OECD Health Policy Studies

Tackling the Impact of Cancer on Health, the Economy and Society

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BETTER POLICIES FOR BETTER LIVES

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Foreword

Despite significant progress in preventing and treating cancer over the past decade, cancer remains one of the most significant public health challenges to health systems, economies, and societies worldwide. Not only does cancer cause one in four deaths in the OECD, directly affecting the lives of patients, families, and communities, but it also imposes a substantial economic burden. Across OECD countries, annual health expenditure is EUR 449 billion higher than if there were no cancer, and workforce output EUR 163 billion lower.

This report analyses the economic costs and societal impacts of cancer. Using advanced systems modelling covering 51 countries, including the OECD, EU and G20, the report offers insights into the health burden of cancer, its impact on people's mental health and work life, healthcare expenditure, and other economic costs such as lost productivity. The report also examines the potential impact of cancer policies, highlighting co-benefits for the economy, the environment, and the society as a whole.

Both the economic and social toll of cancer will grow. For example, because the cancer risk increases with age, population ageing alone is projected to increase per capita healthcare expenditure on cancer by 67% on average across the OECD between 2023 and 2050. Spending will also continue to rise as new therapies become available. It is therefore imperative that policy makers adopt a proactive approach to cancer control and fight on all fronts. This includes actions to reduce the cancer burden by addressing key risk factors and vaccinating for human papillomavirus, combined with effective screening, diagnosis and treatment to improve the lives of people with cancer.

This publication is part of the OECD's ongoing efforts to support countries in addressing major public health challenges. By providing evidence-based analysis and policy recommendations, it aims to assist governments in reducing the burden of cancer, improving health outcomes, and fostering sustainable economic and social development.

Better cancer policies make for better lives – reducing human suffering, lowering healthcare expenditure, boosting economic productivity and improving societal well-being. This report provides governments with a strong case to invest in cancer, ensuring resilient health systems and healthier, more prosperous societies.

Acknowledgements

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The work was funded through regular contributions from OECD member countries and received support from the Health Programme of the European Union.

The opinions expressed and arguments employed herein do not necessarily reflect the official views of the OECD member countries or the European Union. The organisations and institutions whose data was used in this report do not bear any responsibility for the analysis or interpretation of the data.

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Executive summary

There is an urgent need to reduce the high cancer burden

Cancer continues to be one of the most pressing public health challenges, with far-reaching consequences for health systems, economies, and societies. Every minute in the OECD, an estimated 11 people are diagnosed with cancer. According to OECD's model-based estimates, cancer costs a total of EUR PPP 449 billion annually to OECD health systems, increasing health expenditure by 6% relative to a situation where there is no cancer. This is more than the total annual health budget of France. At the societal level, cancer lowers labour market outputs through reduced productivity and hours worked, reducing workforce output by EUR PPP 163 billion per year – roughly equivalent to the annual gross domestic product (GDP) of Hungary.

Large variation in cancer outcomes across countries shows the significant scope to improve cancer care. Survival rates for lung cancer, for example, vary more than seven-fold across EU and OECD countries. For colorectal cancer, the variation is more than two-fold. OECD estimates suggest that, if all countries were to improve cancer screening, early diagnosis and timely, effective, affordable treatment to attain the best survival rates observed within the OECD and EU, a quarter of all premature deaths due to cancer would be prevented.

Cancer costs are set to rise

Cancer costs are expected to grow in the future, for three main reasons. First, population ageing alone will lead to an increase in health spending on cancer, all other things being equal. Assuming that the incidence and survival rates of cancer per age group remains unchanged, per capita cancer health expenditure would grow by 67% between 2023 and 2050, on average across the OECD. Second, efforts to improve cancer outcomes across countries would lead to higher spending on cancer as people survive for longer, require treatment for longer, and can get cancer again. Increasing survival rates to the levels of the best performing country will save many lives, but will add another 15% in treatment costs over the same period. Third, higher treatment costs from new medicines and technologies, and additional costs associated with providing follow-up care for a growing number of cancer survivors, will further increase the total cost.

Better diagnosis and management would improve the life expectancy and the quality of life of people with cancer

To give patients the best chance for survival, regardless of where they live, countries should enhance cancer screening, early diagnosis, and access to effective treatment. Screening is pivotal in the fight against certain cancers, yet significant disparities in screening rates persist both across and within countries. To boost uptake, countries should increase awareness and optimise the design of screening invitations and delivery. Delays in getting access to care can be addressed by raising awareness of the early signs of cancer among patients, reducing diagnosis delays by informing healthcare workers, and

improving referral processes from primary care to specialist oncology care to minimise treatment delays. Finally, policy makers can enhance access to effective care at an affordable cost by promoting the use of generics and biosimilars, implementing collaborative Health Technology Assessments at a multinational level, improving the use of targeted treatments, and establishing Comprehensive Cancer Centres.

More rigorous policy action to achieve more ambitious policy targets can reduce cancer cost and its societal burden

As around 40% of cancer cases can be prevented by healthier lifestyles, scaling up action to tackle tobacco and alcohol use, unhealthy diets, lack of physical activity and air pollution would significantly curb the growing burden of cancer.

International policy targets on cancer risk factors, such as those from the WHO Global Action Plan on non-communicable diseases, provide pointers that policy makers can follow. The analysis in this report shows that achieving the policy targets for six key cancer risk factors together could prevent around 8% of all cancer cases, 12% of premature deaths due to cancer, and lower the burden of cancer on health expenditure by 9%, between 2023 and 2050.

Tobacco remains the most important policy area for cancer prevention in the OECD, accounting for 40-60% of the total impact of action on risk factors. If international policy targets on tobacco were achieved, 56 000 premature deaths would be prevented annually across OECD countries – one death every ten minutes – and EUR PPP 13.3 billion saved in cancer health expenditure. It is crucial that policy makers complement tobacco control policies with strategies that target a wider set of risk factors, including harmful alcohol use, diet, air pollution, overweight and physical inactivity.

Stronger action on risk factors has other societal benefits. For example, achieving the policy target on harmful alcohol use would also improve safety, preventing around 10% of premature deaths due to interpersonal violence and road traffic accidents, a total of 15 000 premature deaths per year across the OECD. A healthier diet would also reduce greenhouse gas emissions by 304 Mt per year – the equivalent of taking all the cars in Germany and Spain off the road.

Improving vaccination for human papillomavirus (HPV) could prevent around 90% of premature deaths due to cervical cancers

Vaccines are highly effective in preventing HPV infection and the associated cancers. But, while almost all OECD and EU countries have introduced HPV vaccination, coverage rates are generally low: the average coverage of girls receiving a first dose in the OECD was 69% in 2022, well below the target of 90%. According to OECD estimates, optimal vaccination for HPV could prevent around 90% of all cervical cancer cases and premature deaths, reducing the total burden of cancer on health expenditure by 1.3% in OECD countries (not accounting for the cost of vaccination); and increasing workforce productivity and participation by the equivalent of EUR PPP 6.3 billion per year. Considering a single-dose scheme, implementing catch-up vaccination where needed (e.g. after temporary disruption to the programme), and addressing misinformation could help countries increase uptake and coverage of HPV vaccination.

1 Key findings

Despite significant advances, cancer continues to place a major burden on individuals, heath systems and society. This chapter brings together the main messages of this publication and describes the policy implications identified by new OECD analyses of the health, economic and societal burden of cancer. It shows the rising burden of cancer on health and health expenditure, and makes the case for investing in prevention. The chapter presents the expected impact of addressing key cancer risk factors as well as vaccination for human papilloma virus.

In Brief

Stronger action on prevention is urgently needed to attenuate the burden of cancer on individuals, health expenditure and society

Despite significant advances, cancer continues to place a major burden on individuals, heath systems and society. Cancer causes one in four premature deaths in the OECD. It decreases the quality of life of individuals, impacting their mental health and imposing a significant toll on their work life and income. Cancer also places a considerable strain on the health systems of OECD countries. According to model-based estimates, cancer increases health expenditure by 6%, at a total cost of EUR PPP 449 billion annually, across OECD countries between 2023 and 2050 – which is more than the total annual health budget of France. At the societal level, cancer lowers labour market outputs through reduced productivity and hours worked. This is equivalent to a reduction in workforce output of EUR PPP 163 billion per year, broadly equivalent to the annual gross domestic product (GDP) of Hungary.

Large, unwarranted variation in cancer outcomes shows that there remains significant scope to improve cancer care. Survival rates for lung cancer, for example, vary more than seven-fold across EU and OECD countries. For colorectal cancer, the variation is more than two-fold. These inequalities are in large part driven by differences in cancer screening and care. OECD estimates suggest that, if all countries were to improve cancer screening and access to early diagnosis coupled with equitable access to timely, effective, affordable treatment to attain the best survival rates observed within the OECD and EU, a quarter of all premature deaths due to cancer could be prevented and the OECD workforce output could increase by EUR PPP 11 billion – roughly equivalent to more than one month of GDP for the Slovak Republic.

The current trajectory of cancer costs is unsustainable. The rising cancer burden due to population ageing alone – assuming that the incidence and survival rates of cancer per age group remains unchanged – is estimated to increase the per capita cancer health expenditure by 67% between 2023 and 2050, on average across the OECD. If cancer care were improved and inequalities in survival rates removed, a desirable outcome, this would add another 15% in cancer cost over the same period. On top of this, higher treatment cost from new medicines and technologies (with some studies suggesting an average growth of 14% to 17% per year), and additional cost associated with providing follow-up care for a growing number of cancer survivors, would further increase the total cost.

To give patients the best chance for survival in a sustainable way, no matter where they live, countries should improve cancer screening, early diagnosis and access to effective treatment. Screening plays a pivotal role in the fight against certain cancers, but there remain considerable differences in screening rates across and within countries. To improve uptake, countries should increase awareness and optimise the design of screening invitation and delivery. Countries can also address access delays by increasing awareness of the initial signs of cancer among patients; diagnosis delay by increasing this awareness among healthcare workers; and improve referral from primary care through to specialist oncology care to reduce treatment delays. Finally, policy makers can improve access to effective care by encouraging the entry and use of generics and biosimilars, introducing collaborative Health Technology Assessment at a multinational level, improving the use of targeted treatments, and establishing Comprehensive Cancer Centres.

Decisive action on prevention can attenuate the current trajectory of cancer costs, and reduce the wider societal burden of cancer. As around 40% of cancer cases can be prevented by healthier lifestyles, scaling up action to tackle tobacco and harmful alcohol use, high body weight, unhealthy diets, lack of physical activity and air pollution could make a crucial contribution in curbing the growing burden of cancer. However, the prevalence of all these risk factors remains high across OECD and EU countries. Despite recent progress, tobacco use remains common in the OECD, with 16% of adults smoking daily. Other cancer risk factors have seen little improvement: alcohol consumption has changed little over the past decade; only 15% of adults in the OECD eats at least five portions of fruit and vegetables daily; over half of the population is now either overweight or obese; only 40% of adults in the OECD meets the recommended level of physical activity per week; and almost all OECD countries have air pollution levels above the WHO guideline.

