage of disease, and treatment directed to cancer and related symptoms (WHO, 2017[2]).

Early diagnosis of cancer contributes to ensuring better survival rates, fewer complications and better quality of life (Hawkes, 2019[4]; Neal et al., 2015[5]). It also supports the financial sustainability of healthcare systems, since cancer treatment is generally less complex and expensive when diagnosed at early stages (Cancer Research UK, 2014[6]; McGarvey et al., 2022[7]). Many cancers are diagnosed at advanced stages, and therefore present poor prognosis. Potential causes of delays in the diagnosis and treatment of cancer are related to poor cancer awareness by people, late referral and sub-optimal health system performance related to diagnosis, and waiting lists or sub-optimal resources delaying access to the treatment phase. Financial, logistical and psychosocial barriers can also prevent people from seeking care rapidly (WHO, 2010[8]).

Scientific evidence indicates that screening is a relevant tool to increase the likelihood of successful treatment, particularly when cancer is identified at an early stage. Meta-analyses of randomised controlled trials have shown reductions in mortality rates related to cancer screening. For example, screening with guaiac-based faecal occult blood testing reduced colorectal cancer-specific mortality by 21% (Zheng et al., 2023[9]), and mammography screening reduced breast cancer-specific mortality to 12% among screening attenders versus 58% among non-attenders (Zielonke et al., 2020[10]). A systematic review measured the effect of screening on cervical cancer mortality in Europe: ten observational studies reported a mortality reduction among screening attenders versus non-attenders ranging from 41% to 92% (Jansen et al., 2020[11]). Furthermore, higher survival rates were reported for people with colorectal cancer detected through screening (83.4%) than for those diagnosed through other routes (57.5%) (Cardoso et al., 2022[12]).

Breast cancer screening rates based on programme data demonstrate that countries that had higher participation rates among the eligible population in 2015 had better cancer outcomes in 2020, such as a lower ratio of breast cancer mortality to incidence rate (Figure 4.1). Among the 25 countries with available data, 8 had lower participation rates in breast cancer screening and a higher ratio of mortality to incidence (top left quadrant). A further 12 countries had higher participation rates in breast cancer screening and a lower ratio of mortality to incidence (bottom right quadrant).

Figure 4.1. Higher coverage rates for breast cancer screening programmes are associated with lower ratios of breast cancer mortality to incidence



Notes: The quadrant chart shows the association between breast cancer screening rates (2015) and cancer outcomes as measured by a breast cancer mortality to incidence rate ratio. Age-standardised breast cancer mortality data are from 2020; age-standardised breast cancer incidence rates are 2020 estimates from the Joint Research Centre; and breast cancer screening rates are based on programme data from 2015 (or nearest year). The centre of the quadrant chart is the EU average.

Source: OECD Health Statistics (2023[13]), https://doi.org/10.1787/health-data-en; Eurostat (2023[14]), Causes of Death – Deaths by Country of Residence and Occurrence, https://ec.europa.eu/eurostat/databrowser/view/HLTH_CD_ARO__custom_6537139/default/table; ECIS (2023[15]), European Cancer Information System, https://ecis.jrc.ec.europa.eu.

In 2023, a meta-analysis compared a lifetime with access to cancer screening versus a lifetime without (Breekveldt et al., 2023[16]). The findings suggest that common cancer screening tests do not extend lifetime when considering all-cause mortality. In fact, cancer screening programmes focus on preventing and improving survival from cancer and enhancing quality of life of people experiencing cancer, but they do not change the risk of people developing other potentially fatal diseases during their lifetime. Indeed, risk factors for developing cancer were also related to the risk of developing other non-communicable diseases (e.g. coronary heart disease or diabetes mellitus), for which different prevention and early detection strategies have also proved effective.

Potential harms of screening are the risk of detecting an abnormality that, after additional investigation, is concluded not to be a disease (false positive) (Brodersen et al., 2018[17]) and the risk of detecting a disease where treatment will not provide benefit and may cause harm (overdiagnosis) (Brodersen, Schwartz and Woloshin, 2014[18]), such as an early-stage cancer where diagnosis and treatment will not translate into morbidity or survival gains. In both situations, people will experience unnecessary follow-up exams and procedures, with associated psychological distress and potential financial burden. For instance, in South Korea, after the introduction of national screening programmes in 1999, many hospitals included thyroid cancer screening with ultrasonography in "health check-up" programmes (Ahn, Kim and Welch, 2014[19]). This led providers to offer thyroid cancer screening frequently as an add-on to other screening programmes. Consequently, incidence of thyroid cancer increased over six-fold in South Korea from 1999 to 2008 (Park et al., 2016[20]). However, the mortality rate from this disease remained stable over the same period (Ahn, Kim and Welch, 2014[19]).

Since knowledge about each cancer's biology, clinical behaviour and treatment options is rapidly evolving, it is highly relevant to re-evaluate the trade-offs between harms and benefits regularly when considering implementation of screening programmes. Benefits should outweigh risks, and cost – effectiveness analysis should inform decision making about implementation of screening programmes, considering context-specific features, such as population demographics, socio-economic factors and culture, and health service models of care and capacity.

4.2. Implementation of population-based screening programmes is converging across EU+2 countries, but marked differences remain

The principles proposed by Wilson and Jungner in 1968 (Wilson and Jungner, 1968[3]) and by the Council of Europe in 1994 (European Commision, 2003[21]), further developed by other leading experts (Andermann et al., 2008[22]; Harris et al., 2011[23]; Dobrow et al., 2018[24]), are key to informing policy making related to cancer screening. These principles consider disease aspects, such as its epidemiology and natural history, as well as principles related to the relevant tests, such as performance and post-screening test options (Programmes principles are summarised in Box 4.1).

Alongside the existence of a national policy supporting screening programmes, how screening is delivered within a country has influence on the outcomes of the programme. Population-based screening means that, from the whole population, a group of people defined by sex and age is identified as the target to screen for a certain type of cancer (SAPEA, 2022[25]). A screening programme is called "organised" when it fulfils certain requirements: 1) the screening test is part of a care pathway and not performed in isolation; 2) the eligible population is defined following appropriate scientific evidence concerning risk-benefit ratios; 3) the screening test is offered in a systematic way to the eligible population; 4) the screening pathway is governed by evidence-based protocols or guidelines; 5) evidence-based quality standards are followed by screening providers; and 6) the screening programme is supported by an information system, ideally linked to population registries (WHO, 2020[26]). These requirements are key to ensuring that all citizens have an equal opportunity to participate in screening and receive adequate follow-up care in the case of a positive result (IARC, 2016[27]). As such, they contribute to the effectiveness of screening programmes in achieving the greatest benefit with the least harm at the population level.

Box 4.1. Consolidated principles for screening programmes based on a systematic review and consensus process

1. **Screening programme infrastructure**: there should be adequate existing infrastructure or a clear plan to develop adequate infrastructure, to allow for timely access to all components of the screening programme.
2. **Screening programme co-ordination and integration**: all components of the screening programme should be co-ordinated and, where possible, integrated with the broader healthcare system.
3. **Screening programme acceptability and ethics**: all components of the screening programme should be clinically, socially and ethically acceptable to screening participants, health professionals and society, and there should be effective methods for providing screening participants with informed choice, promoting their autonomy and protecting their rights.
4. **Screening programme benefits and harms**: the expected range and magnitude of benefits (e.g. decreased cause-specific mortality) and harms (e.g. overdiagnosis and overtreatment) for screening participants and society should be clearly defined and acceptable, and supported by existing high-quality scientific evidence that indicates that the overall benefit of the screening programme outweighs its potential harms.
5. **Economic evaluation of screening programme:** an economic evaluation of the screening programme using a health system or societal perspective should be conducted (or there should be a clear plan to do so); the evaluation should assess the full costs and effects of implementing, operating and sustaining the screening programme while considering the opportunity costs and effect of allocating resources to other potential non-screening alternatives for managing the disease or condition.
6. **Screening programme quality and performance management**: the screening programme should have clear goals or objectives that are explicitly linked to programme planning, monitoring, evaluating and reporting activities, with dedicated information systems and funding.

Source: Adapted from Dobrow, M. et al. (2018[24]), "Consolidated principles for screening based on a systematic review and consensus process",, https://doi.org/10.1503/cmaj.171154. This systematic review comprises 41 articles, including one outlining the Wilson and Jungner principles (1968[3]), *Principles and Practice of Screening for Disease*, https://iris.who.int/bitstream/handle/10665/37650/WHO_PHP_34.pdf.

Europe's Beating Cancer Plan includes specific goals on cancer screening (European Commission, 2021[28]). One goal is to support EU Member States in ensuring that 90% of the target population receives invitations for cancer screenings for breast, cervical and colorectal cancers by 2025. In 2003, the first EU Council Recommendation on Cancer Screening encouraged Member States to implement three population-based and quality-assured cancer screening programmes for cervical, breast and colorectal cancers (European Commision, 2003[21]). In December 2022, a new EU Council Recommendation underscored the importance of strengthening prevention through early detection for breast, cervical, colorectal, lung, prostate and gastric cancers (European Commission, 2022[29]) (Box 4.2).

Box 4.2. The 2022 EU Council Recommendation on Cancer Screening emphasised the importance of enhancing prevention through early detection across different types of cancers

Breast cancer: Screening for women aged 50-69 with mammography is recommended. Lowering the age limit for screening to 45 and increasing the upper age limit to 74 is suggested. Furthermore, use of digital breast tomosynthesis or digital mammography is suggested. Magnetic resonance imaging should be considered when clinically appropriate.

Colorectal cancer: The preferred screening test is the quantitative faecal immunochemical testing for people aged 50-74. Further research is suggested to develop risk-tailored strategies, such as thresholds defined by sex, age and previous test results. Endoscopy is suggested as a relevant tool to implement combined strategies.

Cervical cancer: The preferred screening test is human papillomavirus testing, using only clinically validated assays for women aged 30-65, with an interval of five years or more. Risk-tailored strategies could be considered by adapting the age range and intervals based on individual human papillomavirus vaccination history, as well as the possibility of offering kits for self-sampling (particularly relevant among non-responders).

Lung cancer: In light of the preliminary evidence regarding lung cancer screening with low-dose computed tomography, countries should: 1) focus on primary and secondary prevention approaches, primarily directed to individuals at high risk for lung cancer such as current or past heavy smokers; 2) investigate the feasibility and effectiveness of screening with the use of low-dose computed tomography targeting individuals at high risk; 3) perform further research regarding optimal ways to reach and invite the eligible population, including identifying and targeting other profiles at high risk.

Prostate cancer: Taking into consideration the preliminary evidence and the substantial amount of opportunistic screening, countries should consider a stepwise approach to evaluate the feasibility and effectiveness of organised prostate cancer screening programmes. The test suggested is prostate-specific antigen testing, combined with additional magnetic resonance imaging as a follow-up test.

Gastric cancer: Implementation studies and screen-and-treat strategies for *Helicobacter pylori* should be considered in countries/regions with high gastric cancer incidence and death rates. People with pre-cancerous gastric lesions unrelated to *Helicobacter pylori* infections should be addressed by screening strategies.

Notes: A recommendation can be strong (when it is "recommended") or conditional (when it is "suggested"). A strong recommendation means that policy makers can adopt it as policy in most circumstances, while a conditional recommendation means that policy makers' decisions should be dependent on the involvement of various stakeholders (European Commission, 2023[30]).
Source: European Commission (2022[29]), Council Recommendation on Strengthening Prevention Through Early Detection: A new EU approach on cancer screening replacing Council Recommendation (2003/878/EC), https://data.consilium.europa.eu/doc/document/ST-14770-2022-INIT/en/pdf.

4.2.1. Governance, operationalisation and developments in current screening programmes differ across countries

Population-based breast cancer screening is implemented in 26 EU+2 countries

Embedded in the European Commission Initiative on Breast Cancer (ECIBC), European screening and diagnosis guidelines were launched in 2021 (European Commission, 2023[31]), together with a quality assurance scheme to support improvement of quality and continuity of care in the context of population-based breast cancer screening (European Commission, 2021[32]; Muratov et al., 2020[33]). For women without symptoms of breast cancer who are considered to have average risk, the ECIBC's Guideline Development Group recommends a population-based screening programme with mammography, suggesting use of either a digital breast tomosynthesis (DBT)[1] or digital mammography (DM) (see Box 4.2). Furthermore, the ECIBC's guidelines recommend that screening intervals differ according to a woman's age (every two or three years for women aged 45-49; every two years for women aged 50-69; every three years for women aged 70-74) (European Commission, 2023[31]).

Aside from Bulgaria, Lithuania and Romania, all other EU+2 countries have population-based screening programmes in place for breast cancer (Table 4.6). Most screening programmes are organised at the national level, except for those in Belgium, Italy and Sweden, which are organised at the regional level. In January 2023, Bulgaria adopted a National Cancer Plan, yet the organisation of screening activities is not performed under this plan. Breast cancer screening in Lithuania follows a nationwide non-population-based approach, while in Romania a pilot is under way, and the first results are expected in early 2024.

Table 4.6. Characteristics of breast cancer screening vary among EU+2 countries

Country	Organisation	Coverage	Target age	Interval	Invitation strategy
Austria	National	Population-based	45-69 years (opt-in possible if ≥40 years)	Every two years	The invitation scheme is co-ordinated by dedicated offices. Invitations are sent to the target population with insurance. Eligible women can get an appointment at a participating radiology centre without a referral; women without insurance can request an invitation.
Belgium	Regional	Population-based	50-69 years	Every two years	Invitations are sent with explanatory information.
Bulgaria	NA	Non-population-based	50-69 years	Every two years	–
Croatia	National	Population-based	50-69 years	Every two years	Invitations are sent to the target population from the population registry to citizens covered by compulsory health insurance.
Cyprus	National	Population-based	45-74 years	Every two years	Personalised invitations are sent by email to the target population. Women must contact their general practitioner (GP) to obtain a mammography referral.
Czechia	National	Population-based	40-45 years: paid out of pocket; ≥45 years: reimbursed by public health insurance	Every two years	Invitations are co-ordinated by the Ministry of Health, which co-operates with health insurers and medical societies. Women need to visit a GP or gynaecologist to obtain a prescription for mammography.
Denmark	Regional	Population-based	50-69 years	Every two years	–
Estonia	National	Population-based	50-68 years (gradual expansion to age 74 planned from 2024)	Every two years	Invitations with detailed information are sent by the Cancer Screening Registry, informed by the population registry. Women can register for a mammogram at the chosen healthcare facility or in a mobile mammography station.
Finland	National	Population-based	50-69 years	Every two years	Invitation letters are sent; translations into other languages are available upon request.
France	National	Population-based	50-74 years	Every two years	The invitation process is being revised (deployment on 1 January 2024), with health insurance funds taking charge of invitations based on reimbursement data.
Germany	National	Population-based	50-69 years (upper age limit will be extended to 75)	Every two years	Invitation letters are sent with a standardised medical history form, which must be completed before the examination.

Country	Organisation	Coverage	Target age	Interval	Invitation strategy
Greece	National	Population-based	50-69 years	Every year	Invitations are sent by mobile text message.
Hungary	National	Population-based	45-65 years	Every two years	Invitation letters are sent with fixed appointment dates at a mammography centre based on place of residence.
Iceland	National	Population-based	40-74 years	40-69 years: every two years; 70-74 years: every three years	Invitations are sent electronically, after which women can book their appointment online or by phone.
Ireland	National	Population-based	50-69 years	Every two years	Women are sent an invitation with an appointment (which can be rescheduled) and an information leaflet. Text reminders for subsequent appointments are sent to women who have given their mobile number at first visit. Since the COVID-19 pandemic, a previous non-attender at the last screening round receives a reminder letter to schedule an appointment instead of being provided with a pre-determined appointment.
Italy	Regional	Population-based	50-69 years	Every two years	Invitation letters are sent with date, information on benefits/harms and informed consent forms.
Latvia	National	Population-based	50-69 years	Every two years	Invitation letters are sent to electronic address after activation by citizens.
Lithuania	National	Non-population-based	50-69 years	Every two years	Invitations are sent via GPs.
Luxembourg	National	Population-based	50-69 years	Every two years	Invitation letters are sent with explanations to guide decision making and a voucher to book an appointment in a radiology centre of choice (letters are valid for two years).
Malta	National	Population-based	50-69 years	Every two years	Invitations are sent to the target population.
Netherlands	National	Population-based	50-75 years	Every two years	Invitations are sent to the target population.
Norway	National	Population-based	50-69 years	Every two years	Invitation letters are sent with a suggested appointment for a mammogram.
Poland	National	Population-based	50-69 years (the legislative process is under way to expand the age range)	Every two years	Since 2022, push notifications are sent through the "myIKP" application (patient portal), along with a link to detailed information online. Notifications are sent to women who have not undergone mammography for the past two years or who fulfil criteria to repeat mammography after 12 months due to a family history of breast cancer or mutations in the BRCA1 or BRCA2 genes.
Portugal	National	Population-based	50-69 years	Every two years	In mainland Portugal, the regional health administrations are responsible for identifying the eligible population, which is communicated to entities external to the national health system for the execution of procedures related to tests. In the Autonomous Regions of the Azores and Madeira, the process is managed by the relevant regional health systems and executed by public entities.
Romania	National	Non-population-based	–	–	–
Slovak Republic	National	Population-based	50-69 years (opt-in possible at 40-50 years)	Every two years	Invitations are sent, allowing patients to book within six months of accepting the invitation.

Country	Organisation	Coverage	Target age	Interval	Invitation strategy
Slovenia	National	Population-based	50-69 years	Every two years	Mail invitations are sent with fixed appointments. Identification is done through the National Population Registry, excluding women with breast cancer registered in the National Cancer Registry.
Spain	National	Population-based	50-69 years	Every two years	Invitation strategy differs per region, although in all cases the invitation is made following the same criteria and included in the common portfolio of services of the national health system.
Sweden	Regional	Population-based	40-74 years	Every 18-24 months	The process differs across regions.

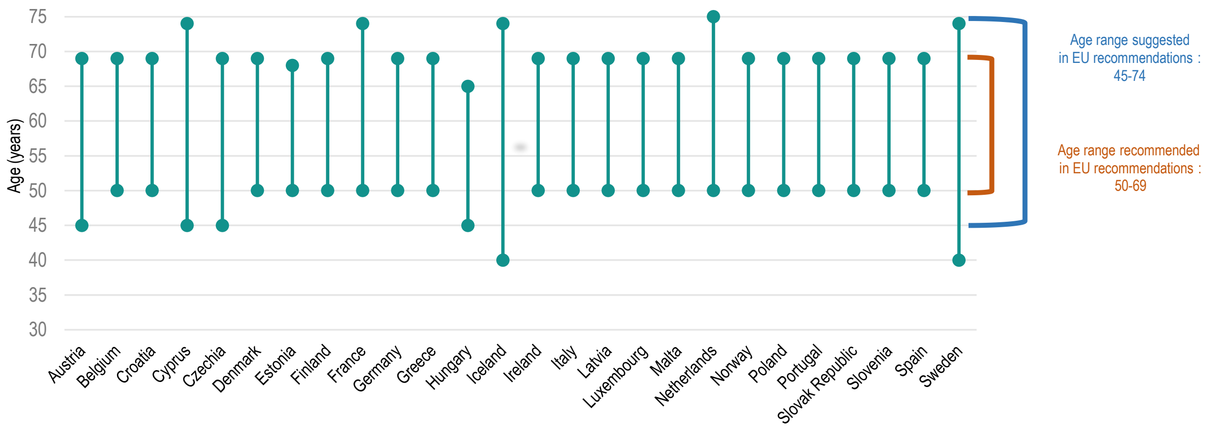
Sources: EU Country Cancer Profiles (OECD, 2023[34]) and 2023 OECD Policy Survey on Cancer Care Performance.

Most of the breast screening programmes among EU+2 countries include mammography every two years for women aged 50-69 (Figure 4.2). Nevertheless, there is some variation in Austria, Cyprus, Czechia, France, Hungary, Iceland, the Netherlands and Sweden, which screen women within a broader age range.

Among the 26 EU+2 countries responding to the 2023 OECD Policy Survey on Cancer Care Performance,[2] 8 have identified changes in breast cancer screening (Cyprus, Estonia, Germany, Iceland, Ireland, Latvia, the Netherlands and Poland). Consistent with the EU Council Recommendation, the changes to breast cancer screening are mostly related to extending the age limits of the target population. For instance, in Malta, there are plans to extend screening to women aged 45 instead of 50; in Spain, the possibility of extending the age range to 45-75 is being evaluated; and in Poland, a legislative process is under way to introduce changes to breast cancer screening.

In Cyprus, the age range of the target population for breast cancer screening has recently been expanded to women aged 45-74 (from 30 September 2023). In Estonia, a legislative process is under way for 2024 to expand the breast cancer target group to ages 50-74. In Germany, a recent guideline, which is not yet in force, raised the upper age limit of breast cancer screening from 69 to 75 (Gemeinsamer Bundesausschuss, 2023[35]). This follows a scientific assessment by the *Bundesamt für Strahlenschutz* (BfS) – the Federal Office for Radiation Protection – in December 2022 in favour of quality-assured breast cancer screening for women up to age 75 (BfS, 2022[36]). In addition, the Institute for Quality and Efficiency in Health Care has determined that the benefits of screening women between the ages of 45 and 49 outweigh the harms, but that informed decision making is important given the marginal benefit. Implementation of the lower screening age will be possible after a positive evaluation from the BfS. It is expected that eligible women will be able to register for screening tests under this new guideline from July 2024.

Figure 4.2. Target age range of population-based breast cancer screening programmes differs among EU+2 countries



Sources: OECD (2023[34]), *EU Country Cancer Profiles*, www.oecd.org/health/eu-cancer-profiles.htm and 2023 OECD Policy Survey on Cancer Care Performance.

Population-based colorectal cancer screening programmes are implemented in 22 EU+2 countries

The new EU Council Recommendation on screening updated the preferred test for population-based colorectal cancer screening to faecal immunochemical testing (FIT) instead of guaiac-based faecal occult blood testing (gFOBT) (see Box 4.2). European colorectal cancer screening guidelines are expected to be announced by the end of 2024, as well as a quality assurance scheme for colorectal cancer screening and care services.

Among the 29 EU+2 countries, 22 have population-based colorectal cancer screening in place, organised at the national or regional level (Table 4.7). In Bulgaria, Cyprus and Iceland, a population-based colorectal cancer screening programme is planned but not yet implemented (in Cyprus, it will be implemented in the first trimester of 2024 using FIT). In Austria, implementation of population-based screening was recently advised by the National Screening Committee on Cancer. In addition, among 26 EU+2 countries responding to the 2023 OECD Policy Survey on Cancer Care Performance, 8 identified recent changes in their colorectal cancer screening programme (Austria, Cyprus, Czechia, Estonia, Germany, Latvia, the Netherlands and Norway).

Table 4.7. Characteristics of colorectal cancer screening vary among EU+2 countries

Country	Coverage and organisation	Implementation status	Target age	Test and interval
Austria	National Non-population-based	Population-based screening recently advised but not yet implemented	45-75 years	FIT (every two years) or colonoscopy (every ten years)
Belgium	Regional Population-based	Implemented	50-74 years	FIT (every two years)
Bulgaria	NA Non-population-based	National Plan adopted (January 2023) but not yet implemented	–	–

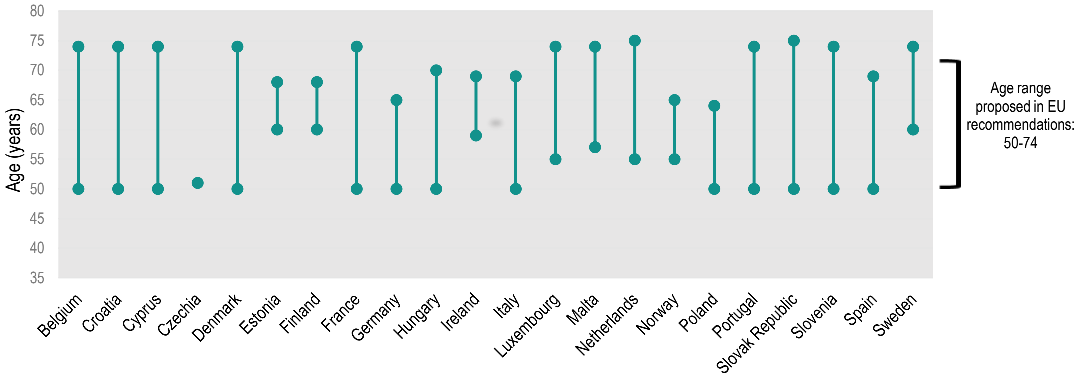
Country	Coverage and organisation	Implementation status	Target age	Test and interval
Croatia	National Population-based	Different implementation across regional public health authorities	50-74 years	gFOBT (every two years)
Cyprus	National Population-based	Implementation planned for the first trimester of 2024	50-74 years	FIT (every two years)
Czechia	National Population-based	Implemented	≥50 years (upper limit set on individual basis)	50-54 years: FIT (every year) ≥55 years: FIT (every two years) or colonoscopy (every ten years)
Denmark	Regional Population-based	Implemented	50-74 years	FIT (every two years)
Estonia	National Population-based	Implemented	60-68 years	FIT (every two years)
Finland	National Population-based	Implemented	60-68 years	FIT (every two years)
France	National Population-based	Implemented	50-74 years	FIT (every two years)
Germany	National Population-based	Implemented	50-65 years	Men and women 50-54 years: FIT every year Men 50-65 years and women 55-65 years: entitled to two screening colonoscopies at least ten years apart Men 50-54 years old: FIT every year, if a colonoscopy is not feasible or desired / Men and women ≥55 years old: FIT every 2 years, if a colonoscopy is not feasible or desired.
Greece	NA Non-population-based	Implemented	50-70 years	gFOBT (every two years) Colonoscopy (every five years)
Hungary	National Population-based	Implemented	50-70 years	FIT: if results are positive, colonoscopy performed every two years
Iceland	NA Population-based	Implementation plan ongoing	≥50 years	Plan to invite people 60-69 years for FIT (every two years), and people ≥50 years for colonoscopy Plan to increase the target population to those aged 50-74, based on assessment of the pilot programme
Ireland	National Population-based	Implemented	59-69 years Plan to extend to 55-74 years	FIT (every two years)
Italy	Regional Population-based	Implemented	50-69 years (except in Piemonte: 58-60 years)	FIT (every two years) In Piemonte, rectosigmoidoscopy performed once at 58-60 years
Latvia	NA Non-population-based	NA	50-74 years	FIT (every two years)
Lithuania	National Non-population-based	NA	50-74 years	FIT (every two years)
Luxembourg	National Population-based	Implemented	55-74 years	FIT (every two years)
Malta	National Population-based	Implemented	57-74 years	FIT (every two years)
Netherlands	National Population-based	Implemented	55-75 years	FIT (every two years)

Country	Coverage and organisation	Implementation status	Target age	Test and interval
Norway	National Population-based	Implemented but contingent on hospitals having enough capacity to offer screening procedures	55-65 years	FIT (every two years)
Poland	National Population-based	Implemented	50-64 years	Colonoscopy once in a lifetime Introduction of FIT being considered
Portugal	National Population-based	Implemented	50-74 years	FIT (every two years)
Romania	National Non-population-based	Pilot project targeting 4% of the eligible population	50-74years	FIT (every two years)
Slovak Republic	National Population-based	Implemented	50-75 years	gFOBT (every two years) or colonoscopy (every ten years)
Slovenia	National Population-based	Implemented	50-74 years	FIT (every two years)
Spain	Regional Population-based	Implemented	50-69 years	FIT (every two years)
Sweden	Regional Population-based	Different rollout across regions: most started in 2022 or 2023; plan to have a fully implemented programme by 2027	60-74 years	FIT (every two years)

Note: NA stands for information not available.
Source: OECD (2023[34]), *EU Country Cancer Profiles*, https://www.oecd.org/health/eu-cancer-profiles.htm, and OECD Policy Survey on Cancer Care Performance.

While recommendations suggest performing FIT among people aged 50-74, the age ranges vary substantially among EU+2 countries (Figure 4.3), and only 10 countries include the age range 50-74. With the exception of Austria, which will target people aged 45-75 when the recent recommendations are implemented, the other countries include narrower age intervals, such as 60-68 in Estonia, 59-69 in Ireland and 55-65 in Norway.

Figure 4.3. Target age of population-based colorectal cancer screening programmes differs among EU+2 countries



Note: In Czechia, the upper age limit is determined on an individual basis.
Source: OECD (2023[34]), *EU Country Cancer Profiles*, www.oecd.org/health/eu-cancer-profiles.htm and 2023 OECD Policy Survey on Cancer Care Performance.