More ambitious policy targets on key cancer risk factors (tobacco use, alcohol use, diet, air pollution, overweight and obesity, and low physical activity), and more rigorous policy action to achieve them, would reap a wide range of benefits. International policy targets on cancer risk factors, such as those from the WHO Global Action Plan on NCDs, were used to evaluate the potential impact of scaling up action on risk factors. This analysis estimates that achieving the policy targets for six key cancer risk factors together could prevent around 8% of all cancer cases, 12% of premature deaths due to cancer, and reduce the burden of cancer on health expenditure by 9%.

Tobacco remains the most important policy area for cancer prevention in the OECD, accounting for 40-60% of the total impact of action on risk factors, depending on the type of impact. If international policy targets on tobacco were achieved, this is estimated to prevent 56 000 premature deaths annually across OECD countries – one every ten minutes – and save health systems EUR PPP 13.3 billion in cancer health expenditure (3.0% of total cancer burden on health expenditure).

Nevertheless, it is crucial that policy makers complement tobacco control policies with strategies that effectively target a wider set of risk factors, including harmful alcohol use, diet, air pollution, overweight and physical inactivity. For example, the current international policy targets on obesity and physical activity are less ambitious than those for tobacco. Similarly, the timeline to achieve the pollution target is much longer than for other targets, which means that the health benefits are delayed. Moreover, it appears that few countries will actually achieve these policy targets.

Stronger action on risk factors would not just benefit cancer. Cancer risk factors are linked to other chronic diseases, bringing additional health and economic benefits. There are also wider societal benefits. For example, achieving the policy target on harmful alcohol use would also improve safety, preventing around 10% of premature deaths due to interpersonal violence and road traffic accidents. Changes toward a healthier diet would also have a direct impact on the environment, reducing greenhouse gas emissions by 304 Mt per year – the equivalent of taking all the cars in Germany and Spain off the road.

Cancer prevention strategies should also capitalise on the potential to protect future generations from cervical cancer through vaccination for human papillomavirus (HPV). Vaccines are highly effective in preventing HPV infection and the associated cancers. But while almost all OECD and EU countries have introduced HPV vaccination, coverage rates are generally low: the average coverage in the OECD was 69% in 2022, well below the target of 90%. According to OECD estimates, optimal vaccination for HPV could prevent around 90% of all cervical cancer cases and deaths, reducing the total burden of cancer on health expenditure by 1.3% in OECD countries; and increasing the workforce output by EUR PPP 5.7 billion per year. Evaluating the benefits and challenges of single-dose schemes, considering catch-up vaccination campaigns if and where needed, and evaluating and addressing misinformation could help countries increase uptake and coverage of HPV vaccination.

Despite significant advances, cancer continues to place a major burden on individuals, health systems and society

Due to advances made in cancer prevention and treatment, the average age-standardised cancer mortality has decreased by 26% over the past three decades across OECD countries – from 134 deaths per 100 000 population in 1987/8 to 99 per 100 000 in 2017/8 (IARC, 2022[1]). Nevertheless, cancer remains a leading cause of death and disability. In 2019, 28% of all deaths were due to cancer in the OECD, and 29% in the EU, making cancer the second cause of death after cardiovascular disease ((IHME, 2019[2]). In addition, the burden of cancer is projected to increase in the coming years, largely driven by to population ageing. For these reasons, cancer already has far-reaching consequences for individuals, health systems and society, and its impact will be even greater in the future unless effective policies are put in place without delay.

The impact of cancer on individuals, health systems and society up to 2050 has been evaluated using advanced and validated microsimulation modelling techniques – the OECD SPHeP NCDs (Strategic Public Health Planning for non-communicable diseases) model (Box 1.1). Findings from these analyses show that every minute in the OECD, an estimated 11 people are diagnosed with cancer. This adds up to 5.6 million people who will develop cancer every year, and nearly 1 million people who die prematurely (before the age of 75) due to cancer (2.0 million and 361 000, respectively, in the EU) (Figure 1.1). As a result, the average life expectancy of OECD and EU populations is nearly 2 years lower than if there were no cancer.

Box 1.1. The OECD Strategic Public Health Planning for Non-Communicable Diseases (SPHeP-NCD) model

Model structure

The OECD SPHeP-NCD model is an advanced systems modelling tool for public health policy and strategic planning. The model is used to predict the health and economic outcomes of the population of a country up to 2050. The model includes a comprehensive set of key risk factors (e.g. overweight, harmful alcohol use, tobacco, diet, pollution, physical activity) and their associated NCDs. The model covers 51 countries, including OECD member countries, G20 countries, EU27 countries and OECD accession and selected partner countries.

For each of the 51 countries, the model uses demographic and risk factor characteristics by age- and sex-specific population groups from international databases. These inputs are used to generate synthetic populations, in which each individual is assigned demographic characteristics and a risk factor profile. Based on these characteristics, an individual has a certain risk of developing a disease each year. These relative risks are based on the Global Burden of Disease study (Murray et al., 2020[3]), amongst others. Note that the model uses population predictions to adjust the size and demographic profile of country populations in the future, but maintains current (age- and gender-specific) rates for risk factors. In other words, it does not predict any future trends in risk factor prevalence with the exception of those caused by demographic changes.

Cancer coverage

The cancer types covered in the OECD SPHeP-NCD model together account for 75% of all disability-adjusted life years lost from cancer in the OECD in 2019 (Murray et al., 2020[3]). Cancer types were selected based on their overall burden, as well as what proportion of their burden is amenable to public health interventions (e.g. action on risk factors, screening, vaccination). The cancer types covered are: lung, colorectal, breast, liver, oesophageal, pancreatic, stomach, prostate, cervical, malignant skin melanoma, lip and oral cavity, larynx, other pharynx, and nasopharynx cancer.

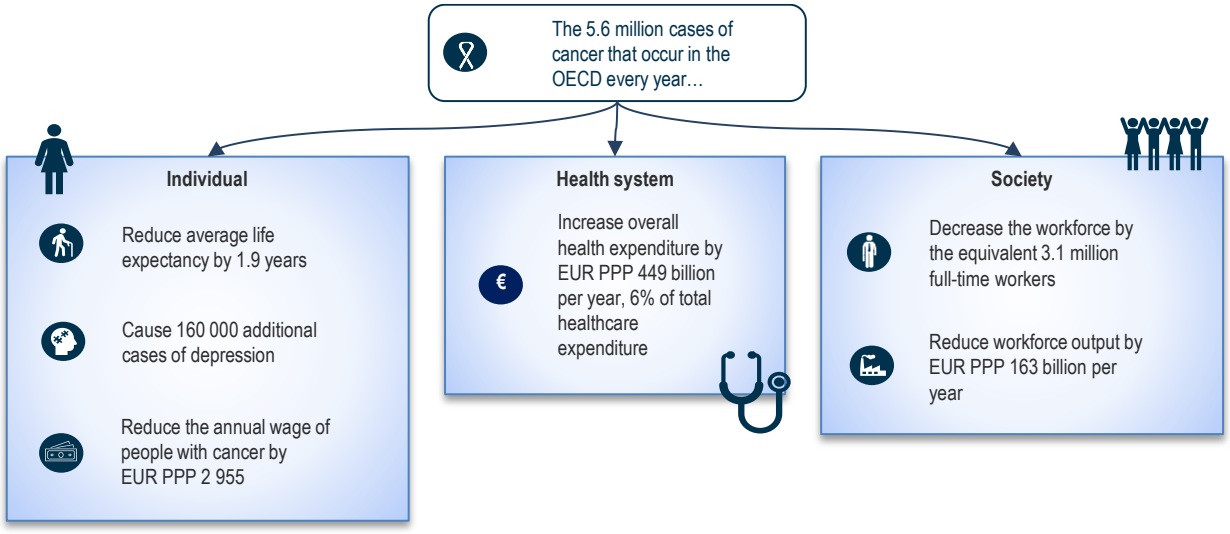
Health expenditure

Total health expenditure is predicted for each patient, based on age, gender and disease status. The total cost is the sum of disease-specific cost, residual cost (which captures costs unrelated to risk factors, for example, the costs of treating migraines or common colds), and, where relevant, the cost of comorbidities and end-of-life related cost. Patient-level cost data from France, Estonia and in the Netherlands was used to create the cost prediction formula.

The cost from France, Estonia and the Netherlands (the "anchor countries") were extrapolated to other countries based on OECD data on inpatient curative and rehabilitative care spending per capita; outpatient curative and rehabilitative care spending per capita; and medical goods spending per capita. These three factors were weighted for each diseases using weights based on the OECD SHA data on the expenditure by disease, as well as the relative spend across the three for the anchor countries.

For more information, please refer to the online documentation for the OECD SPHeP NCDs model: http://oecdpublichealthexplorer.org/ncd-doc/.

Figure 1.1. The burden of cancer on individuals, health systems and society



Note: These estimates are based on the OECD SPHeP NCDs model, predicting the burden of cancer over 2023-50. Health expenditure estimates are calculated by comparing the baseline scenario to a hypothetical scenario in which there is no cancer, and therefore take into account the cost of other diseases as well as population dynamics.
Source: OECD SPHeP NCDs model, 2024.

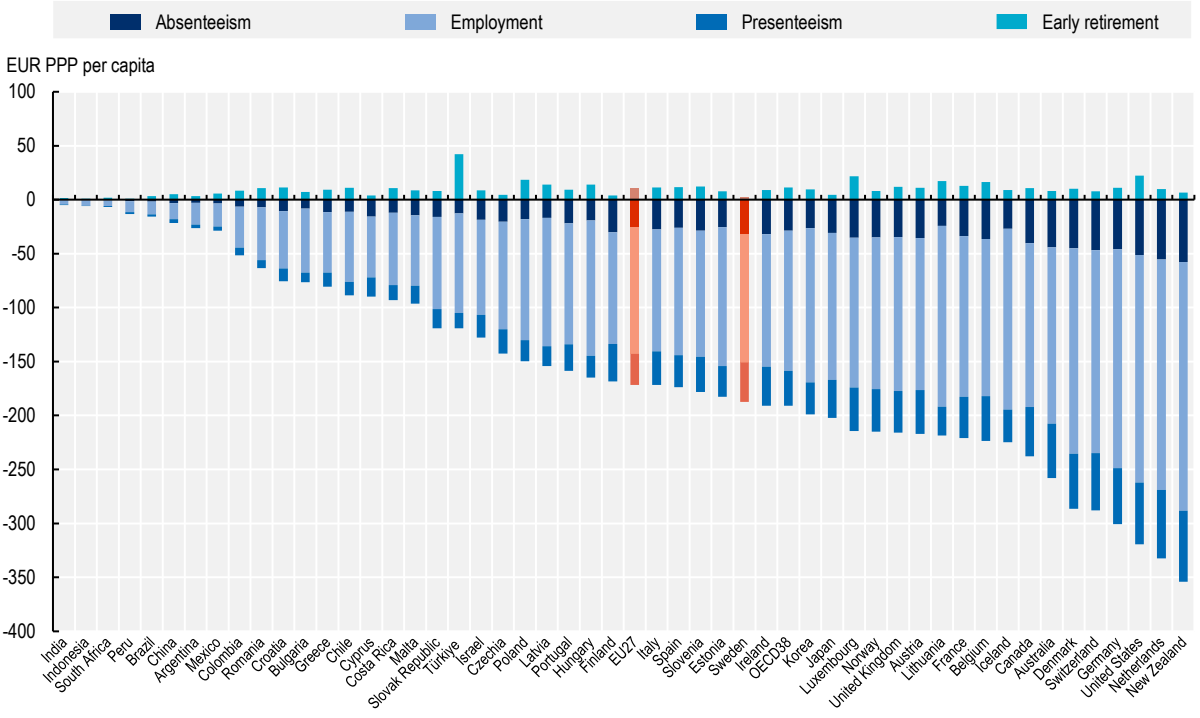
The impact of cancer on the quality of life and income for affected individuals is also severe. Disability associated with cancer is estimated to reduce healthy life expectancy (which takes into account years lived with illness) by 1.6 years on average in OECD and EU countries. The emotional toll of cancer, coupled with symptoms and side effects from treatment, can lead to heightened stress, anxiety, and depression. Every year across the OECD, cancer is estimated to cause an additional 160 000 cases of depression per year (85 000 in the EU). Cancer also has a significant negative impact on a person's work life, leading to many people being forced to work part-time, exit employment and retire early. In addition, cancer affects the opportunities for continuous education and training, which are typically associated with higher wages. As a result, cancer reduces the average annual wage of people in employment by EUR PPP 2 955 – roughly three weeks' worth of income for an average income worker (EUR PPP 2 573 in the EU).