Most countries provide FIT to perform screening, in accordance with current recommendations. Compared to gFOBT, FIT offers various advantages, including the need for one sample instead of three. FIT is also not affected by diet or medications, and allows the cut-off for a positive test to be adjusted according to cost – effectiveness considerations in each country/region. In Ireland, the cut-off value for FIT in the colorectal cancer screening programme is 45 µg Hb/g faeces – similar to the value in the Netherlands (47 µg Hb/g faeces; 235 ng Hb/mL), although it depends on the specific FIT test. In Denmark, a positive result is defined as greater than 100 ng Hb/mL (Petersen et al., 2020[37]). In Poland, discussions are ongoing about introducing FIT for colorectal screening. In Cyprus, colorectal screening with FIT will be implemented in the first trimester of 2024. In 2021, Latvia changed the frequency of FIT in colorectal cancer screening from every year to every two years.

In Norway, colorectal cancer screening started recently, and all 55-year-olds will be invited for screening through FIT every two years for ten years (Kreft Registeret, 2023[38]). The first invitations were sent out in May 2022, and rollout continued in 2023. The Cancer Registry of Norway has been given responsibility for operating the new screening programme, and it co-operates closely with the regional health authorities to ensure the best possible service. Austria’s National Screening Committee on Cancer recommended implementation of population-based colorectal screening for people aged 45-75 in 2022: it recommended a colonoscopy every ten years or FIT every two years (Federal Ministry of Social Affairs, Health, Care and Consumer Protection, 2022[39]), but this has not yet been implemented. In Germany, a nationwide quality-assured colorectal cancer screening programme was introduced in 2019, based on the Cancer Screening and Registry Act of 2013. The former gFOBT was replaced by a quantitative immunological faecal occult blood test (FIT) in April 2017.

The Danish randomised controlled trial CareForColon2015 is examining the use of a colon capsule endoscopy (CCE) applied to colorectal cancer screening (imaging-based screening) (Deding et al., 2021[40]). The control group comprises individuals who undergo regular colorectal cancer screening (FIT followed by colonoscopy when FIT is positive); they are compared with individuals who choose between the colonoscopy or the CCE following positive FIT. The published interim analyses (2021) reported safety and efficiency of CCE and high participation rates, while the proportion of suspected cancers retrieved was lower than expected. The CCE procedure was reviewed, and the trial is under way until 2024.

Different invitation strategies are used across EU+2 countries (Table 4.8). Of the 22 countries with population-based colorectal screening, 19 send invitation letters by post to the eligible population, accompanied by background material for informed decision making. Some countries, such as Estonia and Poland, also send personal electronic notifications. In Ireland, test kits are sent to participants only after their consent is provided to the first round of screening by phone; in subsequent rounds, the test is sent without further phone calls.

Among the countries sending personal invitations, 14 provide citizens with the option to self-test at home and send their sample to a laboratory for analysis. The test kit is attached with the invitation letter in some countries, such as Belgium, Denmark and the Netherlands. Other countries offer the option to obtain a self-test kit in pharmacies, via a GP consultation (e.g. Italy), or sometimes combined with the option to order a test online to receive it at home (e.g. Hungary). France is currently revising the invitation process (deployment in January 2024), with the health insurance fund taking charge of invitations. Citizens will be invited to consult a GP to access the test kit, and will also have the option to access screening tests via pharmacies or online.

Table 4.8. Invitation letters for colorectal cancer screening are used in many EU+2 countries

Country	Invitation procedure for colorectal cancer screening
Austria	NA
Belgium	**Flanders**: an invitation letter is sent with the test, a participation form, instructions for use and accompanying brochure. The sample can be sent free of charge to a central laboratory. **Wallonia**: screening invitations are sent; a test kit (with a pre-paid envelope for returning the completed kit) can be requested from a GP or online. **Brussels**: the sample can be sent free of charge using the pre-paid and pre-addressed envelope in the kit. Tests can be obtained without cost at pharmacies.
Bulgaria	NA
Croatia	Invitation letters are sent to the target population from the population registry of insured people.
Cyprus	Personalised invitations will be sent with screening kits. FIT will be performed by laboratories.
Czechia	Personalised invitations are sent to the target population aged up to 70.
Denmark	Invitation letters are sent with screening kits, which are then returned to the laboratories. A positive FIT result is followed by an invitation for a colonoscopy with a pre-booked time within 14 days of the result.
Estonia	The Cancer Screening Registry sends digital and paper invitations according to the population register and regardless of insurance status, with reminders and text message invitations. People who have undergone a colonoscopy in previous screening or who have been diagnosed with specific disease identification codes related to colon cancer earlier in their life are excluded from screening. Participants send their samples to laboratories by post.
Finland	Eligible population receive an invitation letter (available in other languages on request) to attend a screening centre.
France	The invitation process is being revised (for deployment in January 2024), with the health insurance fund taking charge of invitations based on reimbursement data; these will include an invitation to consult a GP to access the kit, supplemented by possible access to screening kits via pharmacists or a website.
Germany	Insured people receive an invitation letter from their health insurance company, with information that explains the advantages and disadvantages of colorectal cancer screening, the testing options and the course of the examinations.
Greece	Screening is performed by specialist doctors, mostly in the private sector. People are referred by their doctor or seek the service on their own, as waiting times in the public sector can be substantial.
Hungary	Invitation letters are sent by the Screening Management Department to people who have a GP who has joined the screening programme and who has an agreement with the National Public Health Centre. The invitation suggests that individuals contact the GP to obtain the test kit. Alternatively, it is possible to request the test kit by email and receive it by post. “Screening buses” are organised to specific locations, where invitations and test kits are provided to communities.
Iceland	NA
Ireland	Test kits are sent to participants after they consent by phone to the first round of screening. In subsequent rounds, the test is sent without further phone call.
Italy	Invitation letters are sent with written information on benefit and harms. Citizens are required to sign an informed consent form. Testing is delivered by local health services. In some regions, collection is carried out through pharmacies.
Latvia	GPs provide free colorectal cancer screening to the target population as part of the general health prevention programme.
Lithuania	Eligible individuals are referred to screening via GPs.
Luxembourg	Invitation letters are sent by post to those eligible (in five languages), after which they can request a test by phone or online to perform at home or can obtain it from a distributor laboratory and send it free of charge to a laboratory for analysis.
Malta	The target population is invited to do a home-sampled FIT.
Netherlands	An information letter (pre-announcement) is sent, followed after three weeks by an invitation with a leaflet and the FIT. Citizens who do not respond twice only receive an invitation letter instead of the package with leaflet and the test.
Norway	First invitations were sent in May 2022, with continued rollout in 2023. Participants do the test at home and submit it for analysis. Follow-up is with colonoscopy, when appropriate, at the nearest screening centre.
Poland	Since 2022, through the “myIKP” application (patient portal), push notifications are sent to users, along with a link to detailed information online. The number of centres offering colonoscopy varies substantially between regions (ranging from 0 in Zachodniopomorskie to 14 in Slaskie).
Portugal	The target population is invited by GP or private doctor.
Romania	NA
Slovak Republic	Health insurance companies send screening invitations with gFOBT kits to insured people who have not had a routine check-up, or who have not undergone a colonoscopy exam in the last ten years.
Slovenia	Invitations are sent by post to the target population who have compulsory health insurance (data are obtained from the Central Population Register). Participants receive the kit for collection of stool samples at home after signing the informed consent form.
Spain	Invitation methods differ across regions, although in all cases the invitation is made following the same criteria and included in the common portfolio of services of the national health system.
Sweden	Invitation letters are sent with instructions, a sample container and a return envelope. The participant collects a stool sample and sends it to one of the available laboratories for analysis.

Note: NA stands for not available.

Source: OECD (2023[34]), *EU Country Cancer Profiles*, www.oecd.org/health/eu-cancer-profiles.htm and 2023 OECD Policy Survey on Cancer Care Performance.

A systematic review considered 34 studies when assessing the effectiveness of invitation practices in colorectal cancer screening in 11 countries (Gruner et al., 2021[41]). The findings show that any invitation scheme is more effective in increasing screening participation compared to no invitation. The highest increase in test uptake was found when multiple components of invitations were used (increased test usage ranging from 3.2% to 24.7%). Sending an invitation with an attached screening test led to higher uptake of the screening test (ranging from 4% to 19.7%) than other strategies. Reminders delivered by letter or email were more effective (ranging from 8.5 to 15.8%) than those using phone call or text message (ranging from 0.6% to 6.5%). Notably, advance notification, mailing of the screening test and providing reminders were practices demonstrating important, complementary roles in increasing the uptake of the gFOBT in colorectal cancer screening.

Population-based cervical cancer screening is implemented in 21 EU+2 countries

In recent decades, remarkable advances have been made in the availability of effective primary and secondary prevention tools to tackle cervical cancer – namely, vaccination against the most oncogenic human papillomavirus (HPV) types (Chapter 3) and screening with HPV-based testing. Europe's Beating Cancer Plan establishes the goal of eliminating cervical cancer by largely focusing on these preventive strategies (European Commission, 2021[28]).

Of the 29 EU+2 countries, 21 have population-based cervical cancer screening in place, organised at the national or regional level (Table 4.9), and 11 have identified changes to cervical cancer screening programmes (Cyprus, Czechia, Estonia, Germany, Latvia, Lithuania, the Netherlands, Spain, Sweden, Iceland and Norway). In Germany, a nationwide organised quality-assured cervical cancer screening programme was introduced on 1 January 2020. Since then, women aged 35 and over are entitled to a combined examination comprising a cervical smear (cytology) and HPV testing every three years. In Sweden, in 2022, the National Board of Health and Welfare revised the recommendations on cervical screening. Rollout of the new recommendation on primary HPV testing differs across regions; the plan is to have it fully implemented by 2024. In 2018, the Spanish Ministry of Health ordered all autonomous communities and cities (regions) to shift from non-population-based cervical cancer screening to a population-based programme. In April 2019, population-based cervical cancer screening was incorporated into the national health system's portfolio, and regions were given five years to implement the new approach, which is currently in progress across the country.

Table 4.9. Characteristics of cervical cancer screening vary among EU+2 countries

Country	Coverage and organisation	Implementation status (population-based screening)	Target age	Test and screening interval
Austria	NA Non-population-based	–	≥20 years	• ≥20 years: cytology every year • ≥30 years: HPV test every three years, avoiding simultaneous HPV and cytology
Belgium	Regional Population-based in **Flanders**	• **Flanders**: implemented • **Wallonia**: population-based pilot in development; screening every three years currently recommended • **Brussels**: no programme in place, but reimbursement possible every three years for women in target group	• **Flanders**: 25-64 years • **Wallonia and Brussels**: recommended for 25-64 years	• Flanders: cytology every three years (trial under way to change to HPV test every five years, potentially including self-sampling)
Bulgaria	NA Non-population-	National Plan adopted in January 2023; not implemented yet	30-40 years	Cytology

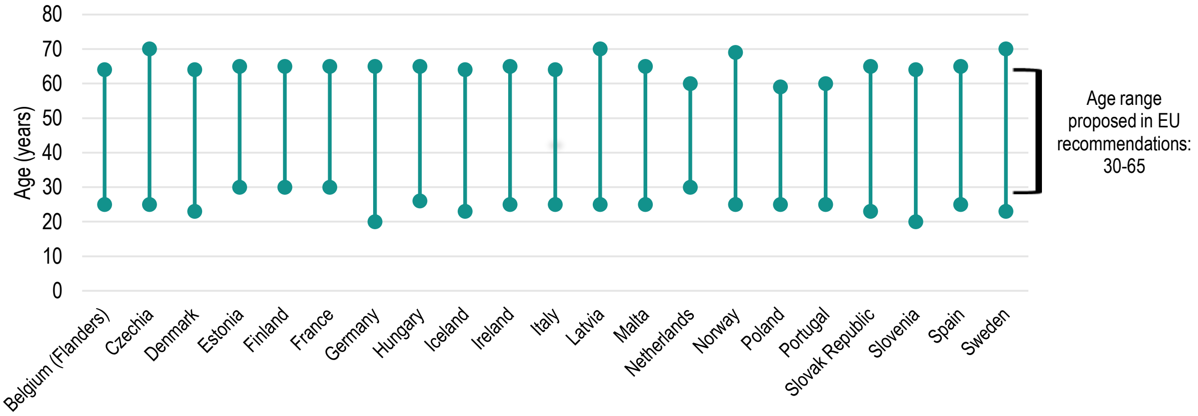
Country	Coverage and organisation	Implementation status (population-based screening)	Target age	Test and screening interval
	based			
Croatia	NA Population-based	Pilot in one county	–	Pilot: combination of cytology and HPV test
Cyprus	NA Non-population-based	Cervical screening programme expected to be implemented in 2024	–	–
Czechia	National Population-based	Implemented	25-70 years From 15 years, screening paid for without an upper age limit	• Cytology every year • HPV co-test at 35, 45 and 55 years (other age groups can access HPV test, paying out of pocket)
Denmark	National Population-based	Implemented	23-64 years	HPV test
Estonia	National Population-based	Implemented	30-65 years	HPV test every five years
Finland	National Population-based	Implemented	30-65 years	HPV test every five years
France	National Population-based	Implemented	25-65 years	• 25-30 years: cytology every three years, following normal results on two tests at one-year intervals • 30-65 years: HPV test every five years
Germany	National Population-based	Implemented	20-65 years	• 20-34 years: cytology every year • 35-65 years: combination of cytology and an HPV test every three years
Greece	NA Non-population-based	NA	–	–
Hungary	National Population-based	Implemented	25-65 years	Cytology every three years
Iceland	National Population-based	Implemented	23-64 years	• 23-29 years: cytology every three years • 30-59 years: HPV test every five years • 60-64 years: HPV test; if negative, discharged from the programme
Ireland	National Population-based	Implemented	25-65 years	• HPV test: • 25-29 years: every three years • 30-65 years: every five years
Italy	National Population-based	Implemented	25-64 years	• Cytology every three years • 30-64 years: regions committed to adopting HPV testing every five years
Latvia	National Population-based	Implemented	25-70 years	• 25 and 29 years: cytology • 30-70 years: HPV test every three years, changing to every five years from 2025
Lithuania	National Non-population-based	NA	25-59 years	• 25-34 years: cytology every three years • 35-59 years: HPV test every five years
Luxembourg	NA Non-population-based	Implementation of a national programme designated in 2014 and 2020 National Cancer Plans but not yet implemented	–	–

Country	Coverage and organisation	Implementation status (population-based screening)	Target age	Test and screening interval
Malta	National Population-based	Implemented – rolling out	25-43 years (upper age limit increases by 1 year every year)	Cytology every three years
Netherlands	National Population-based	Implemented	30-60 years	• 30, 35, 40, 50 and 60 years: HPV test • 45 or 55 years: those previously testing positive for HPV and non-responders of previous testing age invited • 65 years: HPV test for those at age 60 with a positive HPV result not referred to a gynaecologist
Norway	National Population-based	Implemented	25-69 years	HPV test every five years
Poland	National Population-based	Implemented	25-59 years	Cytology every three years
Portugal	National Population-based	Implemented	25-60 years	HPV test every five years
Romania	National Non-population-based	NA	25-64 years	Cytology every five years (regardless of insurance status)
Slovak Republic	National Population-based	Implemented	23-65 years	Frequency and upper age limit of screening dependent on cytology test result First two examinations a year apart; if both negative, following examinations at three-year intervals If three latest cytology results (at three-year intervals) negative and no high-risk lesion detected in the cervical area, screening stops at 65 years
Slovenia	National Population-based	Implemented	20-64 years	Cytology every three years Pilot with HPV test planned
Spain	Regional Population-based (implementation ongoing)	Population-based cervical cancer screening incorporated into the national health system portfolio of services in April 2019, specifying five years for the autonomous regions to introduce it	25-65 years	• 25-34 years: cytology every three years • 35-65 years: HPV test every five years
Sweden	Regional Population-based	Different rollout of 2022 recommendations on primary HPV testing across regions; plan to have it fully implemented by 2024	23-70 years	Primary HPV testing: • 23-49 years: every five years • 50-70 years: every seven years

Notes: NA stands for information not available.
Source: OECD (2023[34]), *EU Country Cancer Profiles*, www.oecd.org/health/eu-cancer-profiles.htm and 2023 OECD Policy Survey on Cancer Care Performance.

There is wide variation in age ranges of the population eligible for screening in EU+2 countries (Figure 4.4). Consistent with the new EU Council Recommendation, Estonia, Finland and France target women aged 30-65. Some countries include lower age limits, such as Germany and Slovenia (age 20), and some include women until ages 69 (Norway) and 70 (Czechia, Latvia and Sweden). In Norway, where the cervical screening programme is run by the Cancer Registry, the age for HPV testing was lowered to 30 in January 2023, and then again to 25 in July 2023. Thus, all women aged 25-69 years are eligible for cervical screening. In Denmark, where HPV-based screening is in place for women aged 23-64, a study is under way to compare screening of women aged 30-54 with HPV testing (every five years) or cytology (every three years).

Figure 4.4. The target age of population-based cervical cancer screening programmes differs among EU+2 countries



Sources: OECD (2023[34]), *EU Country Cancer Profiles*, www.oecd.org/health/eu-cancer-profiles.htm and 2023 OECD Policy Survey on Cancer Care Performance.

Alongside the variability in age range, there is also heterogeneity regarding testing methods (see Table 4.9). Screening tests for cervical cancer include conventional cytology, where cervical cells are collected and analysed to identify pre-cancerous lesions (which can be treated to prevent progression to a more invasive disease) or early-stage cancer (allowing for earlier cancer treatment). However, cervical cytology has certain limitations. It is relatively insensitive in detecting pre-cancerous lesions and cancer; it needs to be conducted frequently to achieve programme efficacy; and interpretation of results is subject to a high degree of subjectivity (Kitchener, Castle and Cox, 2006[42]). Thus, in recent decades, since persistent infection with high-risk HPV is strongly associated with cervical cancer, tests to detect DNA of high-risk HPV virus in cervical cells have been developed as an alternative to cytology-based screening.

Scientific evidence shows that HPV-based screening is an effective method, offering better protection than cytology-based screening, including lower incidence of pre-cancerous lesions and cervical cancer compared to women undergoing cytology (Hamers, Poullié and Arbyn, 2022[43]). An additional benefit is the possibility of using HPV testing on samples collected by individuals themselves. Self-samples based on polymerase chain reaction are as sensitive as samples taken by clinicians (Arbyn et al., 2014[44]; Arbyn et al., 2018[45]), which provides a potential additional tool to reach non-respondents or populations with restricted access to healthcare. International guidelines recommend avoiding co-testing with cytology and HPV at any age (von Karsa et al., 2015[46]). As part of the European Commission Initiative on Cervical Cancer, launched in 2023, the European guidelines on cervical cancer are being updated, and a quality assurance scheme is being developed (European Commission, 2023[47]).

Most of the 29 EU+2 countries offer either high-risk HPV-based testing or a combination of cytology and HPV (mostly defined according to age). Of the 22 countries organising population-based screening, 7 have only HPV-based screening in place (Denmark, Finland, Portugal, the Netherlands and Ireland since 2020, Estonia since 2021, and Norway since 2023). Further, 9 use age-dependent screening methods, where a cytology screening test is recommended for younger women and HPV-based screening for older women, with some variability concerning the age range (France, Germany, Iceland, Latvia and Spain).

Screening intervals are determined based on the test used. Randomised controlled trials assessing HPV-based screening used intervals between three and five years (Kitchener et al., 2009[48]; Rijkaart et al., 2012[49]). Intervals of at least five years with HPV-based screening showed greater protection against invasive cervical carcinomas, when compared to the smear test (Ronco et al., 2014[50]). Another important factor to consider in HPV-based screening is the age at which screening should begin, given that the HPV infection and its clinical progression are dependent on age. HPV infection without symptoms is very common among young women, and it frequently clears spontaneously without further consequences (Schiffman et al., 2007[51]). As such, HPV testing in younger women can lead to considerable overdiagnosis, since only a minority will develop invasive cancer over time (peak at-risk age is about 35-55). The new EU Council Recommendation on Cancer Screening suggests HPV-based testing for women aged 30-65, with an interval of five years or more. It also suggests that countries should consider risk-tailored strategies and self-sampling to increase participation rates.

Some countries without population-based programmes are working to introduce HPV-based testing. In Cyprus, a cervical screening programme is expected to be implemented in 2024. In Bulgaria, the National Cancer Plan adopted in early 2023 includes a population-based screening programme for cervical cancer. At present, cervical cancer screening is accessible to insured women aged 30-40: it is carried out during routine check-ups through cytology tests provided by gynaecologists or GPs. In Croatia, a population-based programme is being piloted in one county, combining both cytology and HPV-based testing. In Sweden, since 2022, HPV testing is available to women aged 23, and intervals have been expanded: every five years for women aged 23-49, and every seven years for women aged 50-70 (Socialstyrelsen, 2022[52]). This new recommendation updates the previous one from 2015 in four key aspects: 1) HPV testing is recommended for all age groups eligible for the screening programme, including participants aged 23-29; 2) the time intervals for testing are extended to women with negative HPV test results; 3) supplementary analysis (i.e. double testing of both cytology and HPV) is no longer recommended; and 4) self-sampling can be offered as an alternative to sampling by a healthcare provider.

A few countries use risk-tailored strategies in cervical cancer screening, where the approach is adjusted based on HPV vaccination history. In the Netherlands, since January 2022, previous HPV results have been factored into screening invitations. Referral policies have also been modified based on HPV genotype risk stratification, although any changes to the screening strategy based on vaccination status are not expected before 2028. Meanwhile, the Slovak Republic adjusts the intervals between screenings based on the results of the previous cytology.

In the new EU Council Recommendation, the possibility of self-sampling is suggested, considering its potential role to reach non-responders, as this allows the test to be sent to eligible women and performed at home. Mailing the eligible population self-sampling devices has also been shown to increase uptake (for both cervical and colorectal cancer screening) (Camilloni et al., 2013[53]). Of the 29 EU+2 countries, 7 provide the option of self-sampling for HPV testing: Czechia, France, the Netherlands, Estonia, Norway Sweden and Spain (in some regions) (Table 4.10). In Denmark, women who do not respond to cervical cancer screening invitations are offered HPV self-sampling tests in the second reminder letter. A pilot programme took place in Czechia, where self-sampling HPV tests were sent to women aged 50-65 from vulnerable groups – such as those at risk of poverty and social exclusion in deprived areas. In Estonia, an HPV self-sampling feasibility and pilot study was conducted in 2020 and 2021, followed by an implementation project (2022-24). Since August 2022, women who did not participate in cervical cancer screening in the first half of the year will be able to choose between being provided with a test in a clinic or conducting self-sampling at home. The self-sampling kits can be ordered through an online platform. Additionally, a pilot project was carried out in the north-eastern region of Estonia in 2022, providing self-sampling kits in pharmacies. As of October 2023, the kits are available in pharmacies in five regions. From 2024, the HPV self-sampling option will be available to the target population throughout the year (Tervise Arengu Institut, 2023[54]). In Ireland, a study is being planned to understand attitudes to self-sampling in the population, complemented by a study of attitudes of sample takers.

Table 4.10. Invitation practices and delivery models for cervical cancer screening are heterogeneous across EU+2 countries

Country	Invitation and delivery models for cervical cancer screening
Austria	NA
Belgium	NA
Bulgaria	Delivery by primary and specialised outpatient healthcare providers Citizens with health insurance entitled to yearly visits to gynaecologist and cervical cytology for women aged 30-40
Croatia	NA
Cyprus	NA
Czechia	Personalised invitations sent to target population Self-sampling for HPV testing being tested in a pilot project
Denmark	Delivery by regional hospital centres or GPs
Estonia	Women in the target group identified by linking data of the Population Register and the Estonian Health Insurance Fund databases Screening at healthcare facilities performed by a gynaecologist or midwife contracted by the Health Insurance Fund HPV self-sampling offered as a pilot project; to be fully implemented by the end of 2024
Finland	Invitation letter (available in other languages on request) to attend a screening centre
France	Invitation process being revised (deployment in January 2024), with the health insurance fund taking charge of invitations Possibility of self-testing recently introduced
Germany	Invitation letters with information for decision support sent to all insured people
Greece	Public ambulatory and primary care services not equipped to provide cytology Most tests performed in the private sector; public hospitals can have long waiting times
Hungary	Target population sent individual invitations by post
Iceland	Invitations sent electronically, after which women can book an appointment online Screening provided by midwives, primary care physicians and gynaecologists
Ireland	Participants invited to locate a professional registered as “sample taker” (GPs and other professionals) in their area
Italy	Delivered by local health services and public hospitals Invitation letters sent with a proposed timeslot for the appointment and written information on the benefits and harms of screening Several local health services recently began providing a web-based system to book screening appointments
Latvia	Invitation letters sent to target population or to an electronic address after activation by citizens
Lithuania	Eligible population is referred to screening programmes by GPs Screening performed by GPs or gynaecologist
Luxembourg	Choice of cytology for cervical cancer screening is a decision left to the discretion of women and their clinicians
Malta	Invitations sent to the target population Tests conducted in any health centre across the country
Netherlands	Invitations sent by post Delivery by GPs or via self-sampling Youngest target group (age 30) receives a pre-invitation and an invitation that is more informally drafted
Norway	Cancer Registry sends an information letter to all women living in Norway at age 25 Letters also sent to women two months prior to the next screening test, along with a reminder after one and two years When previous screening detected cell changes, and follow-up tests were not performed six months after the recommended time, reminders are sent Self-sampling possible
Poland	NA
Portugal	NA
Romania	NA
Slovak Republic	Invitations sent by health insurance companies to women who have not visited a gynaecologist in the last two years Delivery by gynaecologists
Slovenia	Free access to a primary care network of gynaecologists who perform screening No personal invitation sent, but gynaecologists can invite women who do not schedule their screenings on time Invitation sent to women without a cytology result in the last four years, and an additional reminder in the fifth year For non-respondents, personal gynaecologist can activate a field nurse to visit or contact a GP Bilingual screening invitation and information leaflet sent to women of Italian and Hungarian communities in Slovenia with permanent residency in bilingual cities and villages
Spain	Invitation methods differ across autonomous regions Self-sampling possible
Sweden	Testing at healthcare providers; self-sampling offered as an alternative in most regions

Notes: NA stands for information not available.
Source: OECD Country Cancer Profiles (OECD, 2023[34]) and 2023 OECD Policy Survey on Cancer Care Performance.

4.2.2. New cancer screening programmes are under way

Alongside breast, cervical and colorectal cancer screening programmes, 15 of the 26 EU+2 countries that responded to the 2023 OECD Policy Survey identified ongoing pilot projects in place for lung, prostate and gastric cancers.

An increasing number of countries have pilot programmes for lung cancer screening

Lung cancer screening is ongoing or planned across several EU+2 countries, while other countries are considering pilot projects. Croatia is the only country with a non-population-based lung cancer screening programme targeting people aged 50-75 who are active smokers or have at least a 15-year history of smoking, without regard to other comorbidities or medical history.

Pilots are under way in Belgium, Czechia, Italy, Norway, Slovenia, Spain and Sweden. In Belgium, pilot projects are ongoing in Flanders to assess the effectiveness of lung cancer screening, particularly for at-risk individuals. In Czechia, the Early Detection Programme for Lung Cancer has been running since January 2022. This aims to identify people at risk of developing lung cancer. The target population comprises individuals aged 55-74 who are either current or former smokers (minimum of 20 pack years[3]) (Májek et al., 2022[55]). This group will be referred by their GP to a pulmonary specialist for a lung examination and will receive a low-dose computed tomography (CT) scan. In Italy, the pilot programme is conducted across 18 regions for men aged 55-75 who are either current smokers or quit smoking less than 15 years ago (30 pack years). In Norway, an ongoing pilot has invited 125 000 individuals aged 60-79 to participate in lung cancer screening. It aims to determine an effective selection process for identifying the at-risk population who should be offered screening. Participants in the study will undergo a CT scan. If no lung findings or signs of injury are detected, they will be included in a subgroup randomly assigned to receive a CT scan either annually or every two years. If lung findings are present, participants will receive annual CT scans. Based on this study, it will be possible to have results on the feasibility of a national screening programme, including its costs and benefits, within two years. Slovenia and Spain are evaluating the feasibility and cost – effectiveness of introducing a programme for lung cancer screening through pilot programmes that are under way. In Sweden, an ongoing lung cancer screening pilot started in 2020, organised by the Regional Cancer Centre Stockholm Gotland. One of its aims is to understand the cost – effectiveness of a targeted approach to lung cancer screening. Linked to this project, in 2022, 15 000 women were invited to answer a survey about smoking history; the at-risk population received subsequent follow-up with a low-dose CT scan and smoking cessation support via the Stop Smoking support line.

Denmark is in the process of planning a three-year implementation study on lung cancer screening, which is planned to start in 2024. In Estonia, a feasibility study was conducted 2021 in three family doctor practices in Tartu, targeting individuals aged 55-74 (Kallavus et al., 2023[56]). The findings show that systematic enrolment of people by family doctors resulted in high screening uptake (around 87%) and provided important input to the organisation of the ongoing regional lung cancer screening pilot, in which 73 practices are participating. In Germany, preparation for early detection of lung cancer with low-dose CT scans among adults aged 50-75 with a history of smoking is under way, following a positive scientific evaluation by the BfS (2021[57]), based on 38 publications of randomised controlled studies. The meta-analysis showed evidence of a benefit of the early detection procedure for heavy smokers. From early summer 2021 until summer 2023, the HANSE prevention programme offered free lung exams for former and active smokers in northern Germany. Three lung cancer centres in the region invited people aged 55-79 who were at an increased risk of lung tumours as either smokers or ex-smokers to a free lung exam. The programme, which travels between three cities via a mobile study truck, anticipated that up to 5 000 participants would receive a free low-dose CT examination. It is co-ordinated by a multiprofessional team and is intended to provide evidence through a pilot study that a comprehensive and effective lung cancer early detection programme can be implemented in Germany.

Two European trials will inform health policy concerning lung cancer screening in the coming years. The SOLACE Project was launched in April 2023 under Europe's Beating Cancer Plan, with funding from EU4Health. It aims to facilitate implementation of and reduce inequalities in lung cancer screening programmes across Europe (SOLACE, 2023[58]). The study plans to develop, test and disseminate individualised approaches for lung cancer screening at national and regional levels to help overcome challenges and address well-known inequalities in European countries. The first pilot programmes will be run in 10 EU countries. The other trial is 4-In-The-Lung-Run (2023[59]), which aims to include 26 000 participants at high risk of lung cancer in screening sites in the Netherlands, Germany, Spain, Italy and France. The study will inform the creation of risk-based screening strategies demonstrated to be effective, affordable, acceptable to the people, cost-effective and suitable for implementation.

There are few ongoing pilots for prostate cancer screening

Prostate cancer screening with prostate-specific antigen (PSA) is associated with a high number of false positive test results. Previous studies showed that around 70-80% of prostate biopsies following a positive PSA screening are negative (Schröder et al., 2009[60]). In addition, non-population-based screening programmes have shown higher rates of overdiagnosis and a small survival benefit compared with population-based screening. Thus, the standard practice has been active surveillance of low-grade disease. The development of risk-tailored approaches to screening – adding non-invasive exams such as magnetic resonance imaging (MRI) and/or biomarkers used in reflex strategies (following a positive PSA result), combined with well-defined criteria for active surveillance – may contribute to reducing the harms of prostate cancer screening and drive implementation of cost-effective programmes (Heijnsdijk and de Koning, 2022[61]). The recent EU Council Recommendation on Cancer Screening urges Member States to pursue further research on the effectiveness and feasibility of population-based prostate cancer screening using PSA testing combined with a follow-up MRI (see Box 4.2).

While some EU+2 countries already have well-established non-population-based screening initiatives for prostate cancer (e.g. as implemented in Germany since the 1970s), others are now considering introducing prostate cancer screening. Most EU27 countries provide PSA testing in a non-population-based model, or on request. In some countries, pilot population-based prostate cancer screening programmes are under discussion (Croatia, Czechia, Estonia, Finland, Ireland, Malta, Romania and Sweden). PRAISE-U is a project co-funded by the EU involving 12 countries (launched in April 2023), which aims to develop national cost-effective algorithms for early detection of prostate cancer (European Association of Urology, 2023[62]). Pilot studies within PRAISE-U will take place in Poland, Lithuania, Ireland and Spain (European Association of Urology, 2023[63]).

In Germany, the PROBASE study is prospectively evaluating risk-adapted PSA screening according to a baseline PSA level, after the country decided against general prostate screening in 2020, considering the potential harms related to overdiagnosis (Deutsches Krebsforschungszentrum, 2020[64]). The primary objective of this clinical trial is to establish the superiority of delayed risk-adapted PSA screening starting at age 50, in comparison to risk-adapted PSA screening starting at age 45, with respect to the specificity of the screening. In Sweden, the National Board of Health and Welfare recommends against a national population-based screening programme, but pilots for prostate cancer testing at the regional level are ongoing, co-ordinated by a national working group with representatives from each health region. The first pilot started in 2020. A health economics analysis found that evolving the prostate cancer screening from unorganised PSA testing across the regions to an organised screening with PSA testing would increase quality-adjusted life-years in the population and would be cost-saving from a societal perspective in the long term (Confederation of Regional Cancer Centres, 2023[65]). In Slovenia, non-population-based screening for prostate cancer is available, but further steps have been taken to evolve the current design into an organised population-based screening programme. In Cyprus, a prostate screening programme is expected to be implemented during 2024.

Pan-European projects aim to provide recommendations on implementation of gastric cancer screening

In Europe, incidence rates of gastric cancer are considerably lower than in Asia (Japan and Korea), which is related to distinct *Helicobacter pylori (H. pylori*) strains and infection rates among the population, as well as diet factors, smoking and alcohol consumption. For instance, Japan has over a two-fold higher incidence rate of gastric cancer among men than Lithuania (Morgan et al., 2022[66]). The effectiveness of gastric cancer screening among people aged 40 and over was evaluated in Korea in a nested case-control study (Jun et al., 2017[67]). Mortality from gastric cancer was less likely in screened subjects than non-screened patients (the odds ratio for dying from gastric cancer among screened subjects was 0.79). Gastric cancer frequently presents at late stages, and its prognosis is generally poor, which underscores the relevance of prevention and early diagnosis. Considering these factors, as well as improvements in diagnostic testing, some countries are making efforts to understand the extent to which implementation of a screening programme for gastric cancer is beneficial.

TOGAS, launched in March 2023, is the first pan-European project to evaluate strategies to reduce deaths from gastric cancer (European Cancer Organisation, 2023[68]). It is led by the Institute of Clinical and Preventive Medicine of the University of Latvia, with partners from 14 European countries. The EU-funded project is set to operate for three years; it aims to provide recommendations on implementation of gastric cancer screening in EU countries. It plans to carry out three large-scale pilot studies pertaining to different features of gastric cancer screening, such as focusing on screening in young adults, strategies for combined screening for upper and lower gastrointestinal cancer, and the adverse effects of *H. pylori* eradication in middle-aged population. TOGAS will build on and scale up another EU-funded project, EUROHELICAN, which was launched in November 2022. This focuses on: 1) implementation of a population-based *H. pylori* test-and-treat programme in Slovenia targeting young adults to assess its processes, feasibility and acceptability; 2) evaluation of long-term effects of the strategy in middle-aged Latvians participating in the GISTAR study (a multicentric randomised study focusing on *H. pylori* eradication and pepsinogen testing for prevention of mortality related to gastric cancer); and 3) development of implementation guidelines for a population-based *H. pylori* test-and-treat strategy via expert working group meetings held by the International Agency for Research on Cancer (IARC) and WHO (European Commission, 2023[69]). In Slovenia, efforts to improve gastric cancer prevention are being supported by these two EU4Health projects. In Croatia, several strategies are under investigation. These include a screening programme for gastric cancer using endoscopy or fluoroscopy, screening for pre-cancerous lesions and screening for *H. pylori*.

4.3. Improving access to cancer screening and early diagnosis, and strengthening awareness are needed

4.3.1. The impact of the COVID-19 pandemic on screening rates for breast, cervical and colorectal cancers has been substantial

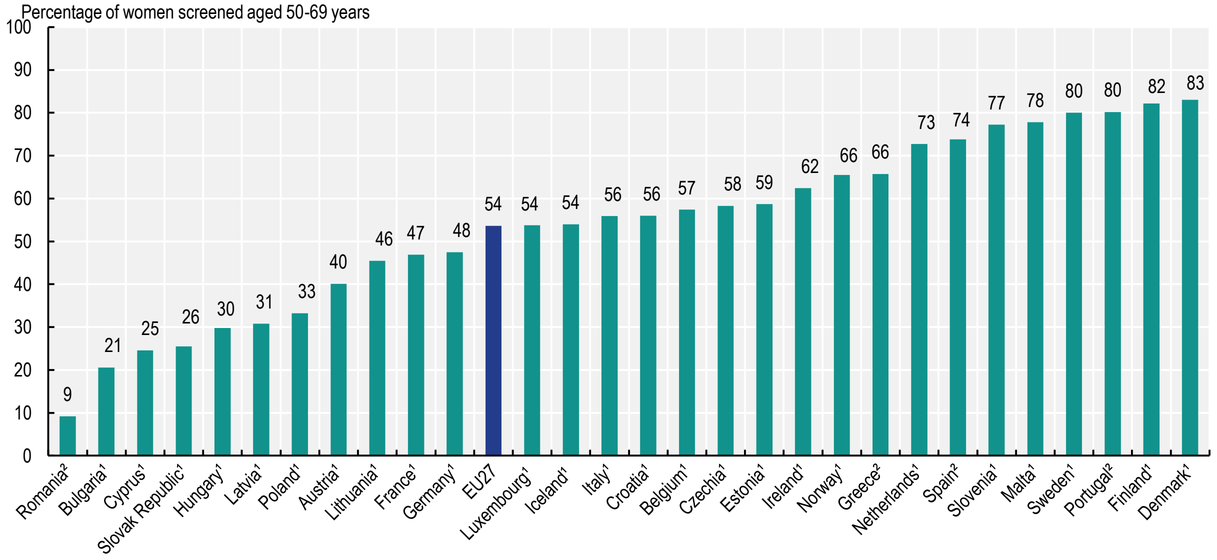
Preventive and diagnostic services suffered from substantial disruptions during the COVID-19 pandemic worldwide, as urgent care was prioritised. In the initial phase of the pandemic, 12 of the 15 EU countries examined halted screening (OECD/European Union, 2022[70]), in addition to which, people were hesitant to seek out healthcare due to fear of COVID-19 infection or of burdening the health system. Few countries were able to increase screening capacity after this first phase (Fujisawa, 2022[71]). A reduction was also observed in the number of diagnostic procedures for and diagnoses of cancer (Chapter 2).

The Joint Research Centre conducted a survey among the cancer registries of 16 EU Member States, plus Norway and Iceland, to understand how the first wave of the COVID-19 pandemic (March to May 2020) affected cancer screening, diagnoses and care (EU Science Hub, 2023[72]). Almost 90% of the respondents reported an interruption or slowdown of organised population-based cancer screening for breast, cervical and colorectal cancers. At least four national cancer registries reported a significant decrease in cancer diagnosis (referring to all cancer diagnoses, not only those targeted by cancer screening): Belgium, Denmark, the Netherlands and Slovenia. In Denmark, a 20% reduction in cancer diagnoses was reported. In Belgium, a 6% reduction in the number of diagnosed cancers was reported in 2020, which corresponds to an estimated 4 000 cancers not diagnosed in 2020 compared to 2019 (Peacock et al., 2021[73]). The OECD/EU 2022 edition of *Health at a Glance* reports that breast and cervical cancer screening rates decreased in most EU countries in 2020, with an average reduction of 6% across countries with available data (OECD/European Union, 2022[70]). For colorectal cancer screening, almost all countries had lower participation rates in 2020 than in 2019.

4.3.2. There is scope to improve participation in cancer screening programmes in many EU+2 countries

In 2021, there were wide disparities in the proportion of women aged 50-69 who had had a mammogram in the preceding two years. Breast cancer screening varies nine-fold across countries (Figure 4.5). For instance, in Romania only 9% of eligible women had been screened in 2019, while the EU27 average reached 54% of eligible women. In Romania, despite a small-scale pilot programme for breast cancer screening in 2017, no population-based screening programme has been implemented yet. Furthermore, women in Romania frequently incur out-of-pocket costs for healthcare, limiting access to screening and early diagnosis activities (Furtunescu et al., 2021[74]).

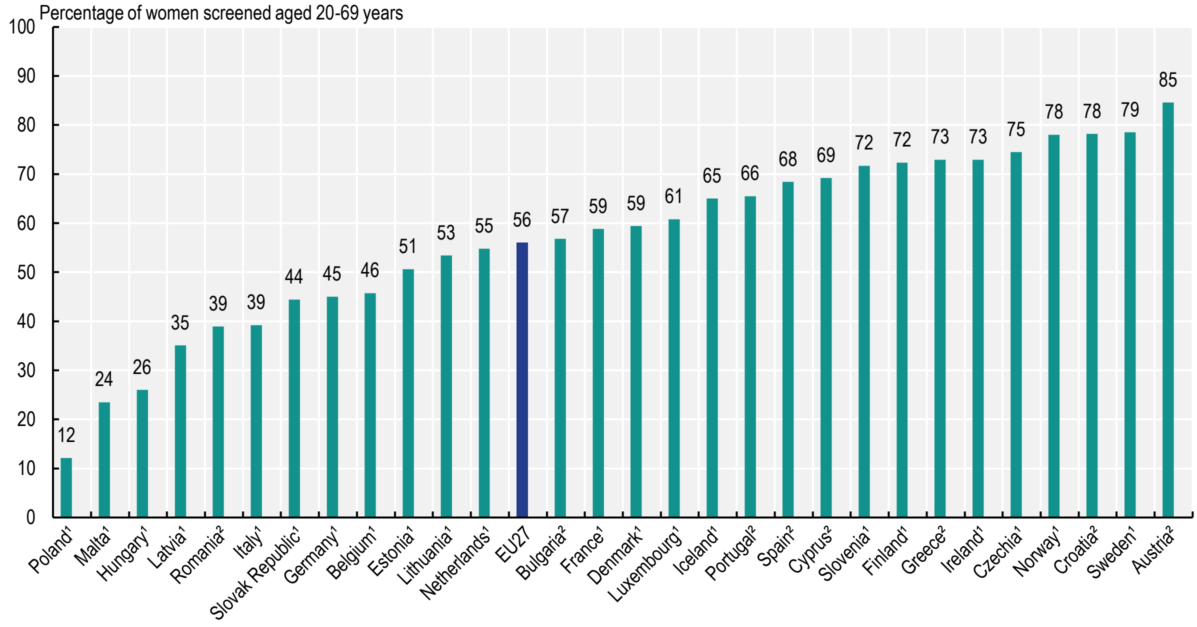
Figure 4.5. In 11 EU+2 countries, participation in breast cancer screening is lower than 50% of women aged 50-69



Notes: Mammography screening in women aged 50-69 within the past two years. 1. Programme data. 2. Survey data. While programme data are collected from national/regional cancer databases/registries, survey data are obtained from international surveys, limiting the international comparability.
Source: OECD Health Statistics 2023, https://doi.org/10.1787/health-data-en.

Disparities in cervical cancer screening uptake among EU+2 countries are also noticeable (Figure 4.6), although not as marked as in breast or colorectal screening programmes. The proportions of women aged 20-69 who had been screened for cervical cancer within the preceding three years varies seven-fold across countries. The proportions were 12% in Poland and 24% in Malta in 2021, while Sweden was able to screen 79% of eligible women that year. Factors such as access to healthcare and level of social protection in Sweden could partly explain such differences beyond differences in the nature of the data reported (De Prez et al., 2021[75]). Furthermore, population-based screening was implemented in Sweden in the mid-1960s, while in Malta the national programme was launched only in 2016. This could also explain low levels of awareness of preventive services, knowledge of risk factors and risk perception among the target population (Deguara, Calleja and England, 2020[76]). Also, after the COVID-19 pandemic and the halting of screening for three months, Sweden changed its approach to cervical cancer screening, sending self-sampling kits to all eligible women, leading to a substantial increase in uptake of cervical cancer screening. For instance, screening uptake in the Stockholm region increased by 10 percentage points to 85% in just over one year (WHO, 2022[77]).

Figure 4.6. In 9 EU+2 countries, participation in cervical cancer screening is lower than 50% of women aged 20-69

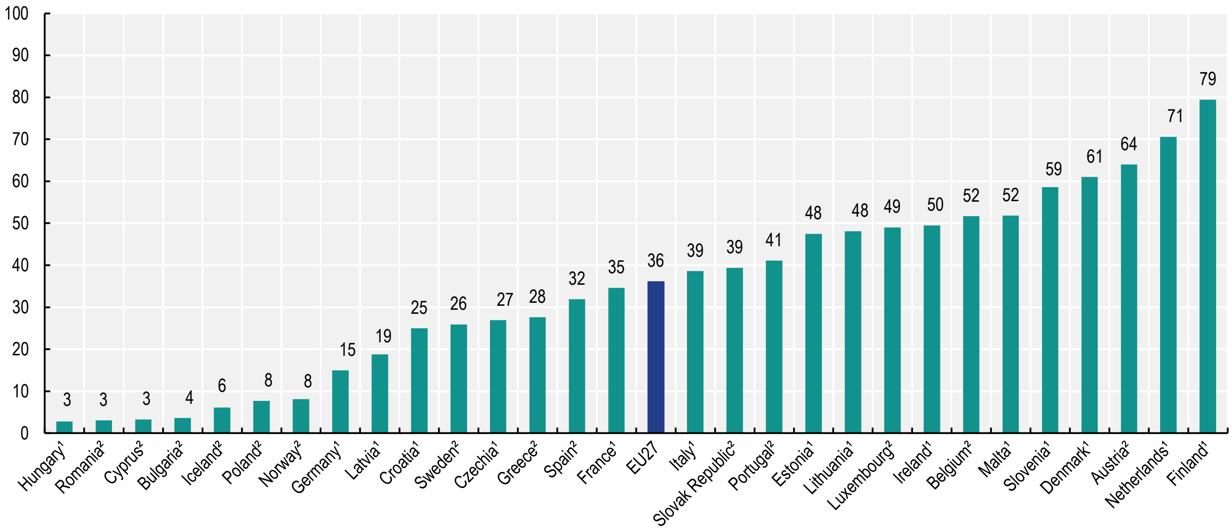


Notes: Women aged 20-69 screened within the past three years. 1. Programme data. 2. Survey data. While programme data are collected from national/regional cancer databases/registries, survey data are obtained from international surveys, limiting the international comparability.
Source: OECD Health Statistics 2023, https://doi.org/10.1787/health-data-en.

Compared to breast and cervical cancer screening programmes, participation rates in colorectal cancer screening programmes are lower on average, at 36% in the EU27, and variation in uptake across countries is wide (Figure 4.7). Of the 29 EU+2 countries, 13 have colorectal cancer screening rates of 30% or less. While in Finland the participation rate was close to 80% of the eligible population, Cyprus, Hungary and Romania had participation rates of about 3% in 2021 (or latest year). In Cyprus, in general, citizens face challenges to universal access to public health systems, aggravated by a high share of out-of-pocket expenses (OECD/European Observatory on Health Systems and Policies, 2017[78]). These factors contribute to low levels of participation in colorectal cancer screening. Implementation of a population-based screening programme is planned for the first trimester of 2024.

According to 2019 data from the European Health Interview Survey (EHIS), disparities in uptake of colorectal screening by sex among the population aged 50-74 are not large. For example, the average percentage of women (33.6%) and men (33%) reporting uptake of colorectal cancer screening within the past two years was similar. The highest gaps by sex were observed in Belgium (11%), Austria (10%), Germany (8%) and Romania (7%). In these countries, women reported screening more frequently than men. In some countries where the difference between men and women was not substantial, such as Finland (4.4%) and Poland (4.3%), men had a higher percentage of reported screening than women.

Figure 4.7. Two-thirds of EU+2 countries have participation rates in colorectal cancer screening programmes lower than 50%



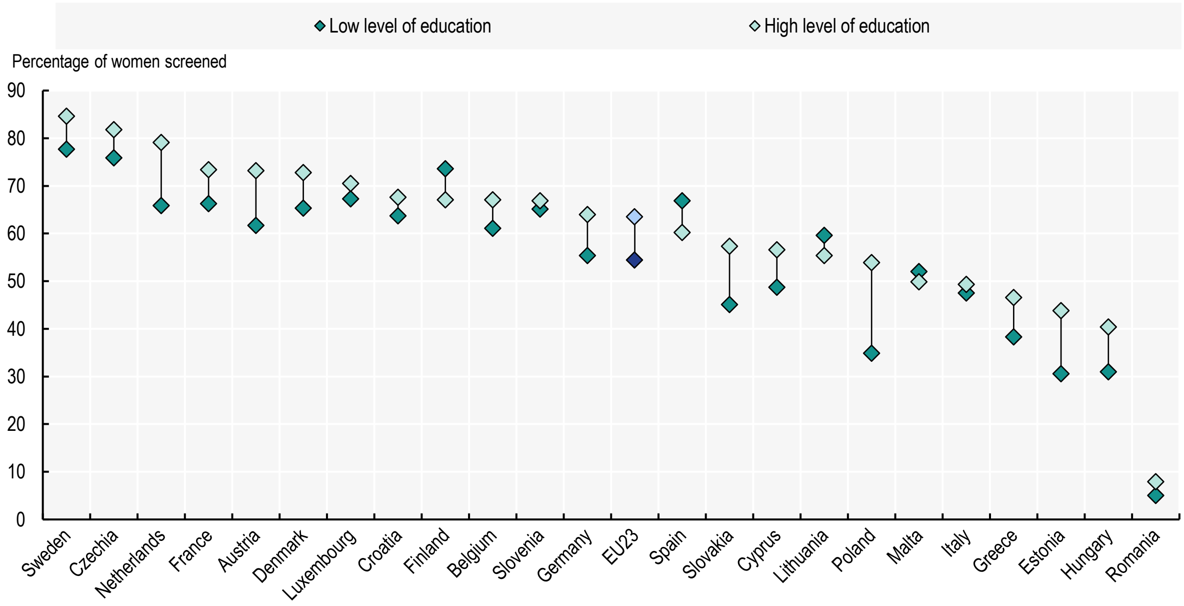
1. Programme data are based on national programmes that may vary in terms of age group and frequency. 2. Survey data based on EHIS, referring to people aged 50-74 screened over the past two years. While programme data are collected from national/regional cancer databases/registries, survey data are obtained from international surveys, limiting the international comparability.
Source: OECD Health Statistics 2023, https://doi.org/10.1787/health-data-en.

4.3.3. Uptake of cancer screening varies according to individual socio-economic characteristics including education, income and citizenship

The Survey of Health, Ageing and Retirement in Europe wave 8 (2021/22), which asks whether people have received breast and colon cancer screening, indicates that across EU+2 countries with available data, people with lower socio-economic characteristics have a lower probability on average of attending screening for the two types of cancer. For breast cancer screening, the likelihood of having received a mammogram is 54% among women with lower education levels compared to 64% among women with higher education levels. Inequalities in favour of better educated people are observed in 19 countries (Figure 4.8). The largest inequalities are found in Austria, the Netherlands, Poland, Estonia and the Slovak Republic, with gaps of between 12 and 19 percentage points between education groups. Only in Spain, Lithuania, Finland and Malta is uptake of breast cancer screening higher among people with lower education levels. A comparable pattern of inequality is found when comparing the richest and the poorest income quartiles. In 19 EU+2 countries, the likelihood of receiving breast cancer screening is higher among the highest income quartile (63%) than the lowest (52%). This is consistent with previous research on income and education-related inequalities in cancer screening using EHIS data (OECD, 2019[79]).

Figure 4.8. Women with low education levels are less likely to receive a mammogram in 19 EU+2 countries

Indirectly age-standardised probability of having had a mammogram, by country and education level



Notes: Analysis based on 16 035 observations of women aged 50-74 living in a private household in 23 countries. Probabilities are based on indirect age standardisation. Education level is built according to the International Standard Classification of Education (ISCED), with ISCED 0-2 for low level of education and ISCED 4-6 for high level of education.
Source: Survey of Health, Ageing and Retirement in Europe wave 8 (2021/22).

For colorectal cancer screening, only 31% of people with lower education levels reported having received preventive tests compared to 38% of people with higher education levels. Inequalities in favour of people with higher education levels are observed in 18 countries. The largest inequalities are found in Austria, Poland and Spain, with differences of between 10 and 13 percentage points between education groups. Only in Czechia, Finland, Italy, Romania and Slovenia is uptake of colorectal cancer screening similar across education groups or higher among people with lower education levels. Comparable patterns of inequality are found when comparing the highest and the lowest income quartiles. In 20 EU+2 countries, the likelihood of receiving colon cancer screening is higher among the highest income quartile (37%) than the lowest (31%).

Controlling for all core individual characteristics (demographics and socio-economic characteristics) and country-specific effects, analysis largely confirms the association between income and education with cancer screening participation (Table 4.11). It also points to the importance of citizenship and living areas to explain screening participation rates. Across EU countries, people with migration backgrounds have a lower likelihood of accessing breast cancer screening, but the relationship is entirely explained by a lower education and income. People living in rural areas also have a significantly lower likelihood of receiving breast and colon cancer screening than those living in urban areas. As shown in Table 4.11, the association remains statistically significant after controlling for all individual characteristics for both cancer screening services.

Table 4.11. Income and education are significant predictors of cancer screening participation in EU+2 countries

Individual characteristics	Likelihood of breast cancer screening		Likelihood of colorectal cancer screening	
Controls	Age, sex, household	All socio-economic characteristics	Age, sex, household	All socio-economic characteristics
Non-citizen (compared to citizen)	↓ (*)	↓ (NS)	↓ (NS)	↓ (NS)
Rural areas (compared to urban areas)	↓ (***)	↓ (***)	↓ (***)	↓ (**)
Highest income quartile (compared to lowest quartile)	↑ (***)	↑ (***)	↑ (***)	↑ (***)
High education (compared to lowest education)	↑ (***)	↑ (***)	↑ (***)	↑ (***)

Notes: Level of significance: NS: non-significant, * p <0.10, ** p <0.05, *** p <0.01, **** p <0.001. An up arrow indicates positive marginal effects, and a down arrow indicates negative marginal effects (for example, people in the highest income quartile and with the highest education level have a higher likelihood of reporting access to breast cancer screening than those in the lowest income quartile and with low levels of education).
Source: The Survey of Health, Ageing and Retirement in Europe, wave 8 (2021/22).

These results align with previous studies in several EU and OECD countries. A recent study on cancer test utilisation in Europe revealed that people with lower household incomes were generally less likely to undergo mammography (odds ratio (OR) = 0.55), cervical smear tests (OR = 0.60) and colorectal testing (OR = 0.82) compared to those with higher incomes. Additionally, individuals born outside the EU, those with lower educational levels, and unemployed or retired people were also less likely to get tested. The income-related gap in access to breast and colorectal testing was most pronounced in Southern Europe; for cervical smears, it was most significant in Central and Eastern Europe (Bozhar et al., 2022[80]). In the Netherlands, within the National Colorectal Cancer Screening Programme, the participation rate in FIT screening was notably lower for individuals in the lowest socio-economic quintile (67%) in contrast to those in the higher quintiles (ranging from 73% to 75%). Similarly, there was a significant difference in uptake of colonoscopy following a positive FIT result among these socio-economic groups (van der Meulen et al., 2022[81]). A recent French cross-sectional study, based on census data from the health insurance information system, also revealed stark disparities in screening participation rates by socio-economic position and place of residence. Looking at mammography and cervical smear testing, the study shows higher participation rates in large urban areas than rural areas, with a stronger social gradient in large urban areas than other areas (Ouanhnon et al., 2022[82]).

In Germany, significant variations were found in cancer testing utilisation among people with a migration background. Specifically, migrants from EU countries (adjusted OR = 0.73) and non-EU countries (OR = 0.39) were less inclined to opt for gFOBT than non-migrants (Wahidie, Yilmaz-Aslan and Brzoska, 2022[83]). Non-EU (50.1%) and EU migrant women (52.7%) consistently reported lower utilisation rates of cervical cancer screening than non-migrant women (57.2%). These disparities persisted even after accounting for predisposing, enabling and need factors, highlighting the continued differences in screening uptake (Brzoska, Aksakal and Yilmaz-Aslan, 2020[84]). The main barriers to cervical cancer screening for migrant groups included a lack of information, an absence of female healthcare providers, limited proficiency in the local language, and emotional responses to the test – with fear, embarrassment and discomfort being prominent concerns. EHIS data also confirmed that migrant populations have a lower likelihood of being up to date with cancer testing including mammography, cervical smear test and colorectal test (Bozhar et al., 2022[80]).