Cancer also places a considerable strain on health systems. According to model estimates, which take into account competing diseases and population dynamics, cancer increases the health expenditure of OECD countries by a total of EUR PPP 449 billion, every year between 2023 and 2050 – more than the total health budget of France (EUR PPP 93 billion for the EU). This is 6.0% of total health expenditure in the OECD, and 4.7% in the EU.

The impact of cancer extends beyond health and health expenditure. Cancer affects all facets of people's lives, and this has consequences for the economy and society. Through cancer's impact on productivity and workforce participation, it is estimated that OECD countries lose the equivalent of 3.1 million full-time workers (1.1 million in the EU). This translates into a lost workforce output of EUR PPP 180 per capita per year, or EUR PPP 163 billion per year, broadly equivalent to the annual gross domestic product (GDP) of Hungary (EUR PPP 49 billion for the EU) (Figure 1.2).

Figure 1.2. Cancer lowers workforce output through lower employment and higher presenteeism and absenteeism

The impact of cancer on the workforce output through absenteeism, early retirement, employment (combining unemployment and part-time work) and presenteeism, EUR PPP per capita (working age), average over 2023-50



Note: Although cancer increases the chance that a person retires early, it actually reduces the overall rate of early retirement in the population. This happens because cancer can cause people to die earlier, meaning fewer people make it to the age where they would typically retire early.
Source: OECD SPHeP NCDs model, 2024. See https://stat.link/01idxo.

Significant scope to improve cancer care remains – with the potential to avoid one in four cancer-related premature deaths

While cancer care has improved significantly over the past decades, large and unwarranted variation in cancer outcomes shows that there remains significant scope to improve cancer care. There are considerable differences in outcomes within countries (Box 1.2) as well as between countries. For example, there is more than seven-fold variation in lung cancer survival rates across OECD and EU countries, ranging from 5% in Chile to 33% in Japan (Figure 1.3). Survival rates for colon cancer vary more than two-fold, from 35% in Colombia to 72% in Cyprus. Survival rates for breast cancer are higher on average and there is only 1.3-fold variation across OECD and EU countries. Nevertheless, in Colombia and Lithuania only 7 in 10 women survive for five years after being diagnosed with breast cancer, while 9 in 10 survive in the United States and Cyprus.

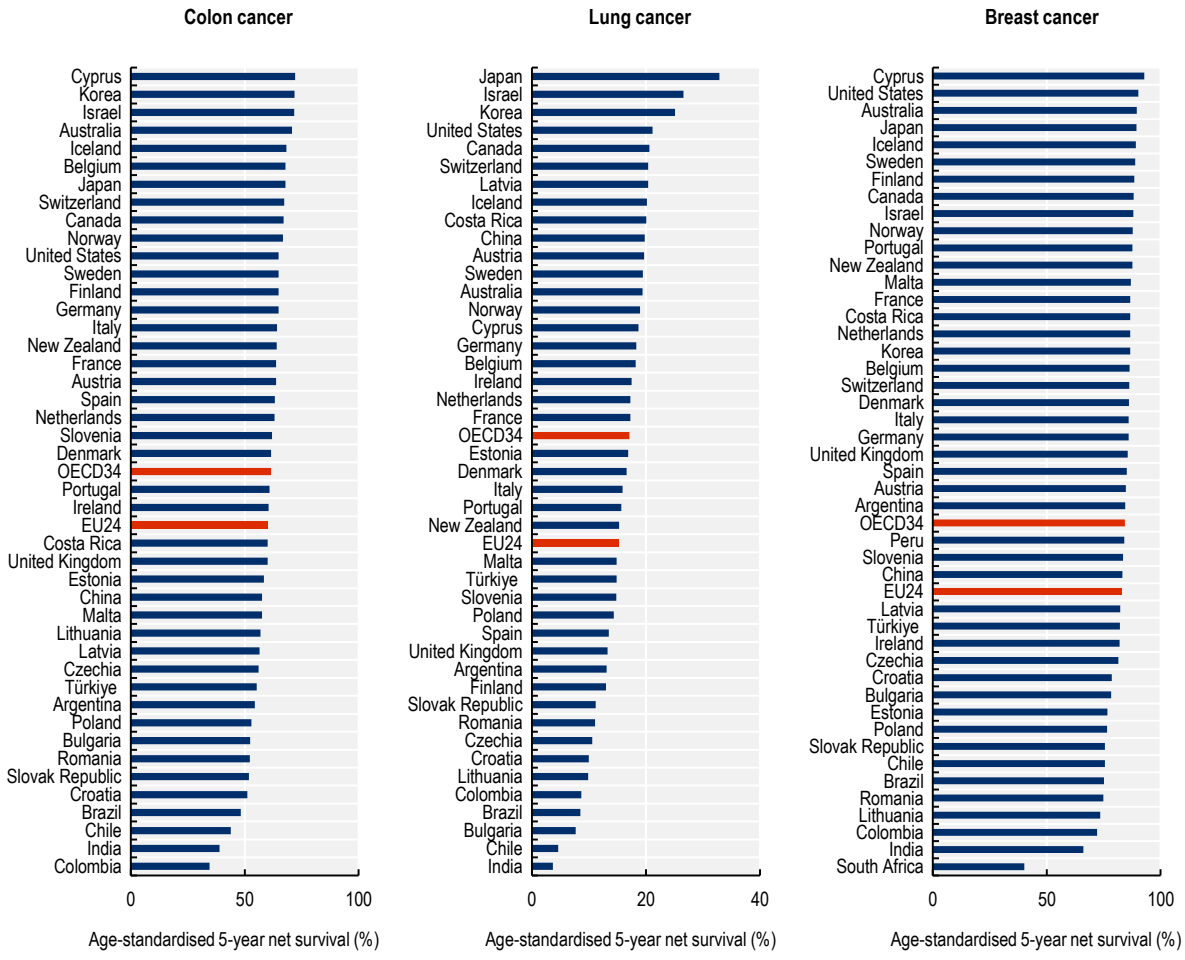
Box 1.2. Cancer inequalities

Major risk factors for cancer are consistently more prevalent among people with lower socio-economic characteristics, such as lower income and education levels (OECD, 2024[4]). One example is smoking. Smoking – a major risk factor for cancer – is notably more prevalent among people with a lower education: on average in the EU, 19% of people with lower secondary education or less smoked daily, compared to 13% of people with tertiary education (Eurostat, 2022[5]). This is reflected in lung cancer rates, the primary cancer associated with smoking. Preliminary findings from the EUCanIneq study show that lung cancer mortality rates were 2.6 times higher among men with lower education compared to men with higher education, and 1.7 times higher among women with lower levels of education (OECD, 2024[4]).

In addition to differences in risk factors, differences in preventive care can also contribute to inequalities across population groups. On average, people with lower education or income levels are less likely to participate in screening (OECD, 2024[4]). For example, women with lower income are twice as likely to miss out on breast cancer screening: only 7.3% of EU women in the highest income quintile report never having had an X-ray breast examination, compared to 15.2% of women in the lowest income quintile (Eurostat, 2023[6]). Similarly, people with higher educational attainment are more likely to participate in breast, cervical and colorectal cancer screening. Almost 80% of EU women with a tertiary education report having had a cervical smear test within the three years prior, compared to only 61% of women with lower secondary education or less. In some countries screening rates among women with higher education are more than double those of women with lower education (Eurostat, 2023[6]).

Figure 1.3. Cancer survival rates for colon, lung and breast cancer

Age-standardised 5-year net survival (%) for colon, lung and breast cancer, 2010-14

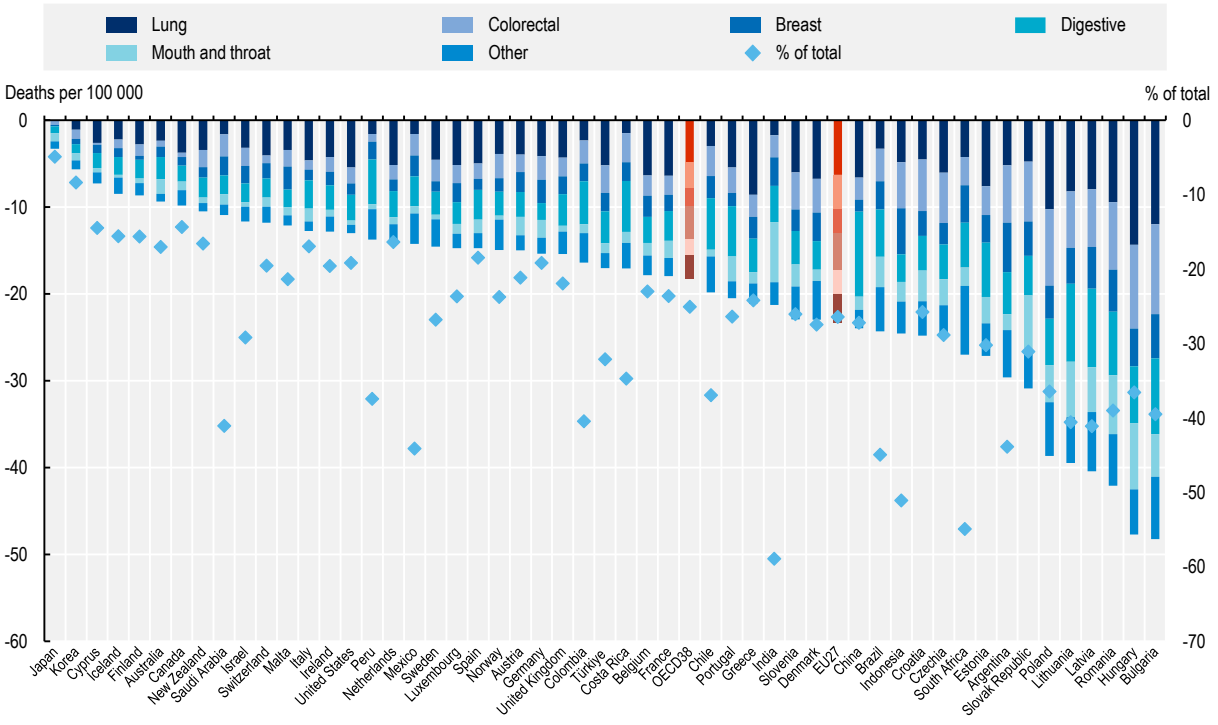


Source: Allemani, C. et al. (2018[7]), "Global surveillance of trends in cancer survival 2000-14 (CONCORD-3): analysis of individual records for 37 513 025 patients diagnosed with one of 18 cancers from 322 population-based registries in 71 countries", https://doi.org/10.1016/s0140-6736(17)33326-3. See https://stat.link/pa15yx.