Inequalities in access to screening programmes have also been highlighted for lesbian, gay, bisexual and transgender (LGBT+) communities, mainly because sexual minority populations are subject to stigma and trauma experiences, leading to health inequalities in cancer care (Kaster et al., 2019[85]). Previous studies have shown that the LGBT+ community have lower access to cancer screening programmes than their heterosexual counterparts due to discrimination, limited access to healthcare providers and lower health literacy (Polek and Hardie, 2020[86]).

4.3.4. Several policy actions are being explored to improve the reach of screening programmes and early diagnosis

Several factors influence both uptake of cancer screening programmes and early diagnosis of symptomatic cancer. Beyond disease factors (such as tumour biology and history of the disease), demand-side factors (such as knowledge and awareness of cancer, and health literacy) and supply-side factors (such as health provider knowledge of the signs and symptoms of disease, and referral pathways) are important drivers of cancer screening and early diagnosis that could be better targeted to promote early detection.

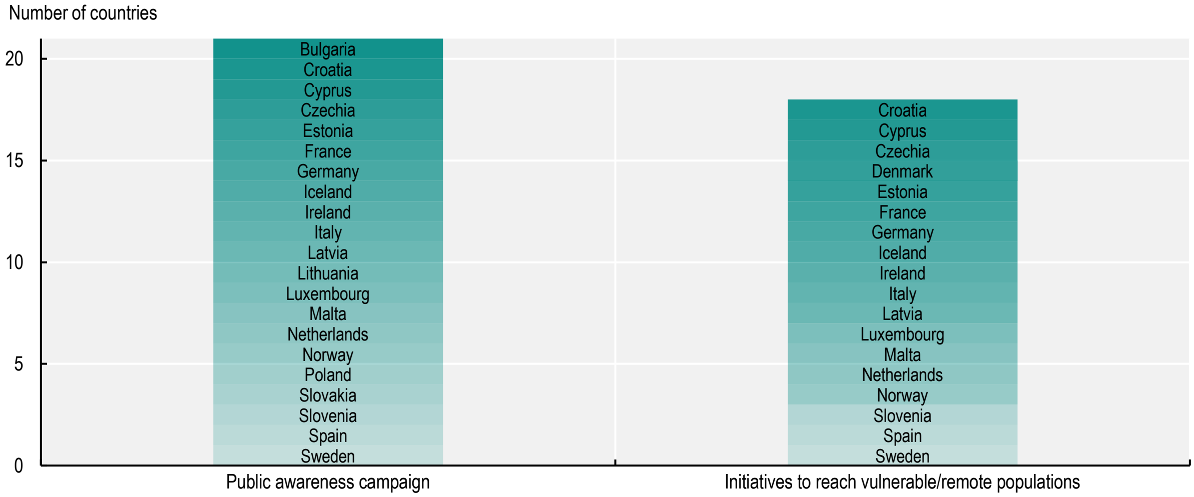
Building cancer awareness is one important policy option, particularly among socially vulnerable populations

Disparities in access to screening and early diagnosis are partly explained by differences in cancer awareness around both screening programmes and recognising symptoms and help-seeking behaviour. Poorer cancer awareness can delay diagnosis, which can lead to lower survival rates. Poor awareness of screening programmes, cancer symptoms or barriers to help-seeking care have been associated with delays in cancer diagnoses in several countries. Large heterogeneity of cancer awareness has also been found across several countries including Australia, Canada, Denmark, Norway, Sweden and the United Kingdom. Overall, Nordic countries (Denmark, Norway and Sweden) have higher levels of cancer awareness than the others (Forbes et al., 2013[87]).

A systematic review and meta-analysis of the European evidence on medical help-seeking for breast cancer suggests that higher levels of breast cancer knowledge, positive beliefs in the benefits of screening and previous screening history were associated with a higher level of screening attendance and prompter help-seeking behaviour (Grimley, Kato and Grunfeld, 2019[88]). Low cancer awareness has been reported to be more prevalent among groups with low socio-economic status, low education levels, ethnic minority backgrounds and older ages (Green, Lloyd and Smith, 2023[89]). In Spain, for example, responses to the Awareness and Beliefs about Cancer Questionnaire showed that respondents from lower socio-economic backgrounds recognised fewer cancer symptoms and were more delayed in help-seeking (Petrova et al., 2023[90]). In France, an empirical analysis based on administrative data showed that women with low socio-economic status have a two-fold risk of having late-stage breast cancer, mainly due to less regular follow-up and poor awareness of breast cancer (Orsini et al., 2016[91]).

Important policy actions to reduce inequalities in cancer awareness include informing people through individual counselling about identifying cancer symptoms, and addressing barriers and beliefs associated with delays in help-seeking. In a literature review assessing the impact of interventions among lower socio-economic groups, individual counselling on screening activities was found to be more effective than either one call or a letter accompanied by one call (Spadea et al., 2010[92]). Interventions to improve cancer awareness have been developed in 21 of the 26 countries responding to the 2023 OECD Policy Survey, among which 18 reported having specific initiatives to reach vulnerable or remote populations (Figure 4.9). At the EU level, the Cancer Screening Campaign webpage provides multi-language information, direct access to websites related to national screening programmes and media kits to raise awareness of cancer screening among European citizens, including a focus on vulnerable populations (European Commission, 2023[93]).

Figure 4.9. Several EU+2 countries have public awareness campaigns and initiatives to reach vulnerable populations



Note: Information for Belgium and Portugal is not available.
Source: 2023 OECD Policy Survey on Cancer Care Performance.

In Ireland, for example, equity is defined as a key priority in the Strategic Plan for the National Screening Service 2023-27 (Health Service Executive, 2023[94]). Various research projects are being conducted, such as development of a strategic framework to improve equity in screening, and research related to behavioural interventions to improve screening uptake among vulnerable populations. Tailored awareness and information campaigns directed to the indigenous minority of Irish Travellers are also being developed, focusing on the cancers that most affect these populations (Marie Keating Foundation, 2023[95]). Workshops, online-information materials and other tailored educational resources are helping to reach these marginalised communities. In France, easy-to-read and -understand tools are available for people with low literacy. In Belgium, pilot projects on self-testing for women with disabilities are ongoing in Flanders. In Finland, invitation letters are available in minority languages on request, while in Germany and Belgium, information about the cancer screening programmes is available in various languages (see Box 4.3 for other country examples). In the Netherlands, changes were introduced to support access to cancer screening programmes among refugees from the war in Ukraine. In addition, funds are allocated to reach groups with lower socio-economic status, and additional funds were made available by the Dutch Cancer Society to focus on implementation of cancer prevention projects at the local level to support a healthy lifestyle and living environment (Chapter 3).

Box 4.3. Policy actions are in place to increase cancer awareness

Policies to raise cancer awareness, increase engagement with vulnerable populations and increase screening participation

- Media campaigns and information leaflets to increase awareness among the population are available (Bulgaria, Estonia, Italy, Luxembourg, Norway, Poland, Slovenia).
- Peer-to-peer helpers inform people in their networks about screening and early detection (Slovenia, Sweden); in some programmes, this includes piloting a quick-response (QR) code on the invitation to translate the information to the language set on the cell phone (Sweden).
- A “hesitation hotline” that can be called about colorectal cancer is provided by medical students, supported by physicians (Netherlands).
- Easy-to-read and -understand tools are available for people with low literacy (France); information leaflets about the colorectal cancer screening programme are available in simple language (Germany).

Policies to reach disabled, migrant and other vulnerable or minority populations

- Slovenia communicates with non-governmental organisations working with people with disabilities. Community health nurses can visit people at home if they need help to carry out screening programme procedures.
- Health professionals from various countries have created informative video messages for migrant communities. These videos are available in 25 languages and cover important health topics. Online guides to cancer screening are available in English, Irish, Ukrainian and Russian (Ireland).
- Invitation letters are available in minority languages on request (Finland); information about the breast cancer screening programme is available in 12 languages (Germany); online information about screening programmes is available in 10 languages (Belgium, Flanders).
- Leaflets, infographics and videos about all screening programmes are available in English, Turkish, Arabic, Ukrainian and Russian, with letters and leaflets updated annually (Netherlands).
- Breast and cervical cancer screening are made accessible for transgender and intersex people to whom screening is relevant (Netherlands).
- LGBT+ awareness training takes place for professionals involved in cervical cancer screening, dedicated points of contact for the LGBT+ community and representatives of the LGBT+ community in the Patient and Public Partnership of the National Screening Service (Ireland).

A few countries have implemented interventions to target LGBT+ communities specifically. The Irish targeted intervention for the LGBT+ communities is an example of good practice across EU+2 countries to reduce inequalities in cervical screening. The intervention, which is part of the Cervical Check Programme, includes a specific training programme for health professionals and dedicated points of contact for the LGBT+ community. The overarching objectives are to increase training for sample takers, to include and communicate with the LGBT+ community in cervical screening, to develop more targeted messaging and campaigns for the LGBT+ community, and to do further research. Similar programmes exist in Canada, the United States and the United Kingdom. In Canada, for example, the Canadian Cancer Society developed awareness programmes for the LGBT+ community on breast, cervical and colorectal cancer screening. Members of LGBT+ communities share their experience with screening to improve screening awareness and encourage each other to get screened.

Mobile units and an increased role for pharmacists help to reduce socio-economic and geographical disparities in access to screening programmes

In the area of cancer screening, new delivery models have been adopted to reach socially vulnerable populations, including rural and underserved communities. As highlighted by previous research, people on lower incomes and those living in rural areas can experience poor access to screening services because of financial or geographical barriers. Mobile cancer screening programmes have a key role in bringing cancer screening to people in the communities where they live and work. Mobile breast cancer screening programmes have been implemented in a few countries (Croatia, Cyprus, Estonia, France, Iceland, Ireland, Norway, Slovenia and Sweden). For example, in Estonia, three mobile mammogram buses drive around the country and stop in multiple cities and towns in all counties to make sure that everyone has easy access to breast cancer screening. In Ireland, 24 mobile breast cancer screening units are used for vulnerable and remote populations. In Germany, approximately 70 mobile screening facilities (screening buses) are in service for the mammography screening programme; they are particularly used in rural areas. In France, mobile mammography units travel to isolated populations far from radiology centres and to marginalised urban areas. In other OECD countries, such as in the United States, mobile lung buses bring low-dose CT lung screening to areas where at-risk individuals may have limited access to screening services, and breast, cervical and colorectal mobile screening are also in place in some states.

Among the scarce available evidence, a cost – effectiveness analysis in France suggested that mobile mammography units increase participation in breast cancer screening and reduce geographical and social inequalities. The study shows that a mobile mammography unit is more cost-effective than a radiologist office in remote and in deprived areas (De Mil et al., 2019[96]). Earlier studies also found 15% higher participation rates for mobiles units compared to fixed sites, particularly for women in the lowest household income quintile. Women who receive mammography in mobile units are more likely to belong to low socio-economic backgrounds and live in rural areas, and less likely to have contact with the healthcare system; thus, the units help to reduce socio-economic and geographical inequalities (Reuben et al., 2002[97]).

Some countries are also extending the role of pharmacists in cancer screening activities to facilitate early detection of diseases. Community pharmacists remain among the most accessible healthcare providers, along with GPs, and have close communication with patients. Evidence suggests that inclusion of pharmacies in screening programmes has resulted in higher coverage for detection of colorectal cancer because of pharmacies' opening hours, accessibility and familiarity with their users. In France and Spain, community pharmacists are allowed to distribute gFOBT or FIT for sample collection; they provide information to users about the correct method of collection and delivery of the sample. In Catalonia (Spain) the number of kits delivered has increased four-fold since 2013, resulting in positive experiences among the public. In Ireland, community pharmacists have recently been involved in a pilot project for colorectal cancer screening in County Kerry. Evaluation of the pilot demonstrated that colorectal screening kit return rates were 74% after the intervention compared to the 38% national return rate (Flaherty, Flaherty and Farrelly, 2019[98]). In Norway, community pharmacists offer dermatological cancer screening services. Pharmacies assess moles and pigmented lesions and send the images to a trained dermatology specialist for interpretation (PGEU, 2020[99]).

General practitioners, supported by training and decision tools, facilitate participation in screening activities and in identifying cancer at earlier stages

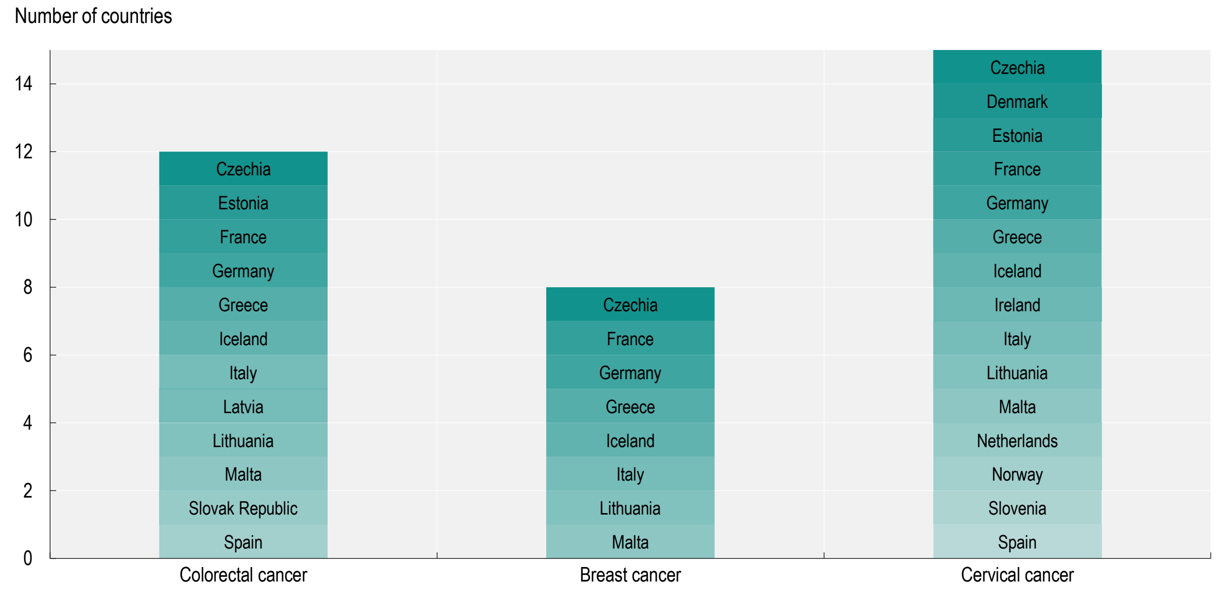
Primary healthcare providers – as the first point of contact with the healthcare system and having both individual-level data and close relationships with communities – have a key role to play in facilitating participation in screening activities and early diagnosis. One notable role is to clarify questions and remind eligible populations about screening programmes. Another is to refer symptomatic users to specialist care following a positive result or for suspected cancer.

Among the 26 countries responding to the 2023 OECD Policy Survey, half reported relying considerably on primary healthcare providers (or GPs) to deliver cancer screening activities for colorectal (12 countries) and cervical (15 countries) cancers (Figure 4.10). Cervical cancer screening is often performed at the primary healthcare level by GPs, GP assistants, practice nurses (as in Ireland) or gynaecologists (as in Germany), who sometimes work at the primary care level (as in Slovenia). In some countries, however, cervical cancer screening is partly carried out in hospitals – as in Spain, where screening is carried out in a co-ordinated manner between primary care and hospitals, and Italy. For colorectal cancer screening, local health services have a role in delivering the tests (as in Italy) while in some countries colorectal cancer screening is partly carried out in hospitals (as in Denmark and Spain). In Germany, both GPs and specialists are involved in cancer screening: GPs, gynaecologists and urologists hand out FIT kits, and colonoscopies are performed by gastroenterologists. For breast cancer screening, in some countries GPs are responsible for inviting the eligible population (as in Lithuania). Nonetheless, most countries have a process for inviting people to screening co-ordinated at the national or regional level. In Bulgaria, the three most common cancer screening types (colorectal, breast and cervical) are performed by specialist medical doctors following a referral by a GP. In Cyprus, it is anticipated that primary healthcare providers will have a greater role in cancer screening activities, with the aim of boosting participation rates. In 2022, France implemented a nationwide effort to improve health information and education via three free comprehensive GP visits that take place at 25 (vaccines, physical activity, addictions, entry to work life), 45 (physical and mental health assessments and screenings for cardiovascular diseases and cancers) and 65 years of age (maintenance of independence, screening for cancer and preventable diseases, and psychological preparation for retirement) (Government of France, 2022[100]).

At the international level, research shows evidence of higher patient participation in breast, cervical and colorectal screening programmes when eligible populations are reminded by primary healthcare providers, or after a primary healthcare recommendation. Postal invitations and reminders, phone calls and providing a scheduled appointment instead of an open appointment were also found to be effective approaches to increase uptake of organised screening (Duffy et al., 2017[101]; Mandrik et al., 2021[102]; Wender and Wolf, 2020[103]). Primary healthcare can thus help to engage and encourage people who are under-screened, or who have never been screened. Recommendations and reminders sent by primary care providers should be a priority intervention to enhance screening participation.

Figure 4.10. Primary healthcare has a key role in delivering cancer screening activities in up to half of EU+2 countries

Countries that reported primary healthcare as the principal provider of cancer screening activities, by type of cancer



Note: Information for Belgium and Portugal is not available.
Source: 2023 OECD Policy Survey on Cancer Care Performance.

Beyond participation in screening activities, the role of primary healthcare in early diagnosis is also of relevance – particularly in raising awareness about relevant symptoms, as well as identifying and referring people with concerning symptoms for further assessment when necessary. Primary healthcare needs to be well equipped with educational interventions (such as training programmes and continuous medical education), decision-support tools and risk scores to assist in recognising and referring symptomatic people with suspected cancer. Optimising primary healthcare recognition and interpretation of symptoms is an important way to improve earlier diagnosis of cancer. Primary healthcare providers need to be appropriately trained to evaluate the risk of cancer and consider the need for investigation. The impact of GP-targeted cancer awareness campaigns, training and continuous medical education about referral guidelines is well documented. It has been found to improve knowledge of cancer among GPs and to improve selection of patients for urgent cancer referral (Toftegaard et al., 2016[104]; Saab et al., 2022[105]). In Denmark, for example, a continuous medical education programme in earlier cancer diagnosis was introduced as part of the National Cancer Plan. The overarching objective was to support GP decision-making strategies for referral. The programme focused on diagnostic processes in general practice, symptom risk assessment tools, risk of false negatives and gynaecological examinations. Similar continuous medical education programmes in cancer diagnosis are in place in other OECD countries, including the United Kingdom and Australia.

In addition, a systematic review analysing the impact of decision-support tools suggested that electronic clinical decision-support tools improve GP decision making in cancer diagnosis, reducing delays in diagnosis for cancer with non-specific symptoms (Chima et al., 2019[106]). Such tools should be made available and be used by primary healthcare providers. In the United Kingdom, for example, primary healthcare providers have access to computer-based algorithm tools, incorporated into GP software systems, to calculate the risk of a patient having an undiagnosed cancer during consultations. They are called Risk Assessment Tools and Cancer, and are available for 18 cancer sites, using symptoms, test results and the individual's characteristics to estimate the risk of cancer. However, according to a cross-sectional survey of primary care providers, cancer decision-support tools are an underused resource in the United Kingdom: they were available and used by only 17% of primary care practices (Price et al., 2019[107]).

Fast-track pathways help to address delays in cancer diagnosis

Once primary healthcare has identified underlying cancer, there is a need to confirm the diagnosis in a timely manner. Fast-track pathways or fast-track referral mechanisms are a policy option to help reduce the time between cancer suspicion, cancer diagnosis and start of initial treatment to affect cancer prognosis. They have been developed in a few countries, including Denmark, Ireland, Latvia, Lithuania, Poland, Slovenia, Sweden and some regions in Spain (OECD, 2020[108]).

In Ireland, the National Cancer Control Programme developed a system of rapid access clinics to reduce time to cancer diagnosis and improve patient outcomes. Patients can typically secure an appointment at a breast or lung rapid access clinic within two weeks, and at a prostate rapid access clinic within a month of being referred by a clinician. The clinics take on much of the country's diagnostic work for these tumours (OECD, 2023[109]). Recent available evidence demonstrated that a dedicated rapid access lung cancer clinic resulted in a higher percentage of early-stage lung cancers being identified compared to the most recent figures from the National Cancer Registry of Ireland (Dunican et al., 2023[110]). The rates of stage I and stage II cancers were more than double those in the Cancer Registry, suggesting that earlier disease is being detected, resulting in better opportunities for intervention.

In Denmark, fast-track cancer pathways were introduced in 2007 by the Danish Health and Medicine Authority to improve the prognosis of people with cancer. The pathways are supported by national guidelines, according to which GPs ensure collection of a pre-defined minimum panel of blood and urine tests, and assesses the results of a CT scan of the thorax, abdomen and pelvis prior to further evaluation and diagnostics at hospitals (Bislev et al., 2015[111]). Based on data from the Danish Cancer in Primary Care Cohort, the cancer pathways significantly improved relative survival rates. For all cancer patients, three-year relative survival increased from 45% to 54% after implementation of the cancer pathways (Jensen, Torring and Vedsted, 2017[112]).

Poland introduced the Rapid Oncology Therapy Package in 2015: if suspected cancer is confirmed, a primary care or outpatient specialist doctor issues a cancer diagnosis and treatment card. This ensures delivery of services covered by the Oncology Package within the guaranteed maximum waiting time limits: 28 days from visiting the primary care doctor to basic diagnostics; 21 days from specialist consultation to in-depth diagnostics; and 14 days from multidisciplinary team meeting to the start of treatment. The introduction of the fast diagnostic pathway resulted in marginal improvements in waiting times for services covered by the Oncology Package, while waiting times for services not covered and follow-up cancer care increased. The National Cancer Strategy 2015-24 developed a framework for reorganising cancer care delivery through the National Oncology Network.

In 2016, Latvia introduced fast-track access for people with cancer (called the green corridor), paid in full by state budgets, to streamline diagnosis and treatment decisions for suspected cancer cases. This requires specialist consultation and diagnostic examination within ten working days of the date of referral. Fast-track access for people with recurrent cancer (called the yellow corridor) was also established to ensure timely access to care. Access to cancer care improved, and the proportion of people diagnosed at early stages increased from 50% in 2015 to 55% in 2017 (OECD, 2023[113]).

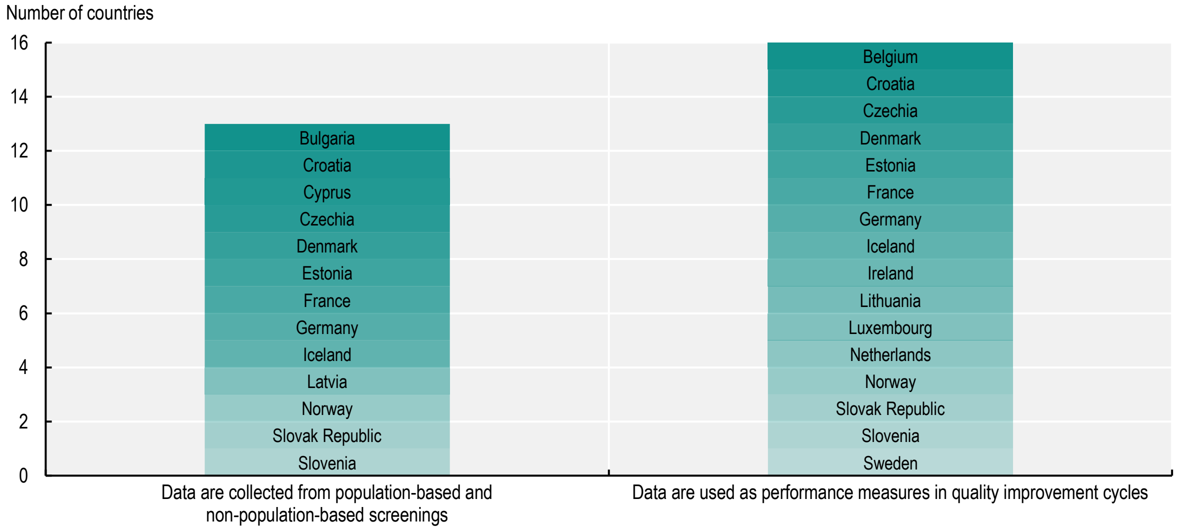
In Lithuania, the green corridor cancer care pathway has been institutionalised to manage the care pathway effectively, from diagnosis to follow-up or end-of-life care. Every cancer centre has adopted this approach, which ensures quicker provision of diagnostic and treatment services for people with cancer that is within national waiting time targets (a total of 42 days from suspicion of cancer to treatment) (Ministry of Health, 2023[114]).

4.3.5. Use of cancer screening data in quality assurance mechanisms could be improved to monitor inequalities and improve quality

Screening data management is key to ensuring identification and invitation of eligible citizens, to maintaining information about screening tests performed and their results, and to implementing quality assurance mechanisms. Compiled data on population-based cancer screening programmes across the EU are available at IARC's CanScreen5 Project (IARC, 2023[115]) – a global data repository that enables comparisons among countries through standardised methods and definitions to estimate performance indicators. The EU4Health-funded project CanScreen-ECIS intends to develop a data system for collection, management and dissemination of performance data related to cancer screening programmes in Europe (European Commission, 2023[116]). The project will be embedded in the European Cancer Information System (ECIS) and aims to improve opportunities to compare screening programmes and monitor inequalities. Data are also key to identifying and engaging with vulnerable groups, allowing tailored policy actions to increase awareness and uptake of screening among non-participants from disadvantaged groups (Spadea et al., 2010[92]).

Of the 29 EU+2 countries, 13 gather information from both population-based and non-population-based screening in existing cancer screening databases (Figure 4.11). Use of screening data to inform quality improvement cycles could also be further encouraged. Among the 26 responding countries, 16 (62%) acknowledged using screening data in quality improvement cycles.

Figure 4.11. Cancer screening information is used in quality improvement cycles in 16 EU+2 countries

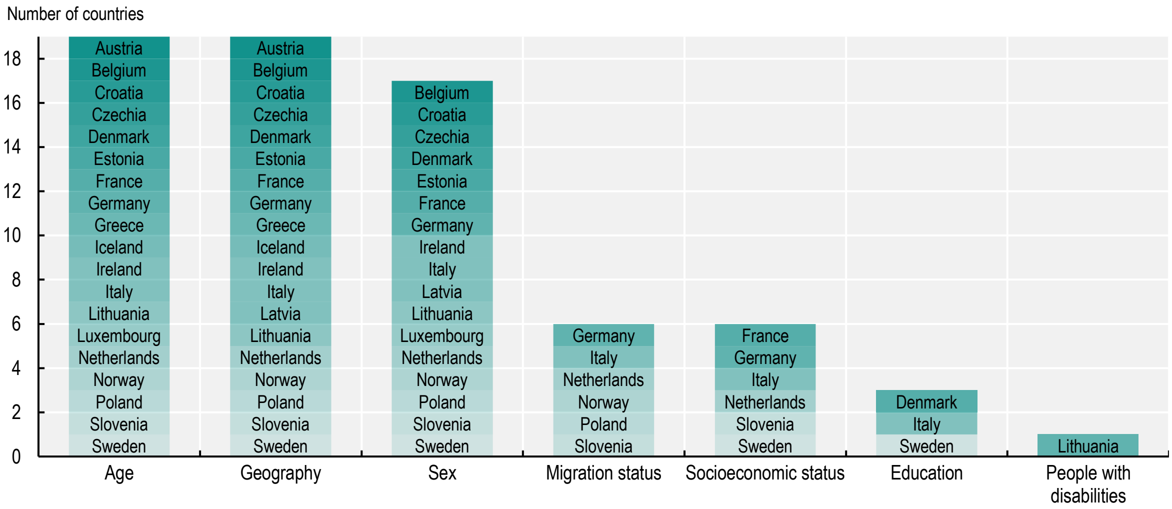


Note: Information for Portugal is not available.
Source: 2023 OECD Policy Survey on Cancer Care Performance.