The OECD SPHeP NCDs model was used to evaluate the potential impact of reducing variation in cancer survival rates. If all countries were to improve cancer screening, diagnosis and treatment to attain the best possible survival rates observed within the OECD and EU, a quarter of all premature deaths due to cancer could be prevented (25% and 26% in the OECD and EU, respectively) (Figure 1.4). This would increase life expectancy by half a year. It would also increase the workforce output by EUR PPP 7.3 billion in the OECD – roughly equivalent to half the annual gross domestic product of Malta (EUR PPP 2.7 billion in the EU).

Figure 1.4. Achieving the highest survival rates would prevent around one in four premature deaths from cancer

The impact of achieving the highest cancer survival rates observed across the OECD and EU on premature mortality (deaths in people aged under 75) due to cancer per 100 000 population; and as a percentage of total premature mortality due to cancer; per year, average over 2023-50

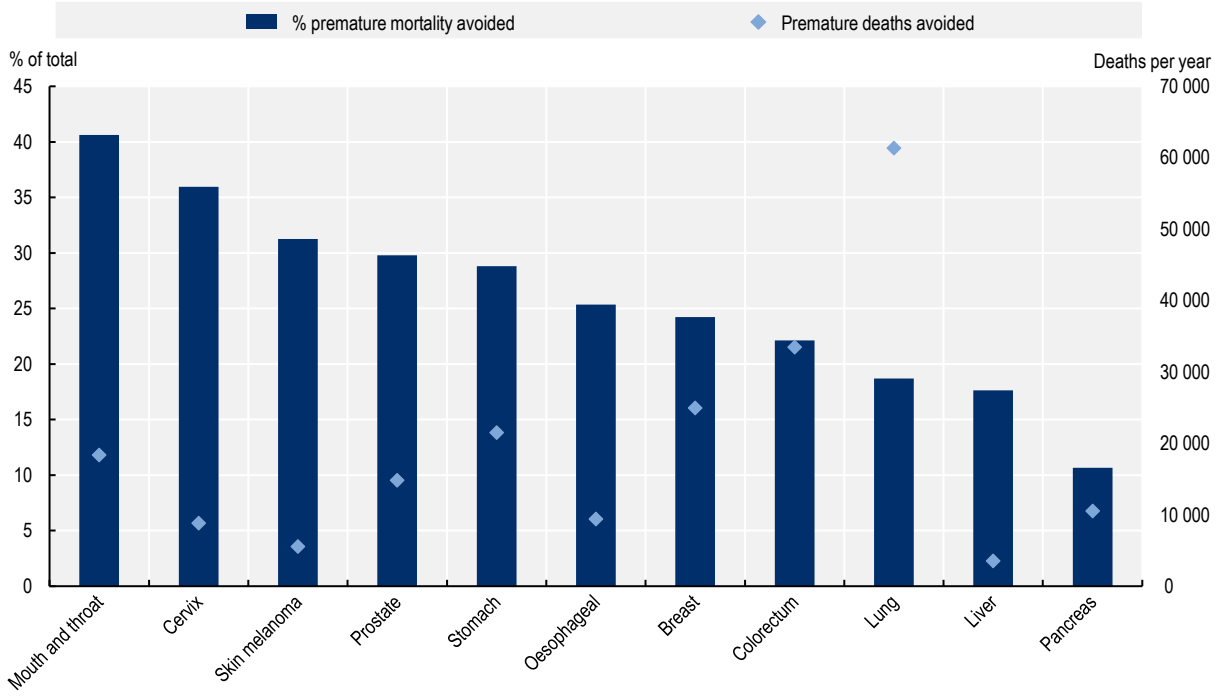


Note: Digestive includes liver, oesophageal, pancreatic, and stomach cancer; head and neck includes lip and oral cavity, larynx, other pharynx, and nasopharynx cancer; and other includes prostate, cervical cancer and malignant skin melanoma.
Source: OECD SPHeP NCDs model, 2024. See https://stat.link/nvqyks.

For mouth and throat cancer, around four in ten premature deaths (41%) could be avoided if the highest survival rates were to be attained across the 43 OECD and EU countries (Figure 1.5). Improved survival rates would also prevent around one in three premature deaths due to cervical cancer (36%) and skin melanoma (31%). However, in absolute terms the impact on lung cancer is by far the largest, with 61 000 premature deaths avoided every year – nearly 30% of the total impact – followed by 33 000 premature deaths due to colon cancer and 25 000 due to breast cancer.

Figure 1.5. Mouth, throat and cervical cancer see the greatest relative impact on premature mortality from improved survival rates

The impact of improved cancer survival rates on premature mortality (deaths in people aged under 75), as percentage of total premature mortality and number of premature deaths per year, by cancer type, for the 43 OECD and EU countries combined, average over 2023-50

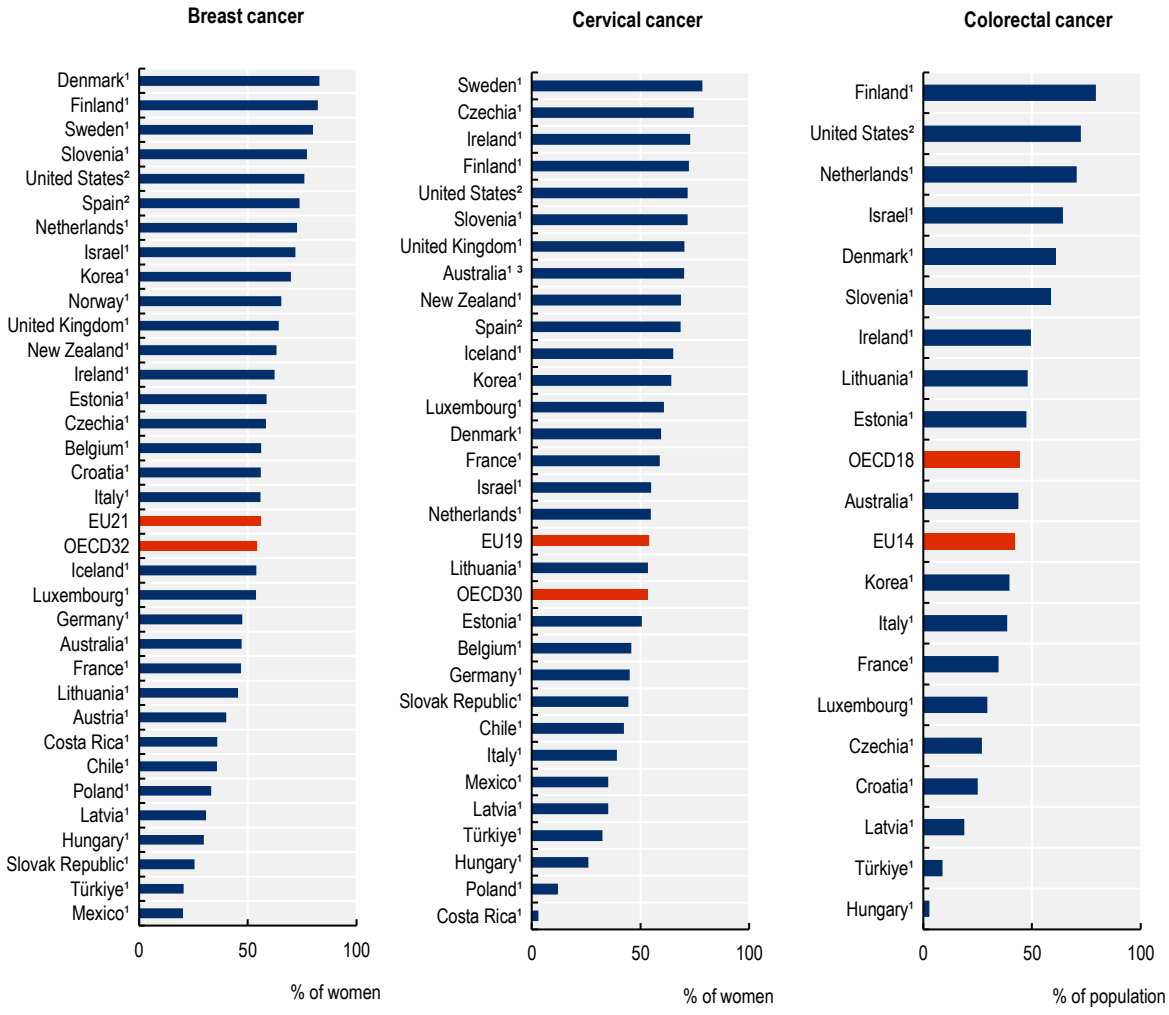


Source: OECD SPHeP NCDs model, 2024. See https://stat.link/suvtb5.

Two of the three cancers for which improved survival rates would see the greatest impact on premature mortality – colon and breast – are also the ones for which most OECD and EU countries have screening programmes. Screening can be highly effective in increasing the survival rate. It is estimated that 10-yearly colonoscopy may reduce mortality from colorectal cancer by 73% (Zheng et al., 2023[8]), and that effective breast cancer screening in women aged 60-69 may reduce their risk of dying from breast cancer by 33% (Nelson et al., 2016[9]). Despite these benefits, there are considerable differences in screening rates across countries (Figure 1.6). Breast cancer screening rates vary four-fold, from 20% in Mexico to 83% in Denmark, and colorectal cancer screening rates 28-fold, from 3% in Hungary and 79% in Finland.

Figure 1.6. Cancer screening rates

Population coverage of breast, cervical and colorectal cancer screening programmes, 2021



1. Programme data. 2. Survey data. Breast cancer: Mammography screening in women aged 50-69 within the past two years; Cervical cancer: Cervical cancer screening in women aged 20-69 within the past three years; Colorectal cancer: colorectal cancer screening coverage of population aged 50-74 who report having had faecal occult blood tests over the past two years.
Source: OECD Health Statistics 2023. See https://stat.link/675f0v.

There are various approaches to increase screening uptake. Invitation by a general practitioner (GP) letter rather than another authority, letters with fixed appointments rather than open invitations (OECD, 2020[10]), and personalised invitations compared to standard invitations were all more successful in encouraging uptake (Staley et al., 2021[11]). Including information in languages other than the primary language can help reach non-native speakers (OECD, 2020[10]). Reminders have also been shown to increase uptake, with reminders delivered by letter or email even more effective than phone call or text message. Facilities with flexible appointment times and with female providers were shown to have higher uptake of breast and cervical cancer screening (Plourde et al., 2016[12]). For women who are uncomfortable seeing a health worker for a cervical smear test, self-testing can help. HPV self-testing was found to be effective in increasing uptake among lower socio-economic groups in France (Sancho-Garnier et al., 2013[13]). Interventions using lay health advisors, where trusted individuals from a specific community (e.g. ethnic minority groups) are trained to provide education to others in the community, have also been shown to increase uptake (Rees et al., 2018[14]).

In addition to improving screening, countries should improve early diagnosis and access to effective treatment to give patients the best chance for survival (Box 1.3). Early diagnosis can be improved by increasing awareness of the initial signs of cancer among patients and doctors, and improve referral from primary care through to specialist oncology care can help to reduce treatment delays. To increase access to effective treatments, policy makers can look at redesigning co-payment policies, introducing collaborative Health Technology Assessment, improving the use of targeted treatments by increasing access to companion diagnostics and next generation sequencing technologies, and establishing Comprehensive Cancer Centres.

Box 1.3. Selected innovative or effective policy actions to improve cancer care

Early diagnosis and access to effective treatment are crucial elements to give patients the best chance for survival from a cancer. Some of the policies implemented by OECD countries to improve quality of care include:

Electronic clinical decision support tools (eCDSTs) in cancer: The diagnosis of cancer in primary care can be complex and challenging as patients can present with non-specific symptoms (Astin et al., 2011[15]; Chima et al., 2019[16]). eCDSTs use epidemiological data, symptoms and test results to improve cancer diagnosis (Chima et al., 2019[16]; OECD, 2024[4]). Information on the patient is entered into the eCDST by the GP, or automatically populated from the patient's electronic health record. Based on an algorithm, the eCDST then produces recommendations, prompts, or alerts for the GP to consider (Chima et al., 2019[16]).

Improved referral from primary care through to specialist oncology: Several countries such as Denmark, Ireland, Latvia, Lithuania, Poland, Slovenia and Sweden have developed fast track referral mechanisms (OECD, 2024[4]). Latvia introduced fast-track access for people with cancer (called the green corridor) in 2016. It is paid in full by the state budget and aims to streamline diagnosis and treatment decisions for suspected cancer cases by requiring specialist consultation and diagnostic examination within ten working days of the date of referral (OECD, 2024[4]). 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[17]; OECD, 2024[4]).

Encouraging the entry and use of generics and biosimilars: When the originator product has gone off patent or lost market exclusivity, the use of generics and biosimilars is becoming increasingly important in lowering prices for oncology treatments (OECD, 2024[4]). Nevertheless, there are still important country differences in the proportion of biosimilars being reimbursed. The mean time from EMA approval to public reimbursement/coverage of biosimilars also exhibited great variation between countries.

Increasing access to targeted therapies: To be able to effectively use new, targeted treatments, governments need to ensure access to their companion diagnostic. A companion diagnostic identifies whether a patient has a certain genetic feature, and would benefit from a specific targeted treatment. Fewer than half of EU countries currently have an automatic link between the coverage/reimbursement decision for a medicine and its companion diagnostic, meaning that it is possible that a treatment is covered by insurance while its companion diagnostic is not (Hofmarcher, Berchet and Dedet, 2024[18]).

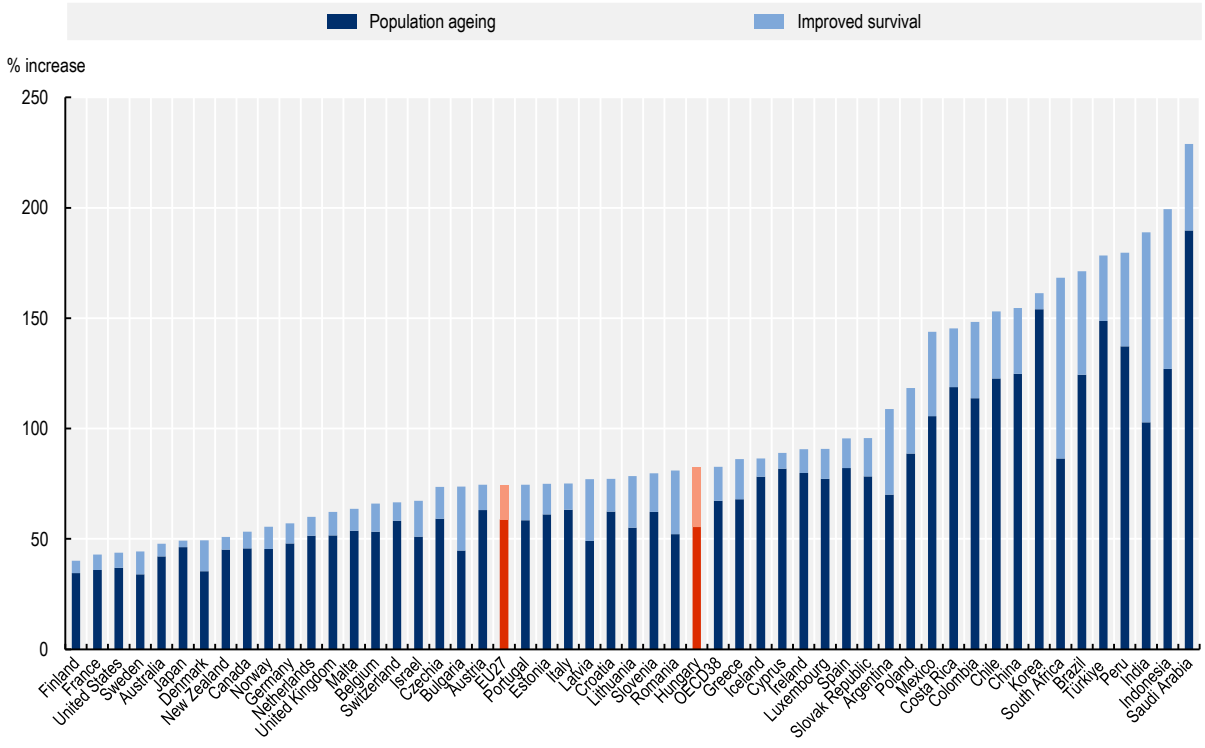
Establishing Comprehensive Cancer Centres (CCCs): CCCs, which combine comprehensive, multidisciplinary care with research and education, can provide high-quality cancer care. In Europe, the Organization of European Cancer Institutes (OECI) and the European Academy of Cancer Sciences have established complementary quality accreditation systems to test the clinical and research excellence of CCCs (Oberst, 2019[19]). A benefit of these centres is increased collaboration in innovative clinical trials. For example, in Finland, four CCCs are working together on a clinical trial to determine the efficacy and toxicity of targeted anticancer drugs (OECD, 2023[20]; ClinicalTrials.gov, 2023[21]).

By 2050, health spending on cancer could rise by up to 84% in the OECD due to ageing and better survival rates for cancer patients

Continuing to improve outcomes for cancer patients is imperative. However, the financial burden associated with a more effective management of the disease would also place a significant strain on healthcare systems worldwide. The rising cancer burden due to population ageing alone – assuming that the incidence and survival rates of cancer per age group remains unchanged – is estimated to increase the per capita cancer health expenditure by 67% between 2023 and 2050 on average in the OECD (Figure 1.7). In the scenario where survival rates are aligned to the best performing country in the OECD and EU, there is an additional 15% increase in per capita cancer health expenditure in the OECD. This is solely due to people living longer with cancer and requiring treatment for longer, and potentially being diagnosed with cancer again, and does not assume any additional costs associated with the improved outcomes.

Figure 1.7. Population ageing and improved cancer survival will increase health expenditure on cancer considerably between 2023 and 2050

The percentage increase in per capita cancer health expenditure due to population ageing and improved cancer survival rates, in 2050 vs. 2023



Source: OECD SPHeP NCDs model, 2024. See https://stat.link/4cykpo.

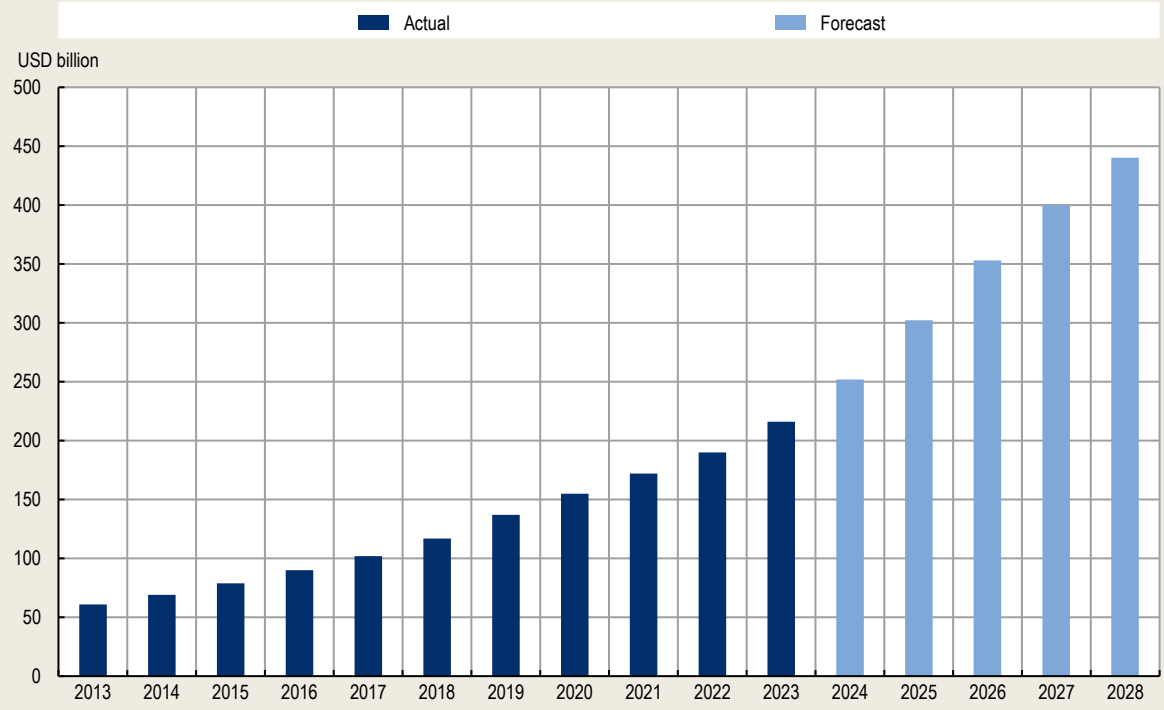
In addition, new medicines and technologies can lead to higher treatment cost (Box 1.4), and additional cost will be associated with providing follow-up care for a growing number of cancer survivors. As the trajectory of cancer treatment costs continues to rise, driven by population ageing, improved care and new technologies, optimising prevention strategies becomes even more urgent to ensure the sustainability of health services.