In the Netherlands, screening data are translated into performance measures and embedded in quality improvement cycles for colorectal, breast and cervical cancers. Such performance measures provide uniform quality assurance for screening programmes; allowing population screening to be monitored at the local, regional and national levels. The National Reference Centre for Population Screening periodically conducts medical assessments of screening organisations. In Luxembourg, a set of performance indicators has been developed for the breast cancer screening programme to monitor and improve care quality for breast cancer patients on an ongoing and systematic basis. The Swedish National Breast Cancer Register comprises diagnostic and therapeutic data, as well as outcomes for all in situ and primary invasive breast cancers, along three sections: notification (with information on the cancer staging at diagnosis), adjuvant therapy and follow-up. A validation study conducted on Register data showed high completeness, comparability and agreement of data. One area identified for improvement was the timeliness of reporting (Löfgren et al., 2019[117]). Czechia has maintained its National Oncological Registry since 1977; it is compulsory by law to provide data to the Registry. Its official website provides epidemiological statistics, incidence per region and clinical stages of diagnosed cancers. In Lithuania, the National Council for Monitoring the Implementation of the Cancer Control Programme, established in 2014, performs evaluations of oncological care (structure, process and outcomes data) and programme implementation annually.

Among populations eligible for cancer screening, age, sex and geography seem to be common variables collected across EU+2 countries to keep track of inequalities in participation rates (Figure 4.12). Collection and linking of socio-economic data are not common among EU+2 countries, performed by only six countries (France, Germany, Italy, the Netherlands, Slovenia and Sweden). Denmark, Italy and Sweden report collecting data about education.

Figure 4.12. Age, sex and geography are the most common variables used by countries to monitor inequalities in cancer screening participation rates



Note: Information for Portugal is not available.
Source: 2023 OECD Policy Survey on Cancer Care Performance.

Spain is working on a cancer information system to measure uptake of screening and assess inequalities. In the Netherlands, screening databases include information about migration status and geographical location. An evaluation report on the screening programmes, studying non-respondents to screening across geographical locations, is being prepared by the National Institute of Public Health. Previous studies have used Dutch postal codes as measure of socio-economic status (van der Meulen et al., 2022[81]). Italy collects screening data assessing socio-demographic characteristics, such as citizenship, household information, socio-economic status and education, facilitating evaluation of disparities in access within vulnerable populations (National Screening Observatory, 2023[118]). In Germany, since 2008, the Robert Koch Institute has been conducting a nationwide cross-sectional survey of the resident population on behalf of the Federal Ministry of Health, called the German Health Update. This provides information about utilisation of and inequalities in cancer screening based on sex, age and education level. In Slovenia, certain categories are not measured in all screening programmes (socio-economic status, geography, and migration status). Occasionally, screening programmes perform analysis on sub-groups of the population by linking screening data with data available from the Statistical Office. In France, territorial and social inequalities may be the subject of studies by regional cancer screening co-ordination centres and are the subject of occasional national studies on participation in screening according to the territory and deprivation level. In Ireland, in 2022 a proof-of-concept BowelScreen Patient Experience Survey was launched to assess the experience of colorectal cancer screening participants by gathering real-time feedback (Health Service Executive, 2023[94]). Given the success of the Survey, implementation of the programme for breast cancer screening is being planned. Beyond EU+2 countries, Australia has a very comprehensive Breast Cancer Registry, where data on inequalities are particularly rich. Its database includes participation rates for breast cancer screening aggregated by age, state and territory, level of remoteness, socio-economic area, and culturally and linguistically diverse populations, including indigenous populations.

4.4. While some innovations in early detection of cancer are promising, many are still in the research phase

4.4.1. Risk-stratified screening is a growing field of research, but policy makers need to consider implementation and ethical challenges

Breast cancer includes diseases with very heterogeneous biological behaviours – from indolent to very aggressive. Most current screening approaches do not consider the variety of breast cancer subtypes or the heterogeneity in risk profiles among women. A stratified risk approach can support personalisation of screening decisions according to individual risk profile (Pashayan et al., 2020[119]). This approach would allow the intensity of screening among women at lower risk of breast cancer to be reduced, while concentrating on those at higher risk through customised surveillance. This could support early detection of more aggressive breast cancer forms and implementation of preventive treatments. Individualised breast cancer risk prediction models allow stratification of women according to risk, by incorporating various factors such as family history, hormonal and reproductive aspects, mammographic breast density and common genetic variants.

Polygenic risk scores (PRS) can be derived from saliva samples and provide information on the combined effect of genetic variants. A personalised breast cancer risk assessment combines PRS with other genetic and non-genetic risk factors. Such models are not yet used routinely in organised screening programmes, partly because further research is needed (Louro et al., 2019[120]). Various international studies are investigating the personalised risk-stratified breast cancer screening approach compared to standard age-guided screening approaches, as well as aspects related to its implementation. These include PROCAS (United Kingdom) (Evans et al., 2016[121]), WISDOM (United States) (Esserman and WISDOM Study and Athena Investigators, 2017[122]), MyPeBS (Belgium, France, Israel, Italy and the United Kingdom) (Roux et al., 2022[123]), and the Canadian PERSPECTIVE I&I (Brooks et al., 2021[124]). The MyPeBS study, funded by the EU, primarily intends to show non-inferiority of the risk-stratified screening approach regarding incidence of breast cancer stage II or higher compared to the standard screening strategy for women aged 40-70. This approach requires collection of each woman's genetic and non-genetic data, calculating her risk profile using risk prediction models and tailoring screening accordingly, as well as potentially applying risk reduction approaches – such as prophylactic bilateral mastectomy – to high-risk women (Lapointe et al., 2022[125]).

In addition, MRI for women with dense breasts is a screening strategy that could be considered according to each country's context. Breast density decreases the sensitivity of mammography, which makes these women more prone to being underdiagnosed in regular screening programmes. Consequently, the likelihood of a delayed diagnosis of breast cancer is higher among women with dense breasts (48% of women). In addition, women with dense breasts are at higher risk of developing breast cancer, thus providing an example where tailored screening programmes may consider individual risk factors. Recent studies – such as the DENSE trial (Bakker et al., 2019[126]), the EA1141 trial (Comstock et al., 2020[127]) and a modelling study that used results from the DENSE trial (Geuzinge et al., 2021[128]) – have provided evidence on the cost – effectiveness of MRI screening for women with dense breasts. This last study showed that incidence of interval cancers[4] was significantly lower in the group of women receiving an MRI (rate of 2.5 interval cancers per 1 000 screenings) compared to the group of women receiving mammogram only (rate of 5 interval cancers per 1 000 screenings). In 2021, the ECIBC suggested using a DBT[1] or DM for asymptomatic women with high mammographic breast density detected in previous screening exams, in the context of population-based screening programmes (a conditional recommendation due to uncertainty of the supporting evidence) (European Commission, 2023[31]).

Personalised screening strategies for colorectal cancer are also being researched. The possibility of sex-specific and age-specific cut-off values for FIT, and of tailoring screening intervals according to the results of prior FIT (specifically, the measured faecal haemoglobin in participants with a negative FIT), instead of considering only a single threshold, are both under consideration. For instance, the PERFECT-FIT study in the Netherlands is studying the effectiveness of screening intervals adjusted based on prior faecal haemoglobin concentration in a FIT-based screening programme (Breekveldt et al., 2023[16]). Such strategies to tailor colorectal cancer screening to individual risk are not yet being piloted or implemented in the EU27.

Implementation of such stratified risk approaches faces implementation challenges, such as resource considerations, health literacy and support for informed decision making by individuals (Toes-Zoutendijk et al., 2023[129]), as well as workforce training (Taylor et al., 2023[130]), and perception of acceptability among healthcare professionals and the general population (Cairns J.M., 2022[131]). For instance, low familiarity with the concept of PRS by healthcare providers not trained in genetics, such as GPs and oncologists, was reported in a previous study in Canada (Lapointe et al., 2022[125]). Social and ethical issues related to stratified risk approaches should also be considered and should be subject to further research to inform policy making. These include data security, logistical challenges related to informed consent (Hall et al., 2014[132]), and policies to ensure equitable access and protect the high-risk population from discrimination (Pashayan et al., 2020[119]). There is also a need for legal and regulatory frameworks related to incidental findings that can be obtained from genetic information.

In Estonia, the National Health Insurance Fund, which co-ordinates breast cancer screening, started accepting PRS information to provide breast cancer screening to women younger than 50 on an opportunistic basis (e-Estonia, 2022[133]; Estonia Research Council, 2023[134]). In 2021, over 10 000 PRS tests were performed, and 42% of the women tested were advised to start screening earlier than the national screening programme target age. The EU-funded BRIGHT Project will conduct three pilot studies in Estonia, Sweden and Portugal to evaluate precision breast screening approaches, targeting screening based on genetic risk. The Estonian health-technology company performing PRS for breast cancer also tests the genetic risk of prostate cancer, colorectal cancer and melanoma. Centres for familial breast and ovarian cancer and centres for familial colorectal cancer have been established in Germany (German Consortium for Familial Breast and Ovarian Cancer, 2023[135]; German Familial Colorectal Cancer Consortium, 2023[136]). These provide counselling, genetic testing and prevention/intensified early detection to populations at risk (such as women with hereditary breast and ovarian cancers). In France, personalisation of screening or follow-up approaches is one of the objectives of the ten-year Cancer Control Strategy.

Self-sampling tests for cervical cancer screening targeting women at higher risk are being developed. Genefirst (2023[137]) is developing a new self-sampling screening test (HPV OncoPredict), aiming to screen and triage women at higher risk of developing cervical cancer by including a triage assay for positive high-risk HPV samples that can distinguish relevant from clinically irrelevant HPV infections leading to cancer. Ultimately, this tool may be able to increase uptake and effectiveness of cervical cancer screening.

4.4.2. Biomarkers are another field of research, although there is no solid evidence yet for their use in population-based cancer screening

Cancer cells release DNA into the patient's blood, and detection of the circulating tumour DNA in the blood constitutes the base of a "liquid biopsy" (Crowley et al., 2013[138]), a biomarker with several clinical applications. While its value in monitoring disease progression and treatment response and as a prognostic tool has been evidenced in various studies, its application as a tool in early diagnosis of cancer is a subject of research. Currently, there is not enough evidence on the effectiveness and safety of these tests as diagnostic tools – particularly in asymptomatic populations (Bradley and Barclay, 2021[139]).

A multicancer early detection blood test is the subject of current research, with a total of eight studies planned in the coming years. These are intended to validate the test in screening for different cancer types, evaluate its performance in eligible screening populations, and assess outcomes in real-world settings (Klein, Beer and Seiden, 2022[140]). As this test's ability to detect cancers increases with the cancer stage, it has a lower ability to detect early-stage cancers (Klein et al., 2021[141]).

Of the 26 EU+2 countries that responded to the 2023 OECD Policy Survey, 11 reported having regulation of biomarker screening and genetic testing in place. For instance, Sweden has legislation on genetic integrity to regulate the use of biomarker data such as genetic testing. Germany has already determined reimbursement for some biomarkers for screening and genetic testing procedures. In addition, the Federal Government has assigned an evaluation committee of the nationwide reimbursement system to implement a process to determine reimbursement levels for new screening and testing procedures in outpatient settings. In Israel, in 2020 the Ministry of Health started funding wide BRCA1/BRCA2 gene testing for women with full or partial Ashkenazi Jewish origin (Greenberg et al., 2023[142]), who present higher risk for BRCA gene mutations, and thus have an increased risk of developing breast and ovarian cancers. The results of this policy can inform the effectiveness of BRCA1/BRCA2 carrier screening in other settings.

4.4.3. Machine learning is being explored for several applications in the field of early detection of cancer

Machine learning (ML) learns patterns from data to solve tasks, allowing a system to learn automatically and improve from experience, updating the internal parameters of the model through extensive contact with input data and the resulting outputs (Swanson et al., 2023[143]). Possible uses of ML in the field of screening and diagnosis are: 1) to triage people who should get enhanced screening by analysing characteristics of the population (risk prediction and risk-stratified screening); 2) to assist in the diagnosis of cancer by assessing images and results from medical exams (image-based risk stratification and cancer detection); 3) to mine information for triage purposes from longitudinal records (e.g. in breast cancer) and identify people who should be diagnosed; and 4) to evaluate the treatment provided to patients with a specific diagnosis to determine whether it is consistent with up-to-date evidence-based practices.

The first EU regulatory framework for artificial intelligence (AI) and a co-ordinated plan for AI were proposed in April 2021 by the European Commission (2021[144]). In June 2023, the AI Act was adopted in the European Parliament (2023[145]) and in December 2023 (2023[146]) a political agreement was reached between the European Parliament and the Council. This Act is the first comprehensive EU legislation to regulate AI, and negotiations are ongoing to finalise the new law.

One of the flagship initiatives of Europe's Beating Cancer Plan is the European Cancer Imaging Initiative, launched in December 2022. This aims to improve the precision, access and timeliness of screening, diagnosis and treatment by linking up databases to build an open infrastructure of cancer images for stakeholders. The AI for Health Imaging Network includes five EU-funded projects working on detection of cancer from imaging through development of AI algorithms, and on establishing federated repositories for cancer images (European Comission, 2023[147]). The EU-funded project EUCAIM (EUropean Federation for CAncer IMages), which is key to the European Cancer Imaging Initiative, started in January 2023 involving 12 European countries and building on the results of the AI for Health Imaging Network. By 29 September 2023, the Cancer Image Europe platform was linking 36 datasets of images of nine cancer types (including image series of about 20 000 individuals) (European Commission, 2023[148]). The EU4Health project eCAN – Joint Action on strengthening eHealth including telemedicine and remote monitoring for healthcare systems for cancer prevention and care (launched in September 2022) aims to provide recommendations on the use of telemedicine and remote monitoring of cancer patients – notably those from rural and remote areas (European Commission, 2023[149]).

ML can also facilitate extraction of clinical data from electronic health records. A study comparing manual extraction of clinical data with automated data extraction showed high accuracy and concordance in a swift manner (Gauthier et al., 2022[150]). This could be a valuable tool to conduct studies with real-world data at a larger scale, providing potentially useful insights for clinical practice and policy making. Another study outlined how the combination of data warehousing and processing text clinical documentation with natural language processing (a branch of AI where computers are enabled to process human language) facilitates creation of a prospective and up-to-date database that enables learning health systems in oncology (Petch et al., 2023[151]).

A contribution to advance personalised screening: risk stratification and risk prediction information are two areas being developed in the field of machine learning

Image-based risk stratification is related to predicting characteristics associated with cancer risk, and to identifying individuals with higher cancer risk, based on medical imaging. Image-based risk prediction using ML to predict the likelihood of breast, lung and prostate cancers from assessment of mammograms, X-rays and MRIs, respectively, has been studied (Swanson et al., 2023[143]). The ECIBC's Guideline Development Group suggests use of double reading supported by AI for reading of mammograms using DM or a DBT in population-based screening programmes.

Cancer pathology slides also offer information that can be used by deep learning algorithms to predict clinically relevant biomarkers (Niehues et al., 2023[152]). The first ML algorithm for risk prediction was recently approved by the EU (Owkin's automated Mismatch Repair Deficiency (dMMR)/Microsatellite Instability (MSI) screening). This facilitates prediction of a highly relevant biomarker in colorectal cancer diagnosis. It also uses pathology slides to predict the risk of relapse in breast cancer patients (Owkin, 2023[153]). Various challenges need to be addressed to advance the deployment of these algorithms, such as their generalisability, interpretability and potential application to other biomarkers.

A contribution to advance non-invasive screening tests: artificial intelligence as a potential tool to improve uptake of screening

Non-invasive screening tests combined with AI could improve coverage of colorectal cancer screening in Europe but are dependent on further research (Shaukat and Levin, 2022[154]). Tests based on imaging technology, such as CT colon capsule combined with AI/ML, may potentially allow performance of the test at home, with results assessed remotely. Such innovations require further evidence, and their implementation will depend on a trained workforce to assess benefits and limitations, and to engage in informed and shared decision making.

While only a few EU+2 countries already use artificial intelligence for cancer screening, some are engaging in discussions or pilot projects

Among respondents to the 2023 OECD Policy Survey, only Norway and Germany reported having already implemented policies on use of AI applications as part of their screening programmes. AI systems are being tested in some EU+2 countries to improve breast cancer detection in screening, but further evidence is needed (Dileep and Gianchandani Gyani, 2022[155]; Marinovich et al., 2023[156]; Larsen et al., 2022[157]). Recent research using mammography screening data from four sites showed that AI-supported mammography screening resulted in a similar cancer detection rate to standard double reading and reduced the mammogram reading workload of doctors almost by half (Lång et al., 2023[158]).

Some European countries are already testing this approach, such as the United Kingdom (Scotland) (pilot testing in six sites), Finland and Hungary. The sustainability of implementation of such practice should include cost – effectiveness considerations. A simulation model comparing two readers of the same exam with a single reader plus an AI technology in breast cancer screening in the United Kingdom showed that the AI technology had the potential to be cost-effective and feasible (Vargas-Palacios, Sharma and Sagoo, 2023[159]). In Germany, use of AI is also planned in cancer registries. Six collaborative research projects are in place, funded by the Federal Ministry of Health, which aim both to prepare cancer registry data for innovative uses of AI and to use AI to analyse the data. As part of the funding priority "Digital innovations for patient-centred healthcare", the Federal Ministry of Health is also funding a project called SCP2 – Skin Classification Project, which uses AI algorithms to support diagnosis of melanoma. In the Netherlands, discussions are under way regarding how AI can support screening activities to make them more cost-effective. In Luxembourg, a project is ongoing about use of AI to support decision making on the level of prioritisation of mammography reading within the screening programme. Cyprus is also in the process of introducing use of AI as part of the breast cancer screening programme.

A project developed in a partnership between Estonia, Latvia, Lithuania and Norway aims to create personalised cervical cancer screening methods focusing on the cost – effectiveness of specific AI tools for prevention in cervical cancer (Stankunas et al., 2022[160]). The Implementation of Personalised Medicine in Estonia Project (2019-23) aims to foster use of genetic data – notably in the area of breast cancer prevention and early detection. The PIONEER Big Data Platform offers a central and federated state-of-the-art Big Data analytic platform for prostate cancer at an EU level (PIONEER, 2023[161]). It aims to improve patient stratification and identification of low- and high-risk patients, including which patients are more likely to respond to a specific treatment.

Artificial intelligence for cancer screening and early diagnosis can exacerbate inequalities if projects are only implemented at the local scale

Implementation of AI technology in healthcare is in its early stages, and further research focused on regulatory, legal, ethical, clinical and economic aspects is needed. Many EU+2 countries have some small-scale projects in place. This is largely due to a lack of interoperability, fragmented technology and lack of harmonising policy. Unless addressed, these issues risk exacerbating cancer inequalities, as wealthier parts of the system may be able to conduct pilot projects and implement them at the local level, while others may be left without access to the innovation. Concerning the ethical challenges posed by AI in the medical field (Dennison, Usher-Smith and John, 2023[162]), the United Nations Educational, Scientific and Cultural Organization Recommendation on the Ethics of Artificial Intelligence acknowledges these challenges, such as aspects related to the risk of unequal access, and the need for an adequate digital infrastructure and regulatory frameworks (UNESCO, 2021[163]).

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Notes

[1] A DBT is an imaging technique that provides quasi-three-dimensional information on the breast, compared to the two-dimensional image obtained with DM (Chong et al., 2019[164]).

[2] Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain and Sweden responded to the 2023 OECD Policy Survey on Cancer Care Performance.

[3] A pack year is a unit representing the number of packs of cigarettes smoked per day multiplied by the number of years the person has smoked. One pack year is 20 cigarettes smoked/day for one year.

[4] An interval cancer is a cancer that is diagnosed between screening tests. Interval cancers are an inevitable component of breast screening programmes (Public Health England, 2021[165]).

5

Ensuring the sustainability of high-quality cancer care systems

In order to address the growing demand for cancer care, countries need to seek effective and efficient ways of delivering high-quality cancer care. Most EU countries, however, have a shortage of healthcare experts in this field, leading to a shared challenge of ensuring widespread access to highly qualified professionals across their regions. With emerging technologies in cancer medicines and medical equipment, EU countries also face difficulties in securing adequate access and ensuring financial sustainability in the provision of high-quality cancer care. Countries address these challenges through policies that encompass enhancing the healthcare workforce, investing in medical technologies and optimising their utilisation, refining the organisation of cancer care delivery, and ensuring high-quality cancer care.

Key findings

- To ensure the sustainability of healthcare systems, considering growing demand for healthcare services, countries need to put greater policy focus on health promotion, prevention and early diagnosis to reduce the burden of cancer. However, healthcare systems also need to tackle challenges in providing sustainable and high-quality cancer care to increasing numbers of patients, including workforce shortages, unbalanced distribution of resources and concerns about the affordability of new oncology medicines:
- Over three-quarters of EU+2 countries (the 27 European Union Member States, Iceland and Norway) face workforce shortages both in cancer care and in the health sector as a whole. Austria, Estonia, Latvia and Norway reported general shortages of nurses and a resulting negative impact on the delivery of cancer care.
- Inadequate geographical distribution of the workforce and of radiotherapy equipment is creating gaps in access to cancer care between urban and remote populations in Cyprus, Greece, Norway, Spain and Sweden.
- To tackle workforce shortages, EU+2 countries have increased training capacity (e.g. Slovenia), encouraged task substitutions among healthcare professionals (e.g. Ireland), provided financial incentives (e.g. Malta) and recruited foreign-trained health professionals (e.g. Iceland).
- Countries face challenges in making new medicines available and accessible. The time between European Medicines Agency (EMA) approval and a reimbursement decision for a given oncology medicine ranged from less than 100 days in Germany and Sweden to over 3 years in Cyprus, Latvia and Lithuania. The proportion of indications with high clinical benefit in breast and lung cancer that are reimbursed or covered also varies 3-fold across countries.
- Addressing barriers that impede patient access to existing reimbursed medicines and new cancer medicines is vital to enhance the quality of care. Alongside the EU regulation on health technology assessment (HTA), tools used by EU+2 countries include joint HTA collaborations and value frameworks developed to support the process of HTA and to assist in rationalising reimbursement decisions.
- Encouraging entry and use of generics and biosimilars helps countries reinvest in new cancer medicines and improve the financial sustainability of cancer care delivery (e.g. Germany and Estonia).
- Countries have sought ways to organise cancer care delivery to ensure timely access and bolster positive outcomes:
    - 14 EU+2 countries have reorganised cancer care delivery to improve effectiveness and to ensure sustainability in recent years. Among these, a few (e.g. Austria, France, Hungary or Germany) have established comprehensive vertically cancer care systems with national centres of expertise, regional specialty centres and local certified cancer centres.
    - In 16 countries, cancer care networks are organised horizontally across providers to improve care co-ordination.
    - A few countries are developing mobile palliative care for cancer patients at home (e.g. Czechia, Slovenia or Spain).
    - Policy levers to improve the quality of cancer care include developing multidisciplinary teams (21 countries), clinical guidelines for high standards of care (20 countries), accreditation or certification mechanisms (16 countries) and monitoring performance indicators (16 countries), notably around waiting times (e.g. Denmark, Iceland, Latvia or Sweden) or patient-reported outcomes (e.g. Belgium, the Netherland or Slovenia).

5.1. Challenges in sustaining high-quality cancer care are increasing

The demand for healthcare services for non-communicable diseases is increasing, and cancer is a major public health concern in Europe. The disease burden is expected to increase further as cancer incidence is increasing along with cancer prevalence due to decreased mortality and improved survival probabilities (Chapter 2). To ensure the sustainability of healthcare systems, countries need to place greater policy focus on addressing cancer risk factors (Chapter 3) and improving screening and early diagnosis to reduce the burden of cancer (Chapter 4). Furthermore, to care for an increasing number of people with cancer in a sustainable way, countries need to seek effective and efficient ways of delivering high-quality cancer care. Most European countries, however, face shortages of various types of professionals providing cancer prevention, diagnosis and care services – in particular, general practitioners (GPs) and nurses. Further, securing access to high-quality professionals across regions within countries is a common challenge. With emerging technologies in cancer medicines and medical equipment, EU+2 countries (the 27 European Union Member States, Iceland and Norway) also face financial challenges in securing access to innovative treatments and in providing sustainable, high-quality cancer care.

This concluding chapter describes the challenges faced by countries in securing and utilising human resources for health and medical technologies, and the policy responses and developments adopted to ensure sustainable, high-quality cancer care. These include utilising a high-quality health workforce effectively by increasing training capacities and promoting task reallocation, as well as investing in medical technologies and optimising their use. Finally, the chapter discusses policy levers for efficient and effective delivery of cancer care, such as concentration of cancer care, establishment of cancer care networks, multidisciplinary team practice, and monitoring and feedback mechanisms for cancer care delivery.

5.2. The majority of EU+2 countries have adopted policies to secure professionals providing high-quality cancer care

5.2.1. Health workforce shortages are a common challenge

Various types of healthcare professionals engage in cancer care, reflecting the complexity of the services provided. Nonetheless, most European countries face workforce shortages in the health sector, affecting the delivery of cancer prevention, screening, diagnosis, treatment, follow-up and palliative care, as reported by 21 of the 26 countries responding to the 2023 OECD Policy Survey on Cancer Care Performance[1] (Table 5.1).

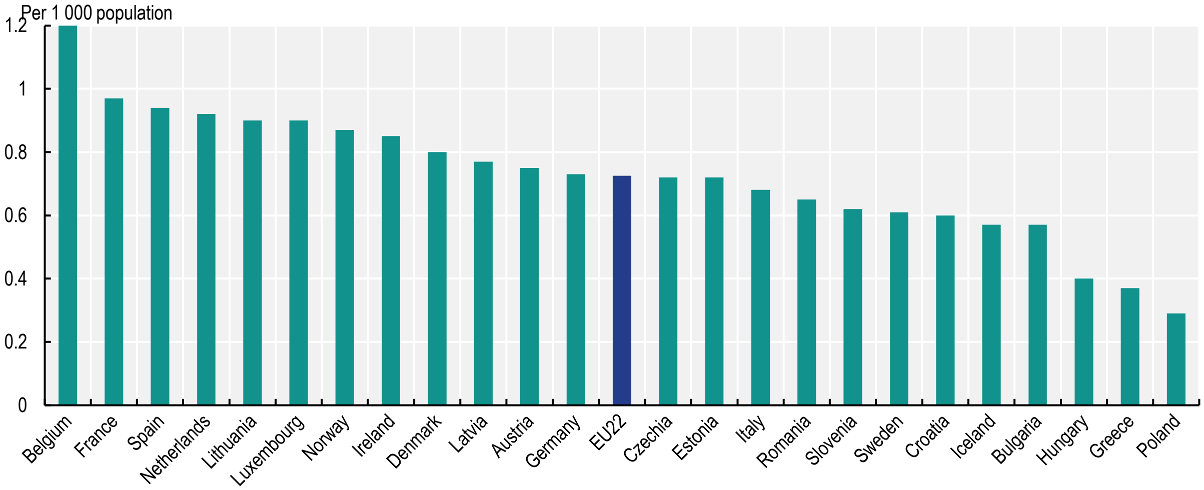
Table 5.1. The majority of EU+2 countries reported shortages of various types of professionals engaging in cancer care

	GPs, family doctors	Oncologists	Radiologists	Radiation therapists	Inpatient oncology nurses	Community-based nurses	Others
Austria	Yes	NA	NA	Yes	Yes	Yes	
Bulgaria	Yes	Yes	Yes	Yes	Yes	Yes	
Croatia	Yes	No	No	No	NA	NA	
Cyprus	No	No	No	No	No	NA	
Czechia	Yes	Yes	Yes	Yes	Yes	Yes	
Denmark	Yes	No	Yes	Yes	No	No	
Estonia	Yes	Yes	Yes	Yes	Yes	Yes	
France	Yes	No	No	No	Yes	Yes	
Germany	Yes	No	No	No	NA	NA	
Greece	Yes	No	No	No	Yes	Yes	
Iceland	Yes	Yes	Yes	Yes	Yes	Yes	
Ireland	Yes	No	Yes	Yes	Yes	Yes	Radiographers, clinical psychologists, child and adolescent psychiatrists, neuropsychologists, mental health-trained/psycho-oncology-trained clinical nurse specialists, medical social workers, music therapists, play therapists, health and social care professionals
Latvia	Yes	NA	Yes	NA	NA	NA	Specialists in radiology diagnosis, general nurses, chemotherapist-oncologists
Lithuania	Yes	Yes	Yes	No	Yes	Yes	
Malta	Yes	Yes	Yes	Yes	Yes	Yes	Medical physicists, oncology/navigator nurses, fast-track and survivorship co-ordinators
Netherlands	Yes	No	No	No	Yes	Yes	
Norway	Yes	Yes	Yes	Yes	Yes	Yes	
Poland	Yes	Yes	Yes	Yes	Yes	Yes	
Portugal	Yes	No	NA	No	NA	NA	Medical physicists
Slovak Republic	Yes	Yes	Yes	Yes	Yes	Yes	
Slovenia	Yes	Yes	Yes	Yes	Yes	Yes	Clinical psychologists, palliative care team members
Spain	Yes	Yes	Yes	Yes	Yes	Yes	
Sweden	Yes	Yes	Yes	Yes	Yes	Yes	Dietitians and nutritionists, physiotherapists, psychologists, counsellors and social workers
Total Yes	22	12	15	14	17	17	

Notes: NA means not answered. Information is not available for Belgium, Italy and Luxembourg. Red indicates workforce shortages and blue indicates no workforce shortages.
Source: 2023 OECD Policy Survey on Cancer Care Performance.