Box 1.4. The rising cost of cancer drugs

Recent years and decades have witnessed rising prices of new cancer medicines (Chapman, Paris and Lopert, 2020[22]). Moreover, newer drug classes of targeted therapies and immunotherapies may complement rather than replace older chemotherapy options, and tend to have longer treatment durations, which increases the costs per patient per treatment (Hofmarcher, Berchet and Dedet, 2024[18]). This has resulted in a growing spend on cancer drugs, which is expected to continue: between 2024 and 2028, global spending on oncology drugs is expected to grow by 14 to 17% per year, while most other drug classes are growing in mid-single digits (Figure 1.8) (IQVIA, 2024[23])..

Figure 1.8. Global spending on cancer medicines

USD billions

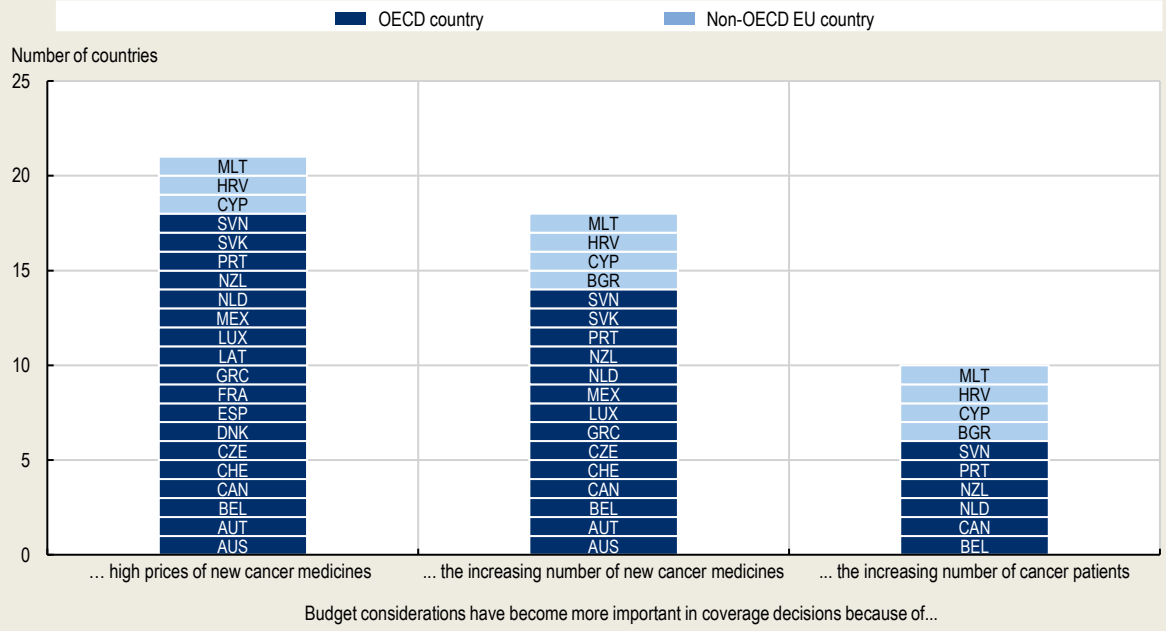


Source: IQVIA Institute for Human Data Science (2024[23]), *Global Use of Medicines: Outlook to 2028,* https://www.iqvia.com/-/media/iqvia/pdfs/institute-reports/the-global-use-of-medicines-2024-outlook-to-2028/iqvia-institute-global-use-of-medicines-2024-forweb.pdf. See https://stat.link/5dlnvy.

However, it has been argued that it is not always guaranteed that high prices of novel medicines are justified by the health benefits they confer (OECD, 2018[24]; Brinkhuis et al., 2024[25]). To manage the budget impact, it is critical to ensure "value-for-money" through the systematic use of health technology assessment (HTA) in the pricing and reimbursement process of new cancer drugs. When it comes to making decisions on reimbursement or coverage of new cancer medicines, 21 out of 27 OECD and EU countries indicate that the budget impact is increasingly important. While the increasing number of cancer patients and new cancer drugs contribute to this, most countries point to the rising prices of new medicines as the driver (Figure 1.9).

Figure 1.9 Many countries indicate that the budget impact of new cancer medicines is increasingly influencing their coverage/reimbursement decisions

Countries indicating that the budget impact of new cancer medicines has become more important for public coverage/reimbursement decisions in the last five years; based on responses from 27 countries (multiple options possible per country)



Note: Even if countries did not indicate an increasing importance of the budget impact for coverage/reimbursement decisions, it does not mean that the budget impact is not a concern in these countries. In Estonia, the importance of the budget impact has remained at the same level, yet the impact of higher prices of medicines on the financing of the budget has increased. In Iceland, the budget impact has been important for a long time, especially in the aftermath of the financial crisis in 2008 but has become less important – yet remaining important overall – as the country recovered financially.

Source: Hofmarcher, T., C. Berchet and G. Dedet (2024[18]), "Access to oncology medicines in EU and OECD countries", https://doi.org/10.1787/c263c014-en. See https://stat.link/4kzw8x.

Scaling up action to prevent the development of cancer will be crucial to alleviate the strain on healthcare systems by reducing the demand for medical services and promoting more efficient allocation of resources. Even more importantly, by investing in prevention, individuals are saved the physical, emotional, and financial tolls associated with cancer, leading to healthier, happier lives. Additionally, healthier societies are more productive, and benefit the economy. Overall, prioritising prevention aligns with principles of sustainability, efficiency, and social responsibility, ultimately contributing to stronger, more resilient societies.

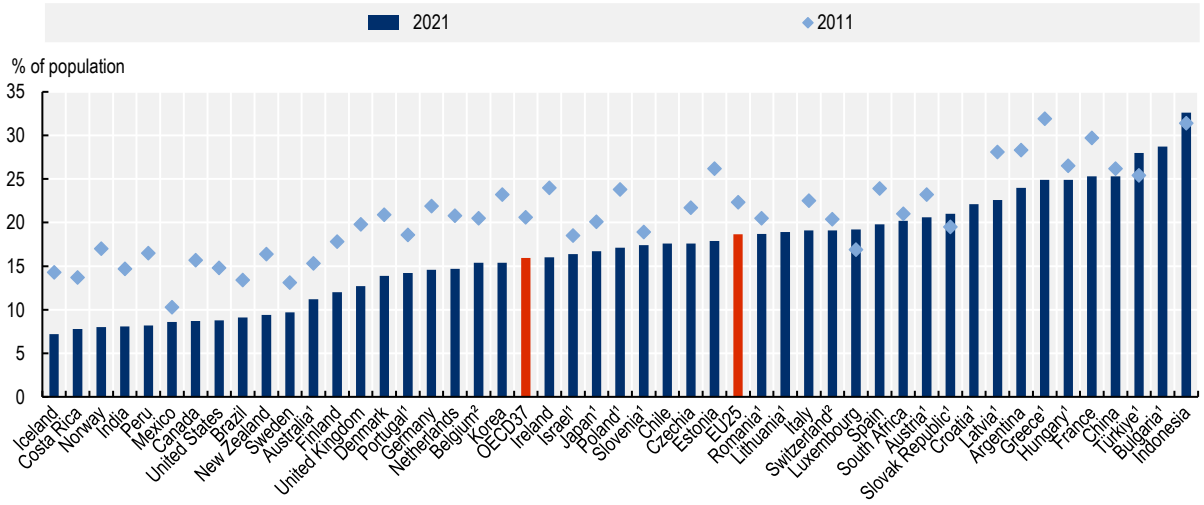
Addressing cancer risk factors would reap a wide range of benefits, but stronger action on prevention is needed

Around 40% of all cancer cases can be prevented by adopting healthier lifestyles and protection from harmful exposures (WHO, n.d.[26]; European Commission, 2021[27]). Ambitious targets on cancer risk factors, and strong policy action to achieve them, should therefore be a cornerstone of the battle against cancer. Six major behavioural risk factors that should be considered in any cancer prevention strategy are tobacco use, harmful alcohol use, diet, air pollution, overweight and obesity, and low physical activity.

Progress on addressing these risk factors has been mixed. Tobacco smoking is the leading cause of cancer, and between 2011 and 2021, almost all countries saw a decrease in smoking prevalence (Figure 1.10). However, smoking remains common in the OECD, with 16% of adults smoking daily in 2021. The greatest drops were seen in countries where rates were already lower. As a result, differences between countries have increased, and rates now vary nearly four-fold across OECD countries.

Figure 1.10. The prevalence of tobacco smoking has decreased in recent years but remains high

Population aged 15 and over smoking daily, 2011 and 2021 (or nearest years)



1. Data from 2019. 2. Data from 2017-18.
Source: OECD Health Statistics 2023. See https://stat.link/fqoun5.

Contrary to tobacco smoking, alcohol consumption has changed little over the past decade. The average per capita consumption in the OECD has gone from 8.9 litres in 2011 to 8.6 in 2021; and in around 40% of countries the consumption of alcohol increased (OECD, 2023[28]). Other cancer risk factors also remain prevalent in the OECD (Table 1.1). On average, only 15% of adults in the OECD eats at least five portions of fruit and vegetables daily, ranging from 2% to 33% (OECD, 2023[28]). Overweight and obesity have been increasing, and in most OECD countries, over half of the population is now either overweight or obese. Only 40% of adults in the OECD meets the WHO recommended 150 minutes of physical activity per week, ranging across countries from 5% to 76%. Despite some progress, in 2020 all OECD countries except Finland had air pollution levels above the WHO guideline of 5$\mu g/m^3$, with five-fold variation across countries (OECD, 2024[4]).

Table 1.1. Major cancer risk factors

Daily tobacco smoking rates among population aged 15 and over, 2021 (or nearest year); Alcohol consumption in litres per capita among population aged 15 and over, 2021 (or nearest year); Self-reported overweight and obese adults (BMI>25), 2021 (or nearest year); Proportion of adults reporting spending at least 150 min per week on physical activity, 2021 or most recent (2019 for EU countries); Daily consumption of five or more portions of fruit and vegetables among adults, 2019 (or nearest year); Mean annual population exposure to fine particulates (PM2.5), 2020

	Tobacco	Change 2011-2021	Alcohol consumption	Change 2011-2021	Air pollution	Change 2000-2020	Overweight and obesity	Physical activity	Fruit and vegetable consumption
Argentina	24.0	▼ -4.3	8.0	▲ 0.3	14.3	▼ -2.5			
Australia	11.2	▼ -4.1	9.5		8.1	▲ 1.0	47.6	71.3	
Austria	20.6	▼ -2.6	11.1	▼ -0.8	10.9	▼ -8.2	51.1	43.8	5.6
Belgium	15.4	▼ -5.1	9.2	▼ -0.9	11.1	▼ -8.2	49.3	29.3	15.3
Brazil	9.1	▼ -4.3	9.8	▲ 0.6	11.6	▼ -2.9	57.3	30.1	
Bulgaria	28.7		11.2	▲ 1.3	17.2	▼ -7.9		11.3	5.0
Canada	8.7	▼ -7.0	8.3	▲ 0.1	6.3	▼ -3.1	55.4	49.0	22.2
Chile	17.6		7.1	▶ 0.0	23.2	▼ -5.0	67.7		
China	25.3	▼ -0.9	4.5	▼ -0.9	34.5	▼ -13.5			
Colombia			4.1	▼ -0.2	13.9	▼ -10.9			
Costa Rica	7.8	▼ -5.9	3.1	▼ -0.2	14.1	▼ -6.9			
Croatia	22.1		9.6	▼ -1.4	15.8	▼ -6.4	63.8	19.9	9.8
Czechia	17.6	▼ -12.3	11.6	▲ 0.1	14.1	▼ -6.3	58.4	25.1	7.6
Denmark	13.9	▼ -7.0	10.4	▼ -0.6	8.9	▼ -6.4	52.6	55.4	23.1
Estonia	17.9	▼ -8.3	11.1	▼ -0.9	6.1	▼ -5.4	52.7	25.8	13.2
Finland	12.0	▼ -5.8	8.1	▼ -1.7	4.9	▼ -3.2	60.0		13.5
France	25.3	▼ -4.4	10.5	▼ -1.9	9.5	▼ -6.3	45.3	27.4	19.8
Germany	14.6	▼ -7.3	10.6	▼ -0.7	10.3	▼ -7.8	52.7	49.0	10.8
Greece	24.9	▼ -7.0	6.3	▼ -1.2	14.2	▼ -9.8	57.2	19.6	12.3
Hungary	24.9	▼ -1.6	10.4	▼ -1.0	14.0	▼ -6.6	58.2	32.3	8.3
Iceland	7.2	▼ -7.1	7.4	▲ 0.6	5.5	▼ -2.6	58.6	55.9	8.8
India	8.1	▼ -6.6	3.1	▲ 0.1	47.4	▼ -12.5			
Indonesia	32.6	▲ 1.2	0.1	▶ 0.0	17.5	▼ -7.6			
Ireland	16.0	▼ -8.0	9.5	▼ -2.2	8.0	▼ -4.3	56.0	37.3	33.1
Israel	16.4	▼ -2.1	3.1	▲ 0.3	18.6	▼ -6.2	54.7		
Italy	19.1	▼ -3.4	7.7	▲ 0.7	14.3	▼ -11.2	46.2	19.7	10.7
Japan	16.7	▼ -3.4	6.6	▼ -0.7	12.6	▼ -0.1		53.6	
Korea	15.4	▼ -7.8	7.7	▼ -1.2	25.3	▲ 0.7	30.6	45.6	31.8
Latvia	22.6	▼ -5.5	12.2	▲ 2.1	11.8	▼ -11.1		20.2	7.2
Lithuania	18.9		12.1	▼ -2.6	9.2	▼ -8.7	55.0	20.9	16.2
Luxembourg	19.2	▲ 2.3	11.0	▼ -0.8	8.7	▼ -5.6	48.4	44.9	13.7
Mexico	8.6	▼ -1.7	5.1	▲ 1.1	14.4	▼ -15.2			
Netherlands	14.7	▼ -6.1	8.1	▼ -0.9	10.8	▼ -8.2	48.5	62.0	30.1
New Zealand	9.4	▼ -7.0	8.8	▼ -0.7	6.3	▼ -0.2		51.9	
Norway	8.0	▼ -9.0	7.4	▲ 1.0	6.1	▼ -4.5	52.0	67.6	8.6
Peru	8.2	▼ -8.3	5.7	▲ 0.5	26.0	▼ -40.6			
Poland	17.1	▼ -6.7	11.0	▲ 0.7	17.8	▼ -7.7	56.6	20.3	8.6
Portugal	14.2	▼ -4.4	10.4	▼ -0.5	8.3	▼ -5.3	53.5	16.9	14.7
Romania	18.7	▼ -1.8	11.0	▲ 1.4	13.8	▼ -6.4	66.9	8.0	2.4
Slovak Republic	21.0	▲ 1.5	9.6	▼ -0.6	15.3	▼ -6.0	57.7	30.5	8.5
Slovenia	17.4	▼ -1.5	10.6	▶ 0.0	14.0	▼ -6.4	56.5	32.6	5.3
South Africa	20.2	▼ -0.8	7.2	▶ 0.0	22.9	▼ -0.6			
Spain	19.8	▼ -4.1	10.5	▲ 0.9	9.7	▼ -6.4	50.2	35.4	11.2
Sweden	9.7	▼ -3.4	7.6	▲ 0.3	5.6	▼ -4.1	51.3	56.4	7.6
Switzerland	19.1		8.5	▼ -1.0	9.0	▼ -7.2	41.9	76.0	
Türkiye	28.0	▲ 2.6	1.4	▼ -0.1	22.1	▼ -0.9	56.1	5.4	2.8
United Kingdom	12.7	▼ -7.1	10.0	▲ 0.1	9.7	▼ -6.1	63.7	61.4	23.7
United States	8.8	▼ -6.0	9.5	▲ 0.8	7.7	▼ -4.9	67.5	47.9	

Note: For each risk factor, the best performance is coloured green, the worst in red, and points in between are coloured proportionally. Grey means missing data.

Source: OECD (2023[28]), *Health at a Glance 2023: OECD Indicators*, https://www.doi.org10.1787/7a7afb35-en/; OECD (2024[29]), *OECD Data Explorer: Exposure to air pollution* ; OECD (2024[30]), *Beating Cancer Inequalities in the EU: Spotlight on Cancer Prevention and Early Detection* https://www.doi.org/10.1787/14fdc89a-en.

Various global or international policy targets have been set to encourage countries to take action to address risk factors (Table 1.2). These policy targets were used in the OECD SPHeP NCDs model to evaluate the potential impact of addressing risk factors on cancer. This analysis estimates that achieving the policy targets for the six risk factors together could prevent around 8% of all cancer cases, 12% of premature deaths due to cancer, and reduce the burden of cancer on health expenditure by 9% (Figure 1.11).

Table 1.2. Policy targets on risk factors

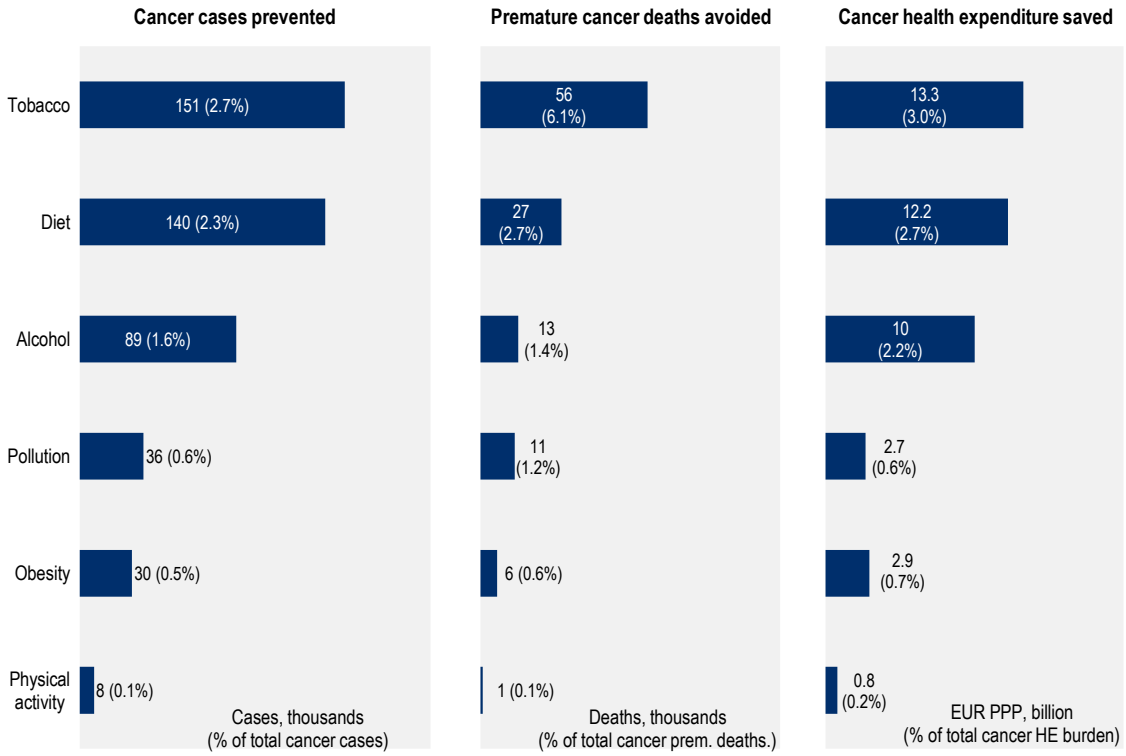
Risk factor	Policy target	Source
Tobacco	30% reduction in tobacco use by 2025 relative to 2010 levels; less than 5% of the population uses tobacco by 2040	*WHO Global Action Plan (WHO-GAP) on Non-communicable diseases (NCDs)* (WHO, 2013[31]) *and Europe Beating Cancer Plan* (European Commission, 2021[27])
Alcohol	20% reduction in the harmful use of alcohol by 2030 relative to 2010 levels (modelled as a 20% reduction in the total use of alcohol, plus at least a 20% reduction in binge drinking prevalence over 2010-30)	*WHO Global Alcohol Action Plan 2022-30* (WHO, 2024[32])
Air pollution	Annual average PM2.5 level capped at 10 µg/m3 by 2030; 5 µg/m3 by 2050	*Proposal on new EU air quality standards* (European Parliament, 2024[33]) *and WHO Global Air Quality Guideline* (WHO, 2021[34])
Obesity	Halt the rise in obesity by 2025 relative to 2010 (i.e. revert back to 2010 levels of obesity)	*WHO-GAP* (WHO, 2013[31])
Physical activity	A 15% increase in physical activity levels for everyone by 2030, relative to 2016 levels	*Based on WHO Global Action Plan on Physical Activity* (WHO, 2018[35]), *adjusted to increase coverage*
Diet	By 2025, everyone consumes less than 18g of processed meat and 52g of red meat per day; and more than 80g of whole grains; 250g of fruit; 250g of vegetables per day; plus a 30% reduction in mean intake of salt/sodium relative to 2010	*National dietary guidelines; WHO-GAP on NCDs for sodium* (WHO, 2013[31])

Note: For more details on the policy targets, see Chapter 5.

Source: OECD analysis of European Commission (2021[27]), *Europe's Beating Cancer Plan* (2021[27]), https://health.ec.europa.eu/document/download/26fc415a-1f28-4f5b-9bfa-54ea8bc32a3a_en; WHO (2013[31]), *Global action plan for the prevention and control of noncommunicable diseases 2013-20*, https://iris.who.int/handle/10665/94384; WHO (2018[35]), *Global action plan on physical activity 2018-2030*, https://iris.who.int/handle/10665/272722; WHO (2022[36]), *Seventy-fifth World Health Assembly: Resolutions and decisions annexes*, https://iris.who.int/handle/10665/365610; WHO (2021[37]), *Global alcohol action plan: Second draft, unedited*, www.who.int/publications/m/item/global-alcohol-action-plan-second-draft-unedited; EAT-Lancet Commission (2019[38]); *Food Planet Health: Healthy Diets From Sustainable Food Systems – Summary Report*, https://eatforum.org/eat-lancet-commission/eat-lancet-commission-summary-report/; WHO (2022[39]) *WHO manual on sugar-sweetened beverage taxation policies to promote healthy diets*, https://iris.who.int/handle/10665/365285; Bennett, J. et al. (2020[40]), "NCD Countdown 2030: pathways to achieving Sustainable Development Goal target 3.4", https://doi.org/10.1016/s0140-6736(20)31761-x; European Parliament (2023[41]), *Texts adopted – Ambient air quality and cleaner air for Europe*, www.europarl.europa.eu/doceo/document/TA-9-2023-0318_EN.html; WHO (2021[34]), *WHO global air quality guidelines: particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide*, https://apps.who.int/iris/handle/10665/345329; WHO (2024[32]), *Global Alcohol Action Plan 2022-2030*, https://iris.who.int/handle/10665/376939.