While GPs have a critical role to play in cancer care and follow-up care, 22 of the 26 responding countries reported that the number of GPs was not sufficient, and only Cyprus reported a sufficient number. The availability of GPs varies widely across EU+2 countries – from 1.2 per 1 000 population in Belgium to less than 0.5 per 1 000 in Poland, Greece and Hungary (Figure 5.1). However, even the countries with the highest availability – such as Belgium, France and Spain – considered the supply insufficient to meet the demand.

Figure 5.1. The availability of general practitioners in 2021 varied over four-fold between Belgium and Poland



Notes: Data for Luxembourg refer to 2017; data for Denmark, Finland and Sweden refer to 2020. Medical interns and residents who have completed a basic medical university education and are undertaking postgraduate clinical training are included if they are specialising in general practice or if they have not chosen their area of specialisation yet.
Source: OECD Health Statistics 2023, https://doi.org/10.1787/health-data-en.

The 2023 OECD Policy Survey on Cancer Care Performance also revealed that the number of oncologists was not considered sufficient in 12 of the 26 responding countries. In Croatia, where about 9 doctors per 100 000 population work as specialists in radiotherapy, oncology or internal oncology, or have completed sub-speciality training in oncology, availability of oncologists was reported to be sufficient for current needs. On the other hand, among the countries reporting shortages of oncologists, Poland and Sweden reported relatively high availability (of between 7 and 8 oncologists per 100 000 population), while Bulgaria reported relatively low availability (about 2 oncologists per 100 000). Due to cross-country differences in the qualification requirements for doctors providing cancer care, the scope of their responsibilities and availability of data, it is challenging to compare the number of oncologists across countries. Nonetheless, about one-third of EU+2 countries consider the supply of oncologists inadequate for the demand.

Nurses are also crucial in providing cancer care, but several countries – including Austria, Estonia, Latvia and Norway – reported general shortages of nurses and a resulting negative impact on the delivery of cancer care. Further, 17 of the 26 countries responding to the OECD Policy Survey also reported shortages of oncology nurses, not only in hospitals but also in community and home care settings. In the Netherlands, for example, the supply of paediatric oncology nurses was reported to be insufficient (Box 5.1).

Shortages of other healthcare professionals are also considered challenging in delivering cancer care. Over three in five countries responding to the OECD Policy Survey reported insufficient numbers of radiologists and radiotherapists. Health workforce shortages were reported for specialists in radiology diagnosis in Latvia; medical physicists in Malta and Portugal; dietitians, nutritionists, physiotherapists and psychologists in Sweden; and professionals providing palliative care and clinical psychology in Slovenia. Ireland also reported shortages of clinical psychologists, child and adolescent psychiatrists, neuropsychologists, mental health-trained clinical nurse specialists and medical social workers, among other professionals.

Box 5.1. Health workforce assessment and planning for cancer care takes place in several countries

While assessment of future demand and supply of health professionals is undertaken in many countries to develop health workforce strategies (Ono, Lafortune and Schoenstein, 2013[1]), only a few countries conduct an assessment specifically covering professionals in cancer care. In **the Netherlands**, the Advisory Committee on Medical Manpower Planning (ACMMP) examines capacity and training programmes for healthcare professionals, produces a national overarching forecast and issues recommendations. The ACMMP also forecasts demand and supply of specific types of professionals who are subject to limited geographic mobility for 12 hospital training programme fund regions; this analysis includes oncology and paediatric oncology nurses. The most recent assessment undertaken in 2018 found that the number of paediatric oncology nurses was lower than the level needed to meet expected healthcare needs (The Capacity Body, 2019[2]).

Other OECD countries also conduct health workforce assessments in cancer care. In **the United States**, a study found that since 2013 the supply of oncologists had increased by 16% – faster than the number of new cancer cases (American Society of Clinical Oncology, 2020[3]). **Australia** also conducted a workforce survey in oncology to inform planning of human resource strategies in cancer care, which suggested the need for geriatric oncology professionals, in view of population ageing (Lwin et al., 2018[4]).

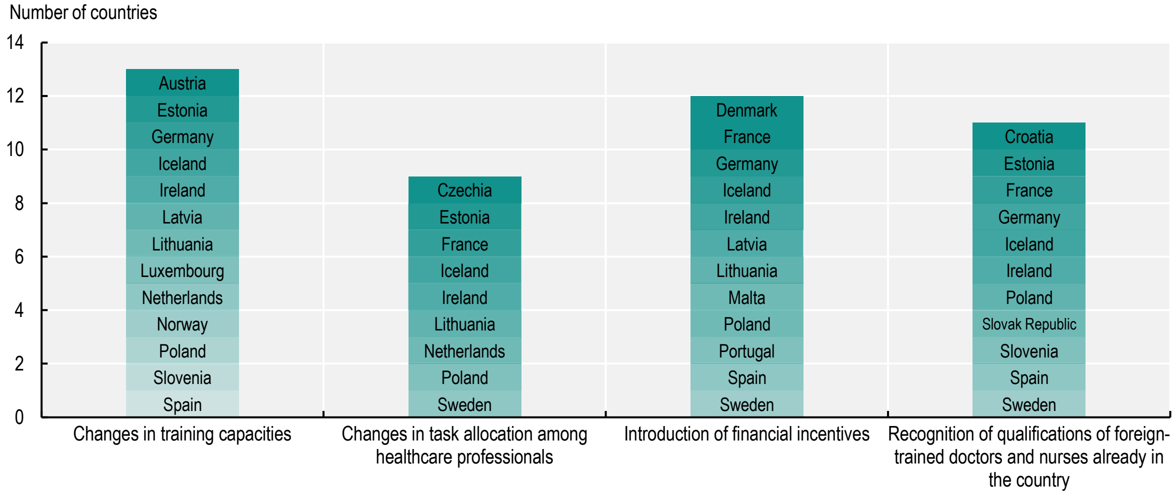
Balanced geographical distribution of the health workforce is important to ensure adequate access to cancer prevention, screening and care across regions. However, a workforce distribution problem is reported in a few EU+2 countries – including Greece, the Netherlands, Norway and Sweden – affecting overall access to healthcare and to cancer care in particular. In Greece, geographically uneven developments of healthcare infrastructure and services have created disparities between urban and rural or remote areas in healthcare, as most doctors – including oncologists – are based in urban areas. There are hospitals with an oncology department that do not have a doctor, and small regional hospitals may also lack other specialists, such as haematologists and lab specialists for biomarker testing (OECD, 2023[5]). Inadequate geographical distribution of oncologists is also reported for Austria, Czechia, Hungary, Italy, Latvia, Norway, Portugal and Romania. In Portugal, medical oncologists are not adequately distributed across regions, leading to variations in workload across oncology departments, and possibly resulting in differences in care experiences and outcomes for people with cancer (OECD, 2023[6]). In some regions of Romania, owing to low supply, one oncologist serves a target population of over 200 000 inhabitants (OECD, 2023[7]).

Compared to specialised oncology care, access to primary care – which plays an important role in cancer prevention, diagnosis, referral and follow-up care – is often more equally distributed across regions within countries (OECD, 2020[8]). Nonetheless, unequal access to primary care is reported to be an issue in some EU countries. In the Netherlands, the density of primary care physicians varied between 6.0 and 7.8 per 10 000 population across regions in 2023. The urban region generally in the western part of the country has a surplus of GPs while some rural areas have a shortage. In France also, there are wide disparities in the density of GPs across regions. Medical deserts - characterised by a very low density of GPs- are located mainly in rural areas and in distant suburbs of small towns and big cities, mostly concentrated in the central and the northwest parts of France.

5.2.2. About half of EU+2 countries are increasing training capacities or reallocating tasks among healthcare professionals

As shown in Figure 5.2, countries are using different policy options to tackle workforce shortages in the health sector, and one of the most common approaches is increasing training capacity. Half of the 26 countries responding to the 2023 OECD Policy Survey on Cancer Care Performance took this approach to improve the availability of workforce providing cancer care. In Luxembourg, the University of Luxembourg began offering places for a Bachelor of Medicine degree for the first time in September 2020, with the goal of increasing the overall domestic medical workforce, as well as three postgraduate speciality medical training programmes including oncology. In Slovenia, there has been an increase in training sites for clinical psychologists and palliative care, as the country plans to increase the number of mobile palliative care units and expand the availability of psychological support (OECD, 2023[9]). In Latvia, specialists in oncology and chemotherapy (oncologist-chemotherapists) have been trained not only in diagnosis of cancer and medical treatment including chemotherapy, endocrine therapy, immunotherapy, supportive and symptomatic therapy but also in palliative and rehabilitative care, which are not always widely available and accessible. Such policies have also been adopted in several OECD countries, including a good example from Canada (Box 5.2).

Figure 5.2. EU+2 countries have adopted a range of policies to address health workforce shortages in oncology



Note: Information is not available for Belgium and Cyprus.
Source: 2023 OECD Policy Survey on Cancer Care Performance.

Box 5.2. Canada has implemented multiple strategies to address shortages of health professionals providing cancer care

In Canada, the COVID-19 crisis hiked the demand for healthcare, exacerbating shortages of healthcare professionals as their working conditions, health and well-being were compromised, and a large proportion of the workforce entered retirement. To tackle shortages of professionals providing cancer care, Canada has implemented multiple strategies, including hiring back retired nurses, incentivising currently employed technicians and practitioners, bringing more nursing students and international trainees into the system, raising enrolment limits on nursing programmes, and modifying task allocation among healthcare professionals (e.g. having family doctors provide chemotherapy treatment and training paramedics to perform palliative care). The Canadian Partnership Against Cancer is currently rolling out funding to provinces and territories across Canada to implement and evaluate innovative models of care along the cancer continuum, which include an effort to address health workforce shortages. Areas of focus include network models, virtual care and expanded scopes of practice models.

Source: 2023 OECD Policy Survey on Cancer Care Performance.

To address workforce shortages and improve overall efficiency in delivering cancer care while optimising the use of the existing workforce, 9 of the 26 countries responding to the 2023 OECD Policy Survey on Cancer Care Performance have reallocated tasks among healthcare professionals (Figure 5.2):

- In Czechia, where availability of oncologists is relatively low, a GP training programme was introduced in 2019 to enhance the skills needed to monitor patients with a history of cancer. This initiative aims to improve access to cancer care (OECD, 2023[10]).
- In France, to expand the role of nurses in medical practice, a Master’s programme to train advanced practice nurses was created in 2018, offering them the opportunity to become responsible for regular follow-up of cancer patients, in co-ordination with oncologists.
- To support pharmacists in providing high-quality cancer care and identifying their training needs, Ireland has developed the National Competency Framework, which outlines the behaviours, skills and knowledge required for pharmacists working in cancer care. Ireland has also developed a number of educational initiatives – including e-learning programmes – to equip various types of nurses with adequate knowledge, skills and competencies in areas such as anticancer therapy and psychosocial care to provide cancer care safely and effectively.

Provision of financial incentives is another common approach to resolve health workforce shortages; these had been introduced in 12 of the 26 countries responding to the OECD Policy Survey (Figure 5.2). Malta, for example, has limited capacity for training in certain specialisations, including oncology, so the government funds specialised oncology training abroad, which typically lasts one or two years, in full (OECD, 2023[11]). In 2023, Denmark also allocated funding to pay healthcare professionals for weekend shifts to improve workforce capacities in cancer care.

Of the 26 responding countries, 11 have expanded efforts to recruit foreign-trained health professionals. In Slovenia, recognition of foreign-trained healthcare professionals has been in place for many years, but the level of language requirement was relaxed recently to attract greater numbers. In Iceland, as Icelandic-born doctors receive oncology specialisation training abroad, efforts have been made recently to recruit these doctors to the national health system. Iceland has also tried to increase numbers of foreign-born doctors (OECD, 2023[12]).

Several countries aim to address workforce shortages in cancer care comprehensively through implementation of their ongoing national cancer plans. In Iceland, education and human resources development in cancer care were identified as among the nine priorities of the National Cancer Plan. To improve recruitment and retention of health professionals in cancer care, a comprehensive review of staffing and education is planned to address issues in medical education, nursing graduate education, specialised education, continuous professional education and work environments (OECD, 2023[12]). In the Slovak Republic, the National Oncology Programme Action Plan 2021-25 aims to develop legislative changes to increase employment and incentives for healthcare professionals in cancer care, alongside specific training of clinical trial co-ordinators and clinical research nurses. Furthermore, a pilot project funded by the EU Human Resources Operational Programme was approved in 2021 to finance staff for mobile palliative teams, which were newly created to cover all Slovak regions (National Oncology Institute, 2022[13]).

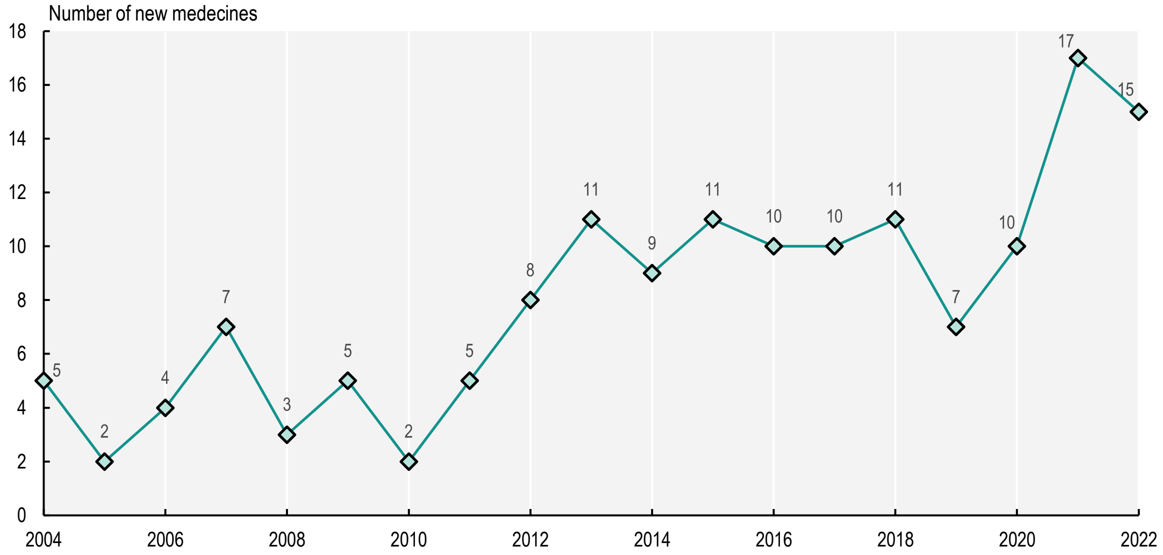
5.3. EU+2 countries aim to balance access to medical technologies and financial sustainability of cancer care delivery

5.3.1. Inequalities in patient access to cancer medicines and ensuring access to new cancer medicines are paramount challenges for healthcare systems

There has been a marked increase in the number of approved cancer medicines and extensions of indications in the past two decades

Between 2004 and 2022, the European Medicines Agency (EMA) granted centralised marketing authorisation to 152 new cancer medicines (EMA, 2023[14]). There has been a marked increase in the number of approved oncology medicines each year. Three distinct periods are noticeable (Figure 5.3). Between 2004 and 2011, the average annual number was close to four. Around ten new medicines per year were approved between 2012 and 2020, while 2021 was an exceptional year, with 17 approvals of new cancer medicines, followed by 15 approvals in 2022. Extensions of the use of existing cancer medicines to new indications (i.e. new patient groups) are also common and subject to approval by the EMA. Between 2020 and 2022, the EMA approved 73 extensions of existing oncology medicines.

Figure 5.3. The annual number of new cancer medicines approved by the EMA increased markedly during 2004-22



Note: Medicines used for cancer patients in Anatomical Therapeutic Chemical (ATC) classification groups L01, L02 and L04 were included. Radiopharmaceuticals in ATC group V were not included. Medicines with identical active substances were only included for their first instance of marketing authorisation. Six medicines were included that had their authorisation withdrawn after initial approval.
Source: Data from EMA (2023[14]), Download medicine data, www.ema.europa.eu/en/medicines/download-medicine-data, accessed on 3 April 2023).

With rising prices of oncology medicines, the budget impact of new medicines is increasingly influencing reimbursement decisions

Nearly all EU+2 countries, except for Cyprus and Slovenia, have established a health technology assessment (HTA) agency to inform decision making in the pricing and reimbursement of a new medicine/indication (WHO, 2018[15]; OECD/European Observatory on Health Systems and Policies, 2019[16]). The most common criteria for reimbursement decision are the relative therapeutic benefit, medical necessity, (lack of) availability of treatment alternatives and relative cost – effectiveness. However, with rising costs of new medicines, the budget impact is becoming an important criterion in public coverage/reimbursement decisions for oncology medicines.

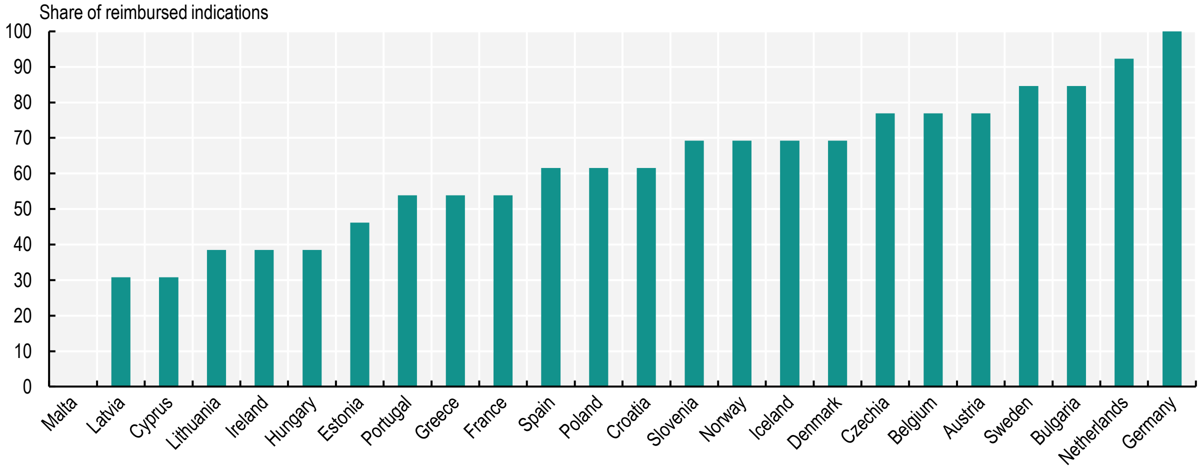
Recent decades have witnessed rising prices of individual cancer medicines (OECD, 2020[17]) and rising expenditure on cancer medicines as a whole, both in absolute spending and in relative terms as a share of total spending on cancer care (Hofmarcher et al., 2019[18]). This creates an affordability challenge even for more affluent countries – in particular, for publicly funded health systems that operate on constrained budgets (Vogler, 2021[19]; WHO, 2018[20]). Of the 26 countries responding to the 2023 OECD Policy Survey on Cancer Care Performance, 17 indicated that the budget impact is increasingly influencing their coverage/reimbursement decisions for various reasons – most importantly, the rising prices of new medicines and the increasing number of new medicines (data not shown). The rising number of cancer patients eligible to receive these new products was also cited as a contributing factor by several countries.

There is a three-fold difference in public coverage of cancer medicines with a high clinical benefit across EU+2 countries

The availability and coverage of new medicines determine the level of access patients have. The definition of "availability" can vary, ranging from marketing authorisation, approval for reimbursement/coverage, and/or first sales in a particular country. In addition, the time to availability is measured as the difference between the starting point (the date of application for regulatory approval or the date of the actual approval) and the endpoint (the date of reimbursement/coverage or the date of first use in routine clinical practice). For EU countries, the Transparency Directive (Council Directive 89/105/EEC) regulates the issue of time to reimbursement. The Directive mandates maximum time limits for pricing and reimbursement decisions (90 days for pricing, 90 days for reimbursement or 180 days for combined pricing and reimbursement decisions) from the time a pharmaceutical company applies for pricing and reimbursement of a medicine to the country's competent authorities. However, the pricing and reimbursement process may include "clock stops" (a period of time during which the evaluation of a medicine is officially stopped while the pharmaceutical applicant prepares responses to questions from the competent authority), and therefore usually lasts longer than 180 calendar days after the application was submitted.

An OECD analysis of a sample of indications in breast and lung cancer with the highest clinical benefit scores and with EMA marketing authorisation after 1 January 2016 shows that the proportion of indications reimbursed/covered varied substantially across countries (Figure 5.4). Germany reported that all indications were covered, followed by the Netherlands (92%) and Bulgaria and Sweden (both 85%). However, it should be noted that the mere inclusion of a medicine/indication in a positive reimbursement list does not mean that all eligible patients may have access in clinical practice. For instance, previous studies found that use of immunotherapies in Bulgaria was among the lowest in the EU in 2018 (Hofmarcher et al., 2019[18]). Budget restrictions might inhibit the widespread use of a reimbursed medicine in practice in some countries. Malta reimbursed none of the indications studied[2], and Cyprus and Latvia reported that only small proportions of indications were covered (both 31%).

Figure 5.4. The share of selected indications of newer cancer medicines with public reimbursement/coverage varies widely

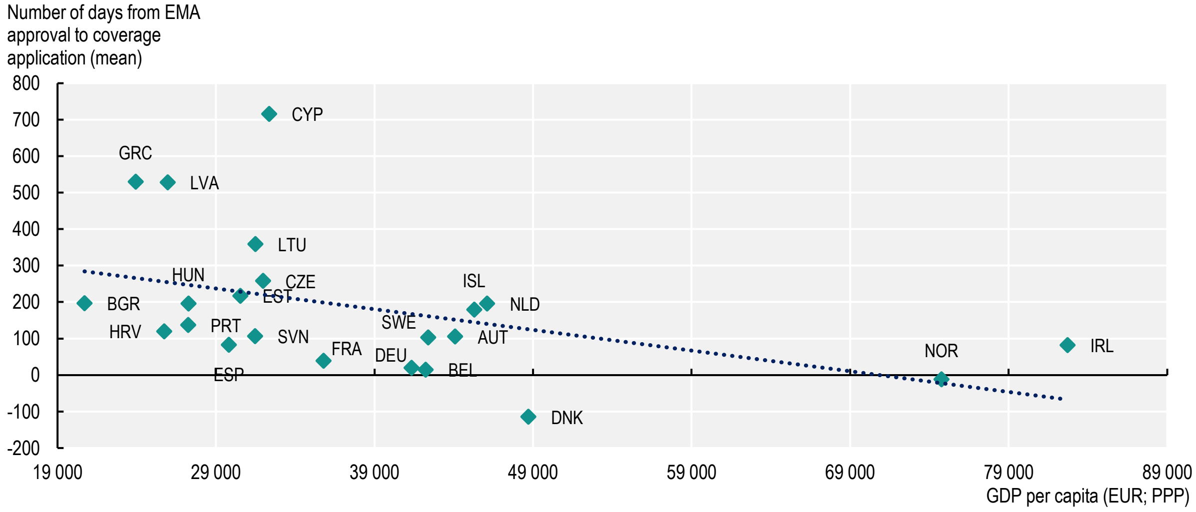


Notes: A total of 24 countries responded to the pilot data collection. Thirteen indications of ten cancer medicines used in the treatment of breast cancer and lung cancer with marketing authorisation by the EMA after 1 January 2016 and active authorisation on 26 March 2023, and with the highest clinical benefit according to the European Society for Medical Oncology Magnitude of Clinical Benefit Scale (ESMO-MCBS) scoring system (scores of A and 5), were included in the analysis. The shares show the inclusion status of the indications in the public reimbursement list on 1 April 2023.
Source: 2023 pilot data collection on access to cancer medicines in EU countries.

Time from marketing authorisation to coverage decision ranges from less than 100 days in Germany and Sweden to over 3 years in Cyprus, Latvia and Lithuania

The time between EMA marketing authorisation and application by the pharmaceutical company for coverage is often interpreted as a reflection of companies' launch strategies, which may in turn be influenced by national pharmaceutical policies. For example, in some countries, the application for coverage can be made prior to receipt of marketing authorisation. Also, the importance of external price referencing as a pricing mechanism in Europe may be a driver of companies' launch policies,[3] alongside the size of the market and the expected profits. Using GDP per capita as a proxy of the size of the market and expected profit, Figure 5.5 shows a negative correlation between GDP per capita and mean time from EMA approval to coverage application. Wide variations in the time to application were found among countries responding to the 2023 OECD Policy Survey on Cancer Care Performance. Denmark and Norway had the shortest mean time between marketing authorisation and application for coverage (with negative values, meaning that application takes place before EMA authorisation), followed by Belgium (15 days after EMA authorisation) and Germany (20 days). Latvia (528 days after EMA authorisation), Greece (530 days) and Cyprus (716 days) had the longest mean times (Figure 5.5).

Figure 5.5. The correlation between time from EMA approval to application for reimbursement and GDP per capita is negative



Note: A total of 24 countries responded to the pilot data collection.
Source: 2023 pilot data collection on access to cancer medicines in EU countries.

In addition to the time between EMA authorisation and application by the company for coverage, there is also the timeline between application for coverage and issuing of the reimbursement/coverage decision. This time is influenced by HTA processes and pricing mechanisms. In Germany, there can be no delays between marketing authorisation and reimbursement. Short durations of fewer than 100 days were reported in Greece, Iceland, the Netherlands and Sweden (data not shown). In the Netherlands, the short time difference is partly explained by the fact that certain indications of immunotherapy medicines are automatically covered on EMA authorisation as a result of special agreements (Lawlor et al., 2021[21]). Longer mean periods of more than 3 years were reported in Cyprus, Latvia and Lithuania, and periods of more than 500 days were reported in Czechia, Hungary, Poland and Portugal (see also Chapter 1). Observed delays are in many cases longer than the 180 days maximum defined in the Transparency Directive for EU countries' reimbursement and pricing procedures. However, in this study, the time measured includes “clock stops” during which pharmaceutical companies are asked to provide additional information. Therefore, these delays cannot be interpreted purely as administrative processing time.

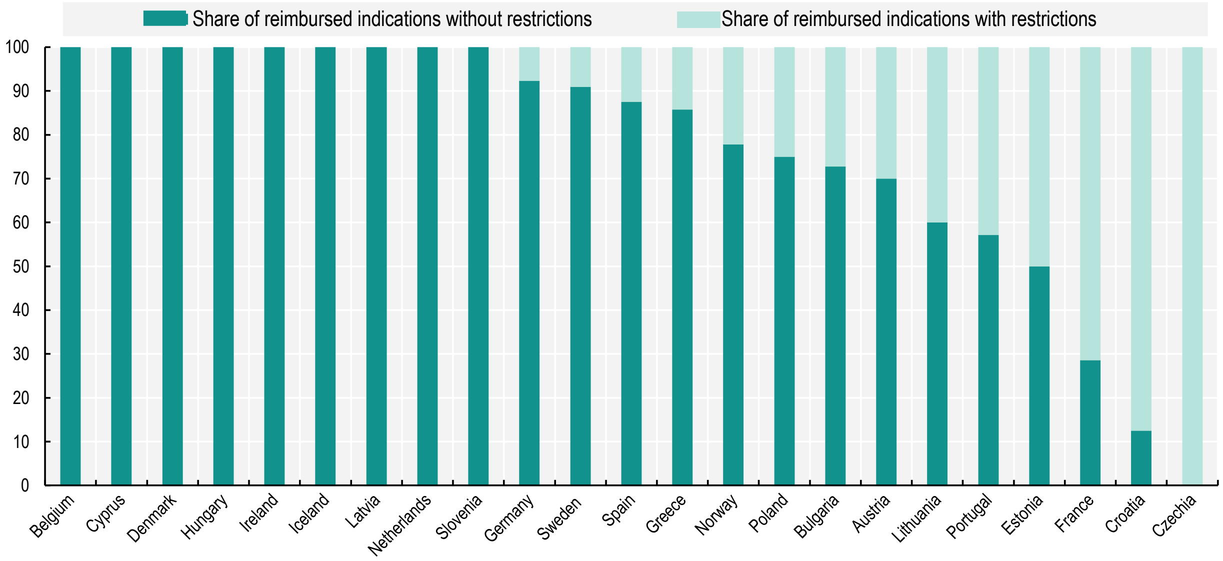
Future timelines for assessment of new cancer medicines and extensions of their indications might see improvements in individual countries. The adoption of Regulation (EU) 2021/2 282 on health technology assessment (HTAR) as part of the EU Pharmaceutical Strategy mandates joint clinical assessments and joint scientific consultations of patients, clinical experts and other relevant experts (European Commission, 2023[22]). This will apply to all new cancer medicines as of 12 January 2025. Joint European HTA and cross-border joint procurement are also good policy options to expedite public reimbursement/coverage decisions in the context of rising cancer medicines costs. Joint evaluations of the (relative) effectiveness of selected cancer medicines by regional collaborations, such as Beneluxa (among Belgium, the Netherlands, Luxembourg, Austria and Ireland) and FINOSE (among the Nordic countries excluding Iceland) have already been conducted. These voluntary collaborations on HTA between European countries might also see changes as a result of the HTAR (OECD, 2020[17]).

At the same time, value frameworks such as the European Society for Medical Oncology (ESMO)-Magnitude of Clinical Benefit Scale (MCBS) have been developed to support the process of HTA and to assist in rationalising reimbursement decisions. The ESMO-MCBS value framework offers a grading system of new indications of cancer medicines and the relative magnitude of clinical benefit that can be anticipated from data derived from pivotal clinical trials or meta-analyses. ESMO proposed the MCBS to be used as a tool to support the process of prioritisation of access to cancer medicines by national health authorities when resources are constrained (Cherny et al., 2015[23]; Cherny et al., 2017[24]). New medicines with a potentially high clinical benefit could be reviewed on a fast-track basis, whereas new medicines with a potentially low clinical benefit could de-prioritised.

Some countries restrict reimbursement of oncology medicines to smaller patient populations than those defined in the market authorisation

The reimbursement and coverage decision for a cancer medicine/indication might entail some restrictions to the eligible patient population as defined by the EMA. Restrictions can include criteria related to a patient’s health condition, the stage of treatment, the duration of therapy or a specific threshold for gene expression. This means that the national eligible patient population would be smaller than the patient population defined in the marketing authorisation. The purpose of these restrictions is to limit the uncertainty of clinical effectiveness in the patient group and/or to limit the budget impact (Hofmarcher et al., 2023[25]). Several countries did not report any restrictions to their reimbursed indications, while Estonia, France and Croatia reported that more than half of all reimbursed indications had restrictions, and Czechia reported that all indications had restrictions (Figure 5.6). This information had already been reported in previous studies in Czechia, Poland, Hungary and the Slovak Republic (Hofmarcher et al., 2023[25]).

Figure 5.6. The share of indications of newer cancer medicines with restricted coverage compared to the market authorisation population varies across countries



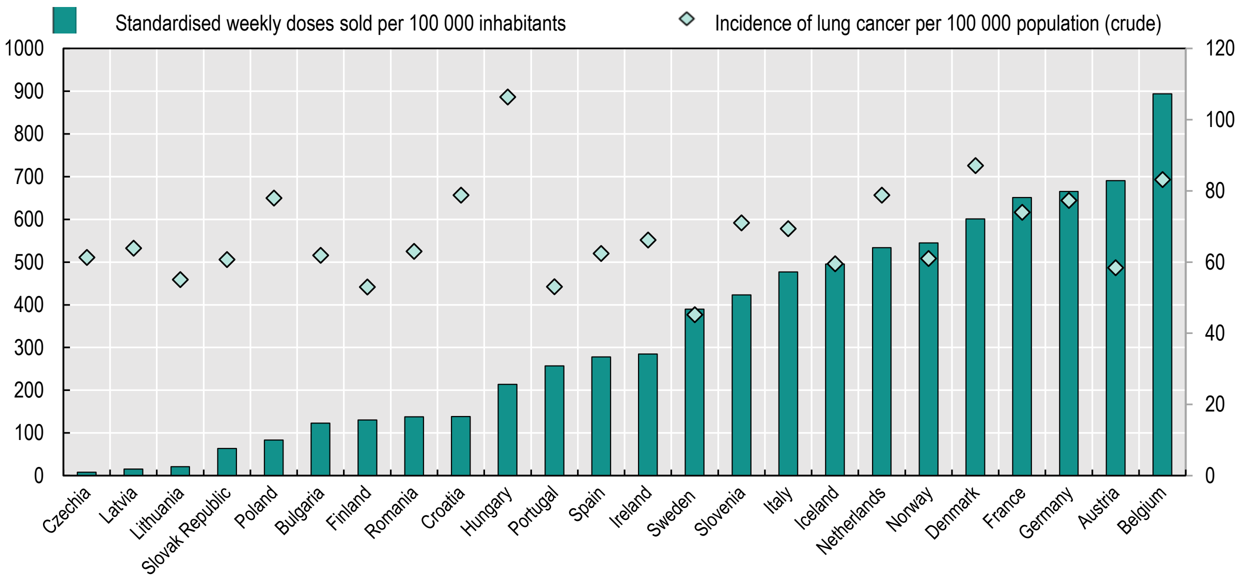
Notes: A total of 24 countries responded to the pilot data collection. Malta is missing because it reimbursed none of the indications studied. Restrictions in reimbursement/coverage were defined as any restriction/limitation in the public reimbursement list on 1 April 2023 compared to the text of the approved indication by the EMA.
Source: 2023 pilot data collection on access to cancer medicines in EU countries.

Central and Eastern European countries tend to have lower use of novel cancer medicines as measured in both cost and volume

Agreed reimbursement/coverage of medicines does not necessarily mean that patients have access to them when seeking care. Countries with high levels of reimbursement/coverage may still be characterised by low use in clinical practice. The use of cancer medicines in terms of costs has been shown to vary widely across countries. Expenditure on all cancer medicines – among countries with complete data – ranged from EUR 13 per capita in Latvia to EUR 108 per capita in Austria in 2018. Countries in Western Europe tended to have the highest expenditure, followed by countries in Northern and Southern Europe, whereas countries in Central and Eastern Europe tended to spend the least (Hofmarcher et al., 2019[18]).

A comparison of the use of medicines in volumes (milligrams) corroborates these findings. An examination of uptake of immunotherapies for lung cancer treatment across Europe suggests much lower utilisation in Central and Eastern European countries (Figure 5.7). Among countries with complete data, Belgium had the highest utilisation, whereas Czechia, Latvia and Lithuania recorded almost no utilisation at all, despite patient needs being roughly equivalent across countries – as approximated by the incidence of lung cancer. Apart from vast country differences in the use of immunotherapies, the analysis (Hofmarcher et al., 2019[18]) also showed that large differences are apparent in cancer types that have seen the recent introduction of many new medicines, such as multiple myeloma and prostate cancer. In contrast, there are much smaller differences in the use of certain older medicines – such as trastuzumab in breast cancer – yet even for these medicines there is a tendency of lower utilisation in Central and Eastern European countries compared to other countries.

Figure 5.7. Uptake of immunotherapies by volume in 2018 was much lower in Central and Eastern European countries



Notes: Data for Cyprus, Estonia, Greece, Luxembourg and Malta are not available. Data for Czechia are incomplete and hence underestimated. Four medicines (atezolizumab, ipilimumab, nivolumab and pembrolizumab) are included. Standardised weekly doses were calculated based on data on milligrams of medicines sold. For each medicine, the total amount of milligrams sold was standardised to the weekly recommended dose in milligrams per patient, which yields the number of weekly doses sold. The weekly doses sold for all medicines were summed up and then divided by the number of inhabitants. Lung cancer incidence is used as an indicator of patient needs for immunotherapy across countries.
Source: Hofmarcher et al. (2019[18]).

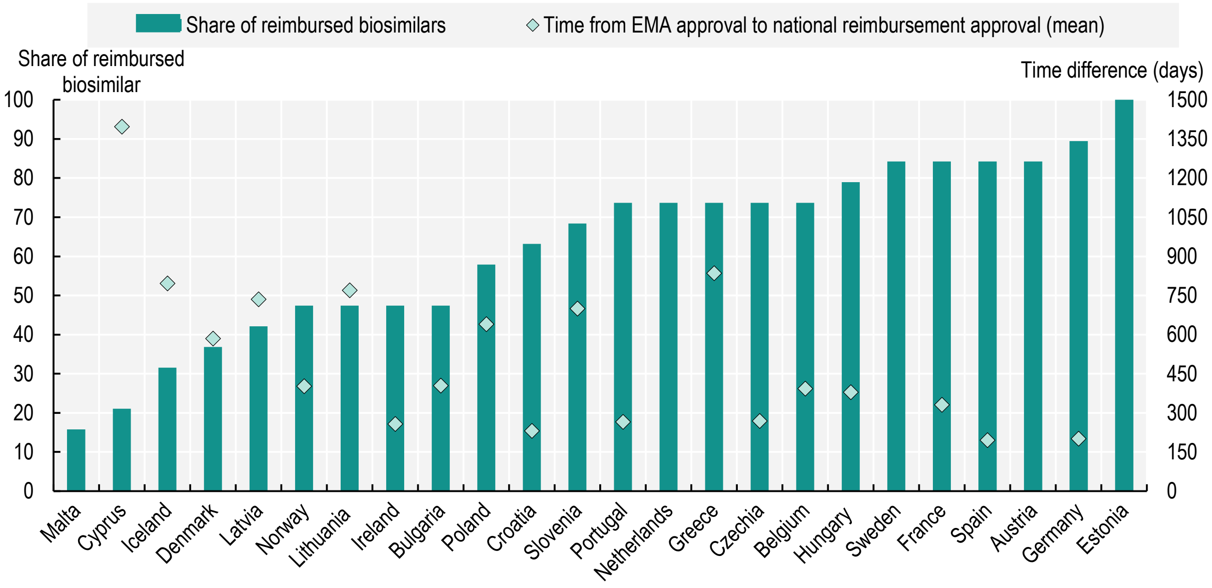
It is also important to note that to improve access to novel cancer medicines, countries most often use early access schemes or programmes (and disregard compassionate use programmes regulated by Article 83 of Regulation (EC) No 726/2004 in EU countries). Early access schemes make a medicine available to a patient prior to marketing authorisation and/or the publicly funded coverage/reimbursement decision in a country. These schemes generally apply to promising medicines used in severe conditions with high unmet need and no therapeutic alternatives; see a recent OECD report for a more detailed general description (Chapman, Szklanowska and Lopert, 2023[26]). Early access schemes for cancer medicines existed in 13 of the 26 responding countries to the 2023 OECD Policy Survey on Cancer Care Performance.

> *While patent expirations in oncology are expected to alleviate part of the financial pressure, there are still important country differences in the proportion of biosimilars being reimbursed*

Encouraging the entry and use of generics and biosimilars when the originator product has gone off patent or lost market exclusivity is becoming increasingly important in lowering prices for oncology treatments (Godman et al., 2019[27]), helping to redirect financial resources to pay for newer medicines and to improve financial sustainability. The 2023 pilot data collection on access to cancer medicines in EU countries revealed significant differences in the share of 19 biosimilars for three reference medicines (bevacizumab, rituximab, trastuzumab) with public reimbursement/coverage across the responding countries (Figure 5.8). In Estonia, all biosimilars are used in hospitals, and the particular brand used depends on tender results. In Malta, only three biosimilars (16%) – one for each reference medicine – are available in the government Formulary List,[4] following a competitive procurement procedure. All countries with the exception of Cyprus had at least one reimbursed biosimilar for each of the three medicines. Previously, Cyprus had only reimbursed biosimilars for two of the three medicines, but one for bevacizumab was added in May 2023.

The mean time from EMA approval to public reimbursement/coverage of biosimilars also exhibited great variation between countries, ranging from around 200 days in Germany and Spain to between 700 and 835 days in Greece, Iceland, Latvia, Lithuania and Slovenia, and almost 1 400 days in Cyprus. Countries with a higher share of publicly reimbursed/covered biosimilars tended to have shorter time periods between EMA approval and public reimbursement/coverage.

Figure 5.8. The share of biosimilars for cancer medicines with public reimbursement/coverage and the time between EMA approval and reimbursement/coverage vary widely



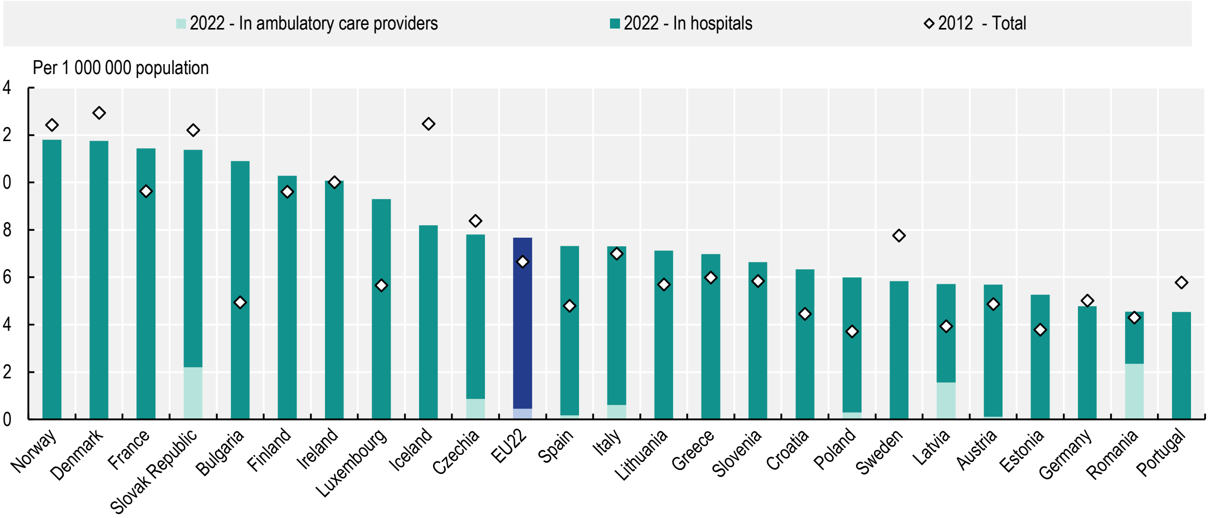
Notes: A total of 24 countries responded to the pilot data collection. Nineteen biosimilars of three cancer medicines (bevacizumab, rituximab, trastuzumab) with active marketing authorisation by the EMA as of 26 March 2023 were included in the analysis. The public reimbursement/coverage status in the countries shows the situation on 1 April 2023. The mean time difference was calculated based on the number of biosimilars with valid reimbursement on 1 April 2023. For Austria, Estonia, Malta, the Netherlands and Sweden, no data on reimbursement dates were provided.
Source: 2023 pilot data collection on access to cancer medicines in EU countries.

5.3.2. Access to medical equipment is uneven due to old equipment and unbalanced distribution in some countries

The availability of medical equipment has improved, but ageing equipment and equitable access are challenges

Reflecting the growing trends of cancer incidence and prevalence (Chapter 2), the availability of medical equipment has improved over the past decade. The volumes of radiotherapy equipment per population have increased by 14% on average in EU countries over the last 10 years. The most notable increase was in Bulgaria, where the volume more than doubled between 2012 and 2021 (OECD, 2023[28]), becoming one of the highest in Europe after Norway, Denmark, France and the Slovak Republic (Figure 5.9). In Hungary, providers have historically received limited public financing for the purchase, maintenance and renewal of medical equipment. Recently, however, several centres have received funds to replace radiation therapy equipment that is over 10 years old (OECD, 2023[29]), increasing the share of new equipment (Box 5.3). The availability of computerised tomography (CT) scanners and magnetic resonance imaging (MRI) units has also increased in almost all EU+2 countries over the last 10 years. The increases were notable in Romania, where the number of CT scanners per population doubled, and in Norway, where the number of MRI units per population increased more than seven-fold. The increase was also substantial in Latvia, where the numbers per population have increased by about 30% for CT scanners and 80% for MRI units since the implementation of the first National Cancer Control Programme in 2009 (OECD, 2023[30]).

Figure 5.9. Volumes of radiation therapy equipment per population vary three-fold across EU+2 countries

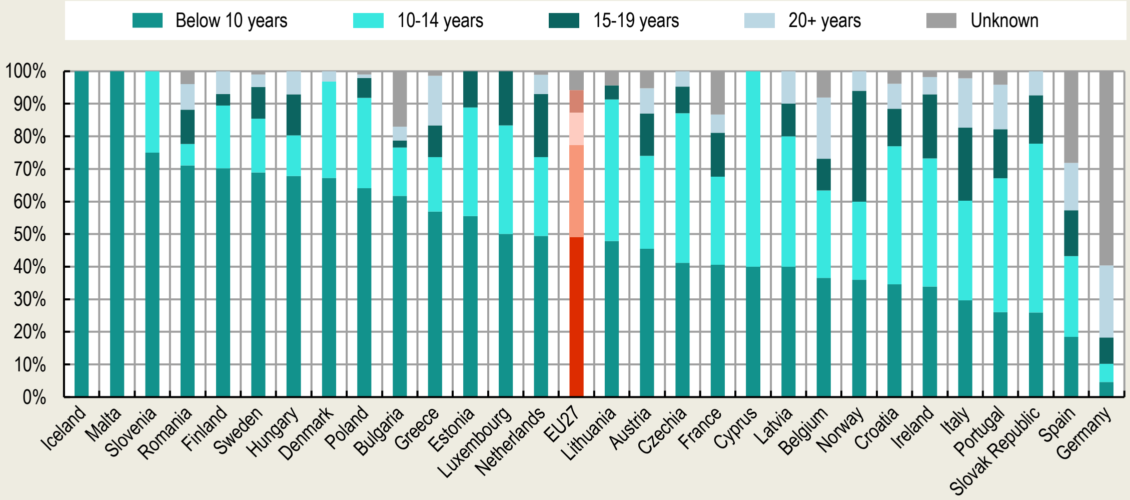


Notes: Data refer to the nearest available year. Radiation therapy equipment includes linear accelerators, Cobalt-60 units, Caesium-137 therapy units, low to orthovoltage X-ray units, high-dose and low-dose rate brachytherapy units and conventional brachytherapy units.
Source: OECD Health Statistics 2023, https://doi.org/10.1787/health-data-en.

Box 5.3. The latest medical equipment is not always available in some EU+2 countries

Although the use of outdated equipment is not recommended, old equipment is used widely in some EU+2 countries. The World Health Organization (WHO) reported that the optimal lifespan of radiotherapy equipment is usually 10-15 years (WHO & IAEA, 2021[31]), and COCIR – the European Trade Association representing the medical imaging, radiotherapy, health information and communication technology and electromedical industries – defined 12 years as the maximum lifespan of equipment, beyond which ideally it should not be in use (COCIR, 2019[32]). In Belgium, Germany, Ireland, Italy, the Netherlands, Portugal and Spain, however, about one-quarter of radiation therapy equipment is more than 15 years old (Figure 5.10).

Figure 5.10. On average in the EU27, 17% of particle therapy equipment is more than 15 years of age



Source: IAEA (2022[33]), *DIrectory of RAdiotherapy Centres (DIRAC)*, https://dirac.iaea.org/ (accessed on 4 October 2023).

The availability of other equipment, such as robot-assisted surgery, has been also expanded over time across countries. Robotic surgery has been shown to lead to faster recovery and shorter hospital stays; less scarring; and lower likelihood of infections at the surgical site, blood loss and postprocedural pain. For colorectal cancer, robotic surgery allows difficult-to-access sites (such as a narrow pelvis) to be reached, and helps patients retain sexual and urinary function following surgery (Avram et al., 2023[34]). Data from the Medicare population in the United States showed that robotic prostatectomy was associated with four times lower odds of receiving a blood transfusion, and three times lower odds of prolonged hospital stay compared to the traditional open procedure (Gandaglia et al., 2014[35]). In stomach cancer patients, in addition to less invasive endoscopic mucosal resection and endoscopic submucosal dissection (which have become available to detect and treat early gastric cancer), robotic surgery has been used and found to be associated with lower rates of intra-abdominal infection complications (4.4% versus 9.4%) while keeping survival rates similar to those for laparoscopic surgery (Hikage et al., 2021[36]). Robot-assisted surgery is also used in pancreatic, head and neck, kidney, bladder and gynaecological cancers, among others.

According to the 2023 OECD Policy Survey on Cancer Care Performance, 21 of the 26 responding countries used robotic or robot-assisted surgery that utilises artificial intelligence. For example, in France, surgical robots have been used for breast, ear, nose, throat, thyroid, gynaecological and digestive cancers, and Germany, Ireland and Slovenia have introduced robot-assisted surgery for prostatectomy. In other OECD countries, Canada also offers robot-assisted surgery for certain types of cancer surgery, including rectal, gynaecological, prostate and kidney cancers, and is studying the cost-benefit ratio for other types of cancer. While robotic and robot-assisted surgery are not currently used in Croatia, Estonia and Lithuania, these countries are exploring their use in the near future.

National cancer plans have been a catalyst for investment in technology in several countries. In Hungary, under the National Cancer Plan, investments were made in new molecular pathology tests, radiotherapy procedures and robot-assisted surgery, and these procedures have become publicly available in recent years (OECD, 2023[29]).

Although within-country differences in the supply of medical equipment have decreased over time, unequal distribution of medical equipment remains, leading to unequal access to medical technologies including the latest clinical procedures across population groups in a few countries. In Cyprus, for example, the majority of medical equipment is in private sector institutions, leading to long waiting times for public healthcare services and financial barriers to access for lower income groups (OECD, 2023[37]). In Spain, six provinces and the two autonomous cities (Ávila, Huesca, Palencia, Segovia, Soria, Teruel, Ceuta and Melilla) do not have radiotherapy units in their territories, creating substantial barriers to access to cancer care among vulnerable groups due to long journeys or accommodation costs (OECD, 2023[38]).

> *Countries need to take comprehensive approaches to optimise the use of medical technologies*

Shortages and unequal distribution of medical equipment can lead to delayed diagnosis and treatment of cancer, but investment in purchasing equipment is not always sufficient to ensure timely access. In Sweden, a recent review of radiation therapy points to restrictions on utilisation of the equipment because of a lack of radiation oncologists and specialist nurses (Bergfeldt et al., 2022[39]). Similarly, in Poland, increases in equipment have not been matched with sufficient supplies of specialised medical personnel capable of performing radiotherapy (OECD, 2023[40]).

To ensure timely access to and optimal use of medical equipment, comprehensive approaches are needed. Countries need to invest not only in purchasing and renewing equipment but also in maintaining it, and adequate workforce capacity and organisation of cancer care delivery also need to be sought. To improve access to high-quality radiation therapy, Belgium, for example, established the Iridium Network, a highly specialised radiotherapy network based on a multidisciplinary approach. The Network, which involves eight partner hospitals, makes structured collaboration possible between doctors from different hospitals in the Greater Antwerp and Waasland area (OECD, 2023[41]), facilitating access to radiation therapy among cancer patients.

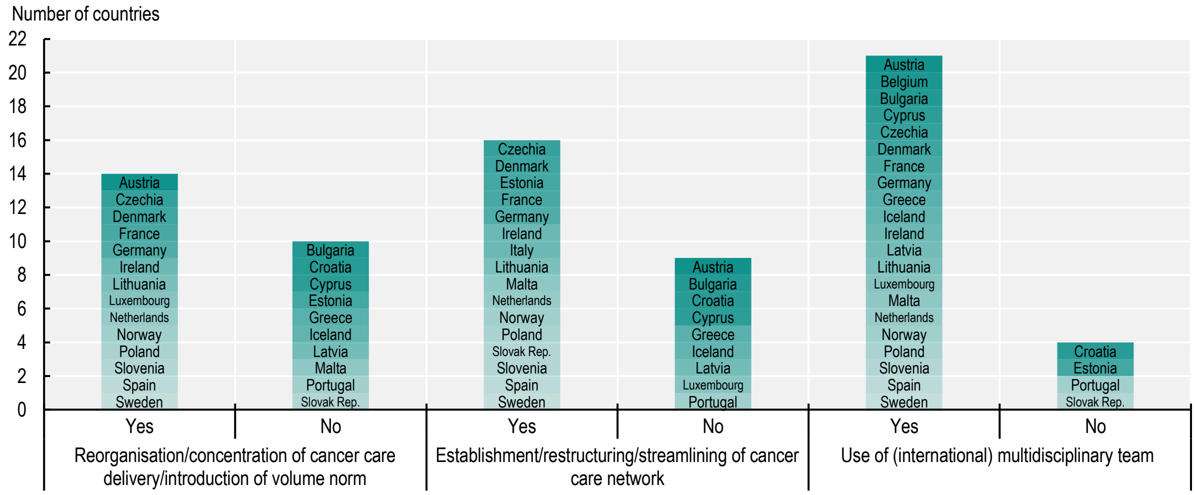
5.4. Organisation of cancer care delivery is improving through care concentration, structured networks, multidisciplinary teams and better availability of home care

5.4.1. Half of EU+2 countries have concentrated cancer care delivery

The clinical benefits of concentration of care are well known: a higher volume of cases that hospitals or doctors treat is known to be associated with a lower risk of perioperative morbidity and mortality (Weitz et al., 2004[42]), better long-term outcomes (Hillner, Smith and Desch, 2000[43]) and higher quality of end-of-life care (Morishima et al., 2013[44]). For example, a recent study found that patients in Ireland with rectal cancer treated at a cancer centre had significantly higher five-year cancer-specific survival probabilities (81.1%) versus those not treated at cancer centres (76.3%) (O'Connell et al., 2022[45]). Furthermore, higher surgeon volume is found to be associated with lower costs for cancer surgical procedures such as pneumonectomy, esophagectomy and pancreaticoduodenectomy (Ho and Aloia, 2008[46]). However, a systematic review found that the overall economic impact of centralisation is unclear, as it also results in greater costs of accessing cancer care by patients and their carers (Ke, Hollingworth and Ness, 2012[47]).

About half of the 26 countries responding to the 2023 OECD Policy Survey on Cancer Care Performance had concentrated cancer care delivery (Figure 5.11). This had often involved established comprehensive cancer centres, which serve as a vital hub that bridges the gap between research and clinical care, and aim to provide state-of-art cancer care (Oberst, 2019[48]).

Figure 5.11. Most countries have sought efficient ways of providing high-quality care in recent years



Note: Information is not available for Belgium (apart from "Use of (international) multidisciplinary team"). According to (OECD, 2023[29]), Hungary has also concentrated cancer care.
Source: 2023 OECD Policy Survey on Cancer Care Performance.

Among the countries that concentrate cancer care, several had established vertically structured cancer care delivery systems:

- In Austria, the most specialised treatment is provided by oncology reference centres, which should have a catchment area of at least 500 000 people and be reachable by any patient in the area within 120 minutes; and specialist centres, which cover at least 300 000 people within 60 minutes. Associated oncology centres mainly support specialist centres with diagnosis, referral and continuity of care, as do office-based specialists. Research, teaching and treatment of rare cancers and high-risk patients are centralised at reference centres (OECD, 2023[49]).
- In Hungary, cancer care delivery is structured and provided at national, regional and county centres. The National Institute of Oncology provides care for rare cancers, and four regional centres provide comprehensive care for medium-incidence cancers. Complex and rare procedures – including recently introduced molecular pathology tests and robot-assisted surgery – are provided in these national and regional centres. County centres, located in each of 19 counties, are responsible for provision of care for high-incidence cancers, and 14 of these also operate as radiotherapy centres (OECD, 2023[29]).

- In Germany, there are 15 certified comprehensive cancer centres, which constitute the third tier and provide care for a broad spectrum of cancer types across all clinical aspects. They also lead research and teaching. Certified oncology centres (currently 141) constitute the second tier and provide care across several cancer types and specialties. At the first tier, 1 130 certified organ cancer centres specialise in one cancer type or specialty (OECD, 2023[50]).

Centralisation of cancer care in sites has been credited with great improvements in paediatric cancer outcomes over the last decades (American Academy of Pediatrics, 2014[51]). A study including Belgium, Bulgaria, Finland, Ireland, the Netherlands and Slovenia found that survival outcomes were significantly better if treatment was mainly given at hospitals with high volumes of patients, particularly for central nervous system tumours (Gatta et al., 2019[52]). A recent study also found that centralisation of cancer care led to improvement in outcomes of paediatric cancers in the Netherlands (van der Steeg et al., 2023[53]). Reflecting these findings, among the countries that reported having concentrated cancer care, almost all reported that care for rare cancers including paediatric cancers is centralised. In Lithuania for example, paediatric cancer care is concentrated in two centres (OECD, 2023[54]). In Ireland, all children are referred to the national Paediatric Haematology and Oncology Centre at Children's Health Ireland on diagnosis, to establish treatment and follow-up plans in a centralised manner (OECD, 2023[55]).

In countries with a small population size, however, concentration of care for rare cancers does not lead to accumulation of sufficient knowledge and expertise due to the low number of cases. Some of these benefit from expertise accumulated abroad for rare cancers including paediatric cancer (Box 5.4).

Box 5.4. Countries seek international collaboration to care for patients with rare cancers

Countries with low population numbers – including Austria, Denmark, Estonia, Iceland and Norway – can benefit from international collaboration to improve access to care, particularly for rare cancers. In **Austria**, treatment of rare cancers is subject to the National Action Plan for Rare Diseases, which ensures access to treatment at hospitals in the European Reference Networks (OECD, 2023[49]). In **Estonia**, doctors can rely on international collaboration when skills or equipment are lacking – as in the case of proton therapy, which plays an important role in paediatric cancer and is not currently available in the country (OECD, 2023[56]). For rare cancers, including childhood cancers for which specific treatment is not available, **Iceland** actively collaborates with university hospitals in Scandinavian countries – particularly in Sweden. To ensure access to care for rare cancers abroad, funding is made available to cover travel and healthcare costs (OECD, 2023[12]). In **Norway**, patients are entitled to treatment abroad for rare cancers or others with expertise gaps, and the government funds treatment in hospitals abroad if the patient meets the requirements (OECD, 2023[57]). **Denmark** also allocated additional funding for referrals abroad in 2023.

To improve treatment outcomes, some countries focus on centralising the delivery of specific cancer care at certain centres. Belgium, for example, delivers pancreatic surgery, complex oesophageal surgery and breast cancer care in a concentrated and centralised manner (OECD, 2023[41]). In Portugal, resources for radiation therapy are concentrated in ten high-volume centres (Directorate-General for Health, 2019[58]), and complex stereotactic treatments are concentrated in five centres (OECD, 2023[6]).

In a few countries, including Czechia, France, Germany, the Netherlands and Spain, a volume norm is set to pay for cancer care or for a facility to be authorised to deliver certain treatment, contributing to cancer care concentration:

- In Germany, hospitals are allowed to provide certain plannable services if the minimum volume is expected to be achieved in the next calendar year based on justified volume expectations. The annual minimum quantity per hospital site is, for example, 20 for complex interventions on the pancreas organ system for adults, 40 for allogeneic stem cell transplantation, 75 for thoracic surgical treatment of lung cancer in adults and 100 for surgical treatment of breast cancer (Gemeinsamen Bundesausschusses, 2023[59]). Furthermore, centre regulation by the Joint Federal Committee requires minimum case numbers, and OnkoZert – a voluntary certification programme of the German Cancer Society – stipulates minimum case numbers for their certification requirement (OECD, 2023[50]).

- In the Netherlands, following the advice of the Quality of Cancer Care Taskforce of the Dutch Cancer Society about the importance of concentrating complex services in specialised settings with adequate resources, expertise and volumes to enhance quality of care, formal agreements were established on minimum patient/procedure volumes in 2007. Currently, minimum volumes are determined by Oncology-SONCOS (Foundation of Co-operation in Oncology), which is part of the Federation of Medical Specialists. Monitoring of volume norms occurs for some cancer types as part of quality assessment by the Dutch Institute of Clinical Auditing (OECD, 2023[60]).

Organisation and delivery of cancer care has been an important feature in a number of countries' national cancer plans. In Spain's 2021 update to its National Cancer Strategy, a key priority area is centralisation of care for rare and paediatric tumours and for highly complex procedures (OECD, 2023[38]). In order to centralise care expertise, Estonia's Cancer Control Plan 2021-30 set a target that 95% of patients with a haematological cancer should be diagnosed in a cancer centre (OECD, 2023[56]).

5.4.2. Over half of EU+2 countries have established cancer care networks to provide high-quality care

Cancer care networks provide a structure for healthcare providers, including individual professionals, to work closely across care settings and professional types. They facilitate better co-ordination and flow of knowledge about high-quality care between organisations and individuals, and are associated with improved access to and quality of cancer care (Brown et al., 2016[61]). For example, according to a study in France (Ray-Coquard et al., 2005[62]), the rate of compliance with clinical guidelines increased significantly for breast cancer (from 12% to 36%) and colon cancer (from 14% to 46%) at regional cancer network hospitals after dissemination of clinical practice guidelines, while such improvement was not observed in hospitals that were not part of the cancer network. Another study in Scotland (United Kingdom) found that managed clinical networks led to significant improvements in waiting times between referral and initial assessment, and in the proportion of patients undergoing appropriate diagnostic procedures (McCullough et al., 2014[63]).

Given these benefits, networks of clinical experts have regularly been established in Europe, and over half of EU+2 countries have created cancer care networks in recent years to promote evidence-based practice and drive improvement in standards of patient care (see Figure 5.11). However, networks are organised differently across countries. In some countries – including Czechia, France and Italy – cancer care networks are organised horizontally across providers at regional levels to improve quality of cancer care, including care co-ordination:

- In Czechia, accredited comprehensive cancer centres form and lead networks called regional oncology groups; within these, oncology care providers co-operate with each other, consult on treatment decisions and co-ordinate follow-up care. Contractual co-operation of cancer centre providers with a regional oncology group promotes compliance with common clinical protocols and guidelines and a standardised oncology care management system. Since 2019, GPs are also included in these collaborative oncology networks, as they have started to gain new competencies for monitoring patients with a history of cancer (OECD, 2023[10]).
- In Italy, regional oncological networks of care were established in 2019 with the aim of ensuring a multidisciplinary approach to cancer care. Networks consist of care providers with different specialisations that co-ordinate care to ensure adequate access to the most appropriate services – from prevention and diagnosis to treatment and palliative care (OECD, 2023[64]).

- The National Cancer Institute in France published new organisational guidelines for regional cancer networks and created one network per region, with the aim of co-ordinating the organisation of healthcare services at a regional level.

At the national level, networks sometimes focus on specialised cancer care – such as for rare cancers – to optimise the use of expertise, which is limited within countries. Rare cancers represent approximately one-quarter of all cancers, and their treatment often encounters common issues such as lack of expertise and quality of care, discrepancies in outcomes and limitations in research (Frezza et al., 2019[65]). To address these issues, the European Reference Networks (ERNs), established in 2017, facilitate cross-border collaborations between specialists for diagnosis and treatment of low-prevalence complex diseases, including rare cancers (Héon-Klin, 2017[66]). ERNs for rare cancers[5] aim to increase equity in access to care in Europe.

The majority of EU+2 countries take part in these ERNs. In Germany, for example, comprehensive cancer centres and certified oncology centres treat patients with rare cancers; they are typically part of ERNs and participate in clinical studies (OECD, 2023[50]). Portugal has also established reference centres for the management of seven oncological specialisations, including paediatric cancer. Other countries have established networks specific to rare cancers at the national level, such as France (OECD, 2023[67]) and Italy (OECD, 2023[64]). Lastly, several countries have also developed a network for specific types of cancer care, including Poland (for breast, lung, ovarian, colon and prostate cancers, and palliative care), Portugal (for palliative care) and Slovenia (for skin melanoma).

At the European level, additional networks are being established to promote high-quality cancer care across countries. The Joint Action on network of Comprehensive Cancer Centres (CraNE) currently undertakes preparatory activities with the aim of creating an EU network linking recognised national comprehensive cancer centres by 2025, as defined in Flagship 5 of Europe's Beating Cancer Plan. The network aims to facilitate uptake of high-quality diagnosis and treatment, including training, research and clinical trials across European countries (European Commission, 2022[68]). To bring together the best resources available in Europe, the EU Joint Action on Networks of Expertise (JANE) also plans to establish seven new EU networks of expertise in areas such as personalised primary prevention, survivorship, palliative care, omic technologies,[6] high-tech medical resources, complex and poor prognosis cancers, and adolescents and young adults with cancer.

5.4.3. Over two-thirds of EU+2 countries provide cancer care in multidisciplinary teams

Multidisciplinary teams (MDTs) have been recommended for cancer treatment and care, as they improve the quality of care and outcomes (Selby et al., 2019[69]). According to a systematic review, MDTs resulted in improved patient outcomes in terms of diagnosis, treatment planning and patient satisfaction, and in improvements in survival probabilities for various cancers including colorectal, head and neck, breast, oesophageal and lung cancers (Prades et al., 2015[70]). MDT practice is also helpful in alleviating shortages in the cancer health workforce and in facilitating provision of integrated cancer care. However, providing MDTs entails considerable costs, and studies on their cost effectiveness are still limited and not yet conclusive (Ke et al., 2013[71]; Edney, Gray and Karnon, 2020[72]).

According to the 2023 OECD Policy Survey on Cancer Care Performance, 21 of the 26 responding countries use MDTs – typically including oncologists, surgeons, radiologists and pathologists – to provide high-quality cancer care in an efficient and effective manner (Figure 5.11). In Luxembourg, through the country's first National Cancer Plan, multidisciplinary oncology consultation boards were developed in 2016 to facilitate evaluation and improvement of practice. There are formal MDT boards for common cancer types at hospitals and specialised MDT boards for rare cancers and complex cases at the National Cancer Institute (OECD, 2023[73]). In the Netherlands, all new diagnosed cancer cases are discussed in MDT meetings organised according to the type of cancer. The meetings aim to establish comprehensive and inclusive decision-making processes for people with cancer, to strengthen communication between specialists on managing evidence-based treatment and to ensure timely initiation of treatment. MDTs also work in palliative care (OECD, 2023[60]). In Slovenia, weekly online multidisciplinary tumour boards and consultations are organised in bigger secondary and tertiary hospitals for all cancer types, where the majority of cancer cases are presented by treating physicians to determine their optimal care (OECD, 2023[9]). Additionally, as illustrated in Section 5.2.2, some countries – including Czechia, Ireland and Latvia – have enhanced inter-speciality training among different healthcare professionals to improve the availability of high-quality multidisciplinary cancer care.

To facilitate multidisciplinary learning and practices in cancer care, some countries have expanded the use of teleconsultation, as in Croatia, Estonia, and the Slovak Republic, for example. In the Slovak Republic, plans were made to establish an online platform for multidisciplinary tumour boards based at the National Cancer Institute. This platform can be consulted by oncologists throughout the country, and can facilitate care co-ordination among cancer care providers, improving the quality of cancer care across regions (OECD, 2023[28]). In other OECD countries, Canada has implemented connected models of care that support improved care co-ordination between cancer specialists and primary care providers, multidisciplinary clinics and cancer care networks. These bring together multiple care specialties and expanded use of virtual technology to support virtual consultations, patient navigation and other areas of care.

5.4.4. Countries are expanding availability of home care

To respond to the needs of patients whose preference is to receive care in the community where they live, countries are expanding availability of cancer care in home settings. Using video consultations, healthcare professionals provide follow-up care to their patients at home after surgery, examine the healing process of a surgical wound or have a psychotherapeutic conversation. Uptake of telemedicine has accelerated recently, particularly since the COVID-19 pandemic. In Hungary, the National Cancer Plan describes specific objectives, actions and measures for general psycho-oncological support, and stresses the need to leverage telemedicine and other digital solutions in cancer care (OECD, 2023[29]). France also has several ongoing projects to support home care, such as the use of telemonitoring for patients on oral therapies based on wearable devices, which allow MDTs to monitor side effects and pain management. In Germany, legislation and regulations were further developed for the use of video consultations, teleconsultations and tele-expertise, which are also used in cancer treatment.

Home palliative care is also becoming available in an increasing number of EU+2 countries, including Belgium, Cyprus, Czechia, Estonia, France, Hungary, Iceland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Poland, Slovenia, Spain and Sweden. In the Netherlands, palliative care is mainly organised at the community level. It is led by GPs and nurses, who are mainly responsible for providing home palliative care, while palliative care specialists are available to support and share their expertise if needed (OECD, 2023[60]). In Spain, palliative care is implemented at the regional level and is covered throughout the country by the National Health Service. In Czechia, 15 accredited comprehensive cancer centres have a contract for palliative home care, and since 2017 coverage of mobile palliative care teams providing home care has been covered by the country's health insurance funds (OECD, 2023[10]). France made a large investment to expand home palliative care in recent years: the 2021-24 National Plan for the Development of Palliative Care and Support at the End of Life aims to guarantee access for all citizens as close as possible to where they live. It allocated EUR 5 million to healthcare facilities to strengthen mobile palliative care teams, and an additional EUR 3 million to regional health agencies to provide palliative care support systems accessible by health professionals practising at home (OECD, 2023[67]).

Despite these recent expansions, however, availability of and access to home care are still suboptimal in most EU+2 countries. In Cyprus, for example, only one voluntary non-governmental organisation provides palliative care at home to patients and families via the nurses it employs (OECD, 2023[37]), and in Italy, access to palliative care at home is limited in some regions, resulting in regional disparities (OECD, 2023[64]).

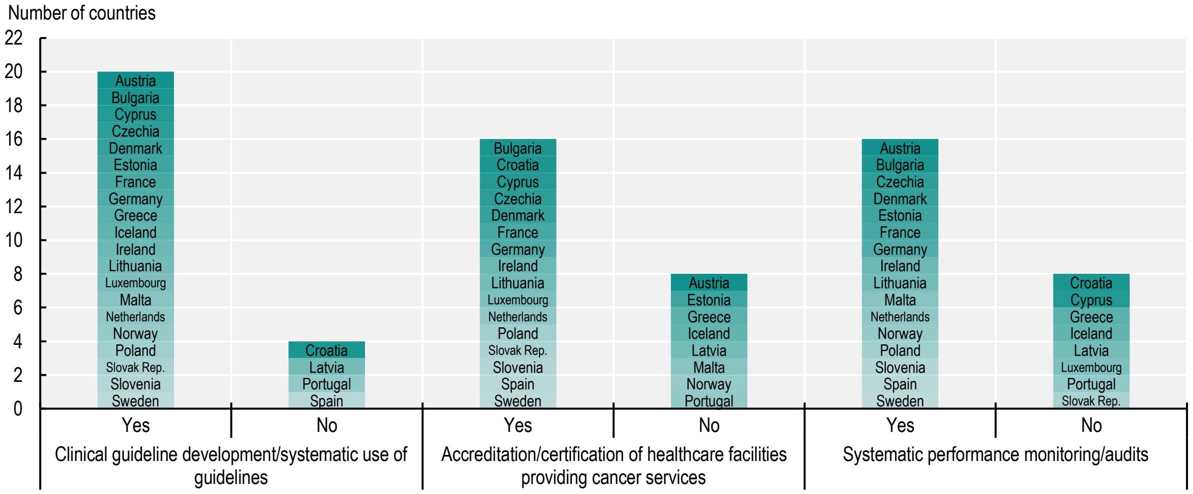
5.5. Countries need to intensify efforts to deliver high-quality people-centred cancer care

5.5.1. Two-thirds of EU+2 countries have developed and use clinical guidelines for standardised delivery of high-quality cancer care

Clinical guidelines are key to providing standardised high-quality cancer care across providers throughout a country, and 20 of the 26 countries responding to the 2023 OECD Policy Survey on Cancer Care Performance reported having developed clinical guidelines for cancer care (Figure 5.12). Among these, several countries have taken a systematic approach to developing clinical guidelines for cancer care. In Germany, for example, the National Guideline Programme of Oncology, launched in 2008 by the Association of Scientific Medical Societies, brings together various specialist societies, the German Cancer Society and German Cancer Aid Foundation to formulate and maintain guidelines. Currently, 32 clinical guidelines in oncology are used at specialised cancer centres, in agreement with social health insurance funds, providing quality standards for all major cancer types across early detection, diagnosis, therapy, follow-up and palliative care (OECD, 2023[50]). In the Netherlands, national guidelines on care quality have been introduced over recent years for cancer care (including rare cancers), underpinned by an auditing system facilitated by the non-profit organisation the Dutch Institute of Clinical Auditing (OECD, 2023[60]).

Several countries benefit from clinical guidelines developed in other countries or at the international level. In Iceland, due to limited national capacity, professionals use international clinical guidelines, including those developed by the National Institute for Health and Care Excellence (United Kingdom), the National Comprehensive Cancer Network (United States) and specialist associations in Nordic and other European countries (OECD, 2023[12]). In Romania, European and international clinical guidelines are transposed into national recommendations (OECD, 2023[7]).

Figure 5.12. Most countries focus on clinical guideline development, accreditation and certification to improve cancer care quality



Note: Information is not available for Belgium and Italy.
Source: 2023 OECD Policy Survey on Cancer Care Performance.

5.5.2. Provider accreditation is commonly used to ensure high-quality cancer care

Provider accreditation has a positive impact on healthcare outcomes, such as process-related performance measures, safety culture, hospital efficiency (Hussein et al., 2021[74]) and hospital performance – including breast radiation and chemotherapy, and colon chemotherapy and nodal yield (Schroeder et al., 2022[75]). To improve quality of cancer care, 16 EU+2 countries use accreditation or certification mechanisms for healthcare facilities in cancer care (see Figure 5.12). In Spain, centres are designated as reference centres for rare cancers for adult and children during the accreditation procedure via onsite audits if criteria in relation to the volume of activity, initial and continuous training of professionals, specific resources (staff and equipment) and research are met (OECD, 2023[38]). Bulgaria accredits healthcare facilities that fulfil the requirements, related to equipment and presence of specialist staff, of the national medical oncology standard for provision of complex specialised services for cancer patients, including outpatient and hospital care, rehabilitation and registration (OECD, 2023[76]).

Over 65 cancer care centres in EU+2 countries are also accredited at the international level. The Organisation of European Cancer Institutes (OECI), the largest network of cancer centres and institutes in the world, developed the Accreditation and Designation Programme to provide equal access to high-quality cancer care for patients. The criteria used for this Programme include availability of a MDT, conducting research, and education and training functions (Boomsma et al., 2023[77]).

In a few countries, cancer care providers need to be accredited for reimbursement. Since 2019, Belgium's National Institute of Health and Disability Insurance reimburses complex pancreatic surgery provided at centres meeting certain criteria, and complex oesophageal surgery operations performed in an accredited centre (there are ten in total) or in a hospital meeting agreed criteria. In France, since the end of 2009, healthcare providers require authorisation by their regional health agency to treat cancer patients. The authorisation system is designed to guarantee the same level of safety, quality and accessibility of cancer care throughout the country (OECD, 2023[67]). In Bulgaria, a hospital with a contract with the National Health Insurance Fund is reimbursed for cancer care provided only if it fulfils the requirements of clinical standards and the clinical pathway set as part of accreditation (OECD, 2023[76]).

5.5.3. To reduce waiting times, at least one-third of EU+2 countries have set targets

Beyond developing fast-track pathways to improve timely cancer diagnosis (see Chapter 4 for more details), at least one-third of EU+2 countries have set waiting time targets to improve access to cancer care (Table 5.2). In most cases these are general guidelines across cancer sites; however, in some countries – such as Ireland and Luxembourg – the guidelines depend on the type of cancer. There are variations in maximum waiting times for the same service across countries. For instance, while Hungary has set waiting time targets of 2 weeks for CT and MRI scans in suspected cases of cancer, the maximum waiting time set for such diagnostic tests in Lithuania is twice as long (4 weeks). The use of waiting time targets is different. In some countries, such as Finland, providers are penalised if targets are not met. In Portugal, patients are able to choose alternative health providers – including in the private sector – if their waiting time approaches or exceeds the maximum (OECD, 2020[78]). In Denmark, if a region cannot provide treatment within the maximum waiting time, it is obliged to refer patients to another hospital within the country or abroad that can do so.

Table 5.2. Countries set various maximum waiting time targets for cancer care

Country	Maximum waiting times
Denmark	Waiting time for examination: 14 days from the day the hospital received the patient referral Waiting time for surgery after final examination: 14 days from the patient's consent Waiting time for medical treatment or radiation therapy: 14 days from the patient's consent
Estonia	Waiting time for an outpatient consultation/visit: 6 weeks Waiting time for planned home nursing care for cancer patients: 2 weeks
Finland	Interval between the arrival of a referral concerning a suspected case of cancer and the start of primary treatment: 6 weeks Interval between surgical treatment and adjuvant therapies: 4 weeks (although this depends on the patient's state of health)
Iceland	Time between a decision to treat and first cancer treatment: 31 days Time between a referral with a highly suspected case of cancer and first cancer treatment: 62 days
Ireland	Time between receipt of a referral and an appointment for patients with breast cancer symptoms meeting clinical criteria for urgent referral to a symptomatic breast disease clinic: 2 weeks (target of 95% of patients) Time between receipt of a referral and an appointment for patients with breast cancer symptoms meeting clinical criteria for non-urgent referral to a symptomatic breast disease clinic: 12 weeks (target of 95% of patients) Time between receipt of a referral and an appointment at a rapid access clinic for patients with suspected lung cancer: 10 working days (target of 95% of patients) Time between receipt of a referral and an appointment at a rapid access clinic for men with suspected prostate cancer: 20 working days (target of 90% of patients)
Latvia	Waiting time for an examination after a screening programme: 30 days Waiting time for a primary diagnostic test of malignant tumour from the date of referral by a family doctor or gynaecologist: 10 working days Waiting time for a specialist visit for secondary diagnosis of malignant tumour after an oncological consultation following primary diagnostics: 10 working days Waiting time for treatment strategies for a patient (surgery, chemotherapy, radiotherapy) after secondary diagnosis of malignant tumour: 1 month
Lithuania	Waiting time between the first visit to a specialist and the date of cancer diagnosis: 28 calendar days Waiting time from diagnosis to initiation of therapy: 14 calendar days Waiting time from registration to receive an expensive diagnostic test (CT and/or MRI and/or positron emission tomography scan) to the date the diagnostic test is performed: 30 calendar days Waiting time from registration to receive chemotherapy, radiotherapy or haematology services to the date services are received: 30 calendar days Waiting time from registration to receive surgery to the date of the operation: 60 calendar days
Luxembourg	Waiting time between chemotherapy and radiotherapy for gynaecological cancers: 4 weeks, or 2 weeks after the anatomical pathology analytical report has been received (Conseil Scientifique Domain de la Santé, 2018[79]) Specific targets also available for patients affected by prostate cancer, breast cancer and colorectal cancer
Portugal	Waiting time for a referral from primary healthcare to specialist care: 24 hours in cases of suspected or confirmed oncological disease Waiting time for the first specialist consultation: within 7, 15 or 30 days, based on priority tiers

Note: This table includes only waiting time targets specific to cancer care pathways; it excludes general targets for diagnostic or elective procedures that may also apply to cancer care.
Source: OECD Waiting Times Policy Questionnaire 2019 and 2023 OECD Policy Survey on Cancer Care Performance.

5.5.4. Over half of EU+2 countries monitor quality of cancer care for continuous quality improvement

Over half of EU+2 countries systematically monitor the performance of cancer care (see Figure 5.12). In Poland, systematic monitoring of cancer care at the central level has been in place since 2019, using indicators developed to measure the quality of oncological care and patient safety. Monitoring is conducted in parallel by a number of stakeholders, including the Association of Polish Oncologists, the Cancer Society, the Ministry of Health and – importantly – the Patients' Association. Shared ownership and patient involvement have enhanced rigorous monitoring (OECD, 2023[40]). The National Cancer Framework Programme in Austria has established quality control processes, as well as evaluation of criteria based on structural, process and outcome measures (OECD, 2020[78]). In Germany, a directive on data-supported quality assurance across facilities of the Joint Federal Committee monitors some service areas (e.g. breast surgery and gynaecological surgery) including cancer care, and the German Cancer Society also publishes annual anonymised reports about the results of audits, which includes adherence to national clinical guidelines and case volume targets (OECD, 2023[50]). In Slovenia, clinical cancer registries and their multidisciplinary expert groups were established for the five most common cancers (breast, colorectal, lung, prostate, and malignant melanoma) through the National Cancer Control Plan, and a set of performance quality indicators were developed for regular monitoring (OECD, 2023[9]).

With the aim of improving delivery of people-centred cancer care, a growing number of countries – including Belgium, Estonia, Germany, Iceland, Ireland, Italy, Latvia, the Netherlands, Slovenia and Sweden – also measure and monitor patient-reported measures. In Norway, annual meetings with patient representatives take place to discuss annual reports and quality indicators (OECD, 2023[57]). In the Netherlands, patient organisations are involved in discussing what data are collected and for what purpose. (OECD, 2023[60])

In countries where waiting time targets for cancer care have been developed (see Table 5.2), waiting times are regularly monitored and assessed. For instance, Denmark has established integrated patient pathways for cancer patients, and monitors these to see whether patients are examined and/or treated within recommended time periods. These data are monitored quarterly and disaggregated by cancer and region. In Iceland, the number of people on waiting lists and the percentage of people waiting for more than three months are reported every three months by the hospital or clinic for specific procedures related to cancer care. Latvia also monitors and prepares annual reports on waiting times for colonoscopy, mammography, chemotherapy and radiation therapy in day care, as well as on oncologists by medical institution (OECD, 2020[78]).

Among the countries with systematic monitoring of cancer care, a few also provide feedback to providers for further quality improvement. These include Estonia, France, the Netherlands, Norway, Slovenia and Sweden. In Estonia, the Advisory Board for the Development of Quality Indicators, established under the Estonian Health Insurance Fund's supervision in 2014, publishes indicators on access to and quality of diagnosis and care for breast, colorectal, prostate and cervical cancer by hospitals (OECD, 2023[56]). In the Netherlands, cancer registries are implemented nationwide, giving participating healthcare providers access to their performance metrics via reports and a dedicated dashboard, and providing other stakeholders – such as patients and carers – with transparency regarding quality of care (OECD, 2023[60]). In Slovenia, feedback based on quality indicators covering different parts of the patient pathway is given to healthcare institutions and professionals involved in cancer care for several cancers (OECD, 2023[9]).

5.6. Conclusion

The landscape of cancer care in EU+2 countries is marked by increasing challenges, given the rising incidence of cancer. Supporting sustainability and high-quality cancer care entails having an adequate level of cancer resources – including workforce, oncology medicine and medical equipment – to facilitate efficient and effective delivery of cancer care throughout patient pathways. Countries need to invest not only in purchasing or renewing equipment but also in adequate workforce capacity and organisation of cancer care delivery to ensure timely access to and optimal use of medical equipment. To guarantee patient access to oncology medicines, countries need to capitalise on HTAR and ongoing and future joint European HTA collaborations, and to ensure efficient use of generics and biosimilars. Prioritising systematic delivery of cancer care through care concentration, implementation of standardised care based on guidelines and MDTs, and monitoring of cancer care performance (most notably around waiting times and patient-reported experience and outcome measures) are important policy options to ensure continuous quality improvement.

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Notes

[1] Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain and Sweden responded to the 2023 OECD Policy Survey on Cancer Care Performance.

[2] In Malta, however, many indications included in this analysis are available through an early access scheme on a named-patient basis, but are not formally endorsed as part of the positive list.

[3] External price referencing involves the use of prices of a medicine in a predefined set of countries to calculate a national reference price for the medicine. This is typically used as a starting point to initiate price negotiations with the pharmaceutical manufacturers during the pricing and reimbursement process. Launching new medicines first in countries where prices are the highest appears a logical strategy in this context.

[4] The Government Formulary List contains all medicinal products, vitamins, food supplements and borderline substances.

[5] The networks are ERN EURACAN for rare adult solid cancers, ERN PaedCan for paediatric oncology, and ERN-EuroBloodNet and ERN GENTURIS for rare genetic tumour risk syndromes.

[6] Omic technologies are used to comprehensively measure the profile of genes (transcriptomics), proteins (proteomics) or small molecule metabolite (metabolomics) within cells or tissues.

OECD Health Policy Studies

Beating Cancer Inequalities in the EU

SPOTLIGHT ON CANCER PREVENTION AND EARLY DETECTION

Cancer causes almost a quarter of all deaths in the EU27, Norway and Iceland, with five new cancer cases diagnosed every minute in 2022. Assessing and improving cancer care from prevention to treatment is essential for promoting longer, healthier lives. This report addresses the latest trends in cancer incidence and mortality in the EU and reviews key cancer risk factors, cancer screening programmes and early diagnoses, and issues in the provision of high-quality cancer care. Country performance, cross-cutting challenges and new developments are examined with a particular focus on disparities by regions, socio-economic status and gender. The report provides policy makers with fiscal, regulatory and health systems organisation tools, as well as examples of initiatives that can be undertaken in primary care, workplaces, and schools to better control cancer and counter inequalities.

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