Figure 1.11. Tobacco remains the most important policy area for cancer prevention in the OECD

Cancer cases prevented (thousands and as a percentage of total number of cancer cases), premature cancer deaths avoided (thousands and as a percentage of total cancer premature mortality), and cancer health expenditure saved (EUR PPP billions and as a percentage of total burden of cancer on health expenditure) if policy targets on key cancer risk factors were achieved, total for OECD countries, per year, average over 2023-50



Source: OECD SPHeP NCDs model, 2024. See https://stat.link/36fizb.

Action on tobacco smoking remains a fundamental element of any cancer prevention strategy, despite the progress that has already been made. Tobacco accounts for 40-60% of the total impact of action on risk factors across the different outcomes. If the policy target on tobacco were achieved, countries would prevent 151 000 cases of cancer per year in the OECD (67 000 in the EU), and 56 000 premature deaths per year – 6.1% of total premature mortality due to cancer (28 000 and 7.8% in the EU). It would also save health systems EUR PPP 13.3 billion each year in cancer health expenditure – 3.0% of total burden of cancer on health expenditure – more than the total annual health budget of Hungary.

However, it is crucial that policy makers go beyond tobacco control, and develop cancer prevention strategies that effectively target a wider set of risk factors. This includes more ambitious targets on physical activity and obesity. The results presented here are based on the international policy target set for each risk factor, and the relatively small impact from addressing obesity and physical activity is in part a reflection of the limited ambition of these targets. While reaching the target on tobacco (*a 30% relative reduction in tobacco use by 2025 versus 2010, and that less than 5% of the population using tobacco by 2040*) would see a considerable impact on smoking rates, the target on obesity (*to reduce current levels of obesity down to those observed in 2010*) would do little to tackle high obesity levels.

The air pollution target would have seen greater impact if its timeline was shorter. For most other risk factors, the scenarios reach their target value by 2025 or 2030. For air pollution, the current policy targets aims to achieve a level of 10 μg/m³ by 2030 and the WHO Global Air Quality Guideline of 5 μg/m³ by 2050

(European Parliament, 2024[33]), which is reflected in the analyses as a linear decrease over time to reach the two targets. Moreover, under the current EU proposal, the 2030 deadline to achieve the intermediary target of 10 µg/m³ can be postponed by ten years under certain circumstances, which would further reduce the impact on cancer.

Stronger action is also needed to achieve these targets. It is estimated that, of OECD, G20 and EU countries, only Estonia and Latvia have a 20% or greater chance of reaching the obesity target for women under a business-as-usual situation. No country in the OECD, G20 or EU has a greater than 5% chance of reaching the target for men in absence of stronger policy action (World Obesity Federation, 2020[42]). The WHO Global Status Report on Physical Activity 2022 found that, if current physical activity trends continue, the global target of a 15% relative reduction in physical inactivity by 2030 will not be met (WHO, 2022[43]). And while the average PM2.5 exposure level fell from 17.5 to 11.6 µg/m³ between 2000 and 2020 in OECD countries, this is still well above the final target of 5 µg/m³ by 2050, or the 10 µg/m³ by 2030 (or 2040 under certain circumstances) target for EU Member States (OECD, 2024[4]).

Stronger action on risk factors would not just benefit cancer. All of these risk factors are linked to other non-communicable diseases (NCDs), including cardiovascular disease, diabetes, chronic respiratory disease, dementia and depression. Action on risk factors would therefore have an additional impact on disease incidence, mortality and healthcare cost through other NCDs. It would also increase workforce productivity and contribute to a higher GDP.

In addition, policies on harmful alcohol use and diet would provide societal benefits to the environment (Box 1.5) and safety. Across the OECD, it would prevent 5 645 premature deaths due to interpersonal violence each year, as well as 9 246 premature deaths due to road traffic accidents (309 and 2065 in the EU). For both this is around 10% of the total number of premature deaths from these causes.

Box 1.5. The impact of achieving the diet targets on the environment

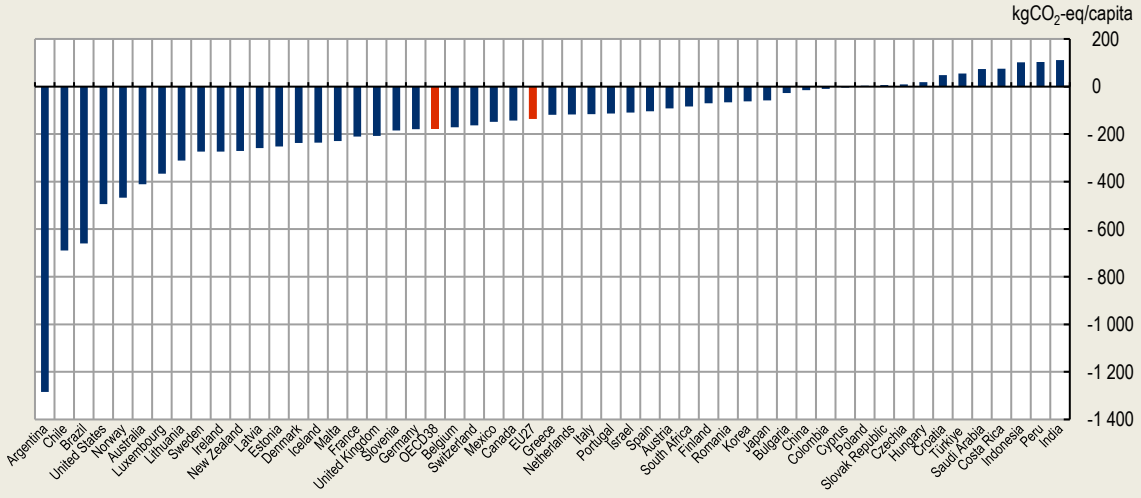
There are strong links between our diet and the environment. About one-third of all anthropogenic (human-caused) greenhouse gas (GHG) emissions are linked our food system (Crippa et al., 2021[44]). This includes land-use, production (farming and harvesting), processing, transporting and distribution, packaging, cooking and disposing of waste. To reflect the relationship between diet and the environment, the OECD SPHeP NCDs model links the dietary factors to GHG emissions, using data from the WHO Diet Impact Assessment model (WHO, 2023[45]).

If everyone in the OECD were to adhere to the diet policy targets, this is estimated to reduce GHG emissions by 304 Mt of carbon dioxide (CO2) equivalent per year (56 in the EU). This is the amount of GHG associated with more than 72 million gasoline-powered passenger vehicles (13 million in the EU) (EPA, 2024[46]), or the number of cars in Germany and Spain combined.

As meat has one of the largest footprints when it comes to GHG emissions, countries with a higher baseline consumption of meat generally see a greater impact on per capita GHG emissions from meeting the diet policy targets (Figure 1.12). However, other factors also influence the relative impact: Argentina's baseline consumption of meat is average, but a high proportion of meat consumption is beef (as opposed to pork or lamb, which have lower emission footprints). In addition, Argentina has relatively high emissions per kilo of beef due to local production inputs and methods. As a result, the per capita impact in Argentina is much higher than for other countries.

Figure 1.12. Impact of achieving the diet targets on GHG emissions

Change in per capita GHG emissions, kgCO2-eq per year, average over 2023-50



Note: Differences between countries are influenced by baseline consumption of target food groups, mix of animal products consumed, and the country-specific emission intensity of the food groups.
Source: OECD SPHeP NCDs model, 2024, and WHO (2023[45]) Diet Impact Assessment model. See https://stat.link/s8690n.

In countries where meat, and in particular beef, consumption is low, the additional GHG emissions from increased fruit, vegetables and whole grain consumption can outweigh the reduction related to meat. In this case, GHG emissions can increase under the diet policy target. However, it is important to note that the scenario assumes no substitution, and that any increase in consumption is on top of current dietary intake. For whole grain, an increase in consumption is likely to come from substituting processed grain, rather than additional grain consumption to meet the whole grain target. In that case, the amount of raw product needed will not be substantially affected, and the impact on GHG emissions would in fact be minimal.

A wide range of effective policies exist to address the major risk factors of cancer and reap the many benefits (Table 1.3). The least intrusive policies increase the choices available to people or decrease the cost of certain choices. For example, improving cycling and walking infrastructure can increase physical activity and reduce air pollution. Policies can also modify preferences through persuasion or provision of information; or by increasing the price of certain choices. Finally, there is the option to regulate, up to forbidding, certain options. This can be selective or partial, such as forbidding to smoke or the sale of alcohol to underage people.

Table 1.3. Policies of varying degree of intrusiveness are available to address cancer risk factors

Risk Factor	Improving choice options available	Modifying preferences based on choice characteristics	Increasing price of selected choice options	Banning selected choice options
Tobacco		Regulating packaging*; health warning labelling*; ban tobacco advertising, promotion, and sponsorship*; mass media campaigns*	Increase tobacco taxation*	Ban sales to minors; control illicit tobacco trade; regulate contents of tobacco products
Air pollution	Increase urban green areas; improve cycling and walking infrastructure; subsidise low emissions vehicles	Information and communication campaigns on ways to improve air quality	Higher taxes on higher polluting vehicles; congestion charges; increase fuel prices	Ban highest polluting vehicles
Alcohol	Increase availability of non-alcoholic alternatives at social venues	Advertising restrictions*; nutrition and health warning labels; promote "dry" months; information campaigns	Increase taxation*; introduce minimum unit pricing	Restrictions on hours and days of alcohol sales *; minimum legal purchasing age; penalties for drink driving
Physical activity	Create active spaces and recreational areas; improve cycling and walking infrastructure; invest in sports infrastructure	Provide information on available activities and resources/facilities; physical education in schools; campaigns on the importance of physical activity	Implement congestion charges; increase fuel prices	
Diet	Subsidies for healthy foods; increase availability of health choices in schools, workplaces and supermarkets through public food procurement policies*; community gardens	Front-of-pack food labelling*; improve food and health literacy; enhance food and nutrition skills (e.g. cooking classes); restrictions on food advertising to children*; mass media campaigns*	Impose tax on products high in sugar, saturated fats, and salt	Ban trans-fats from food supply*
Obesity	*The policy actions for overweight and obesity mirror those examples used for diet and physical activity*			

Note: This table aims to provide examples of different policies across risk factors, and is not exhaustive. Policies with an * are part of the WHO NCD Best Buys to tackle NCDs. However, this does not imply that the other policies are not cost-effective and feasible.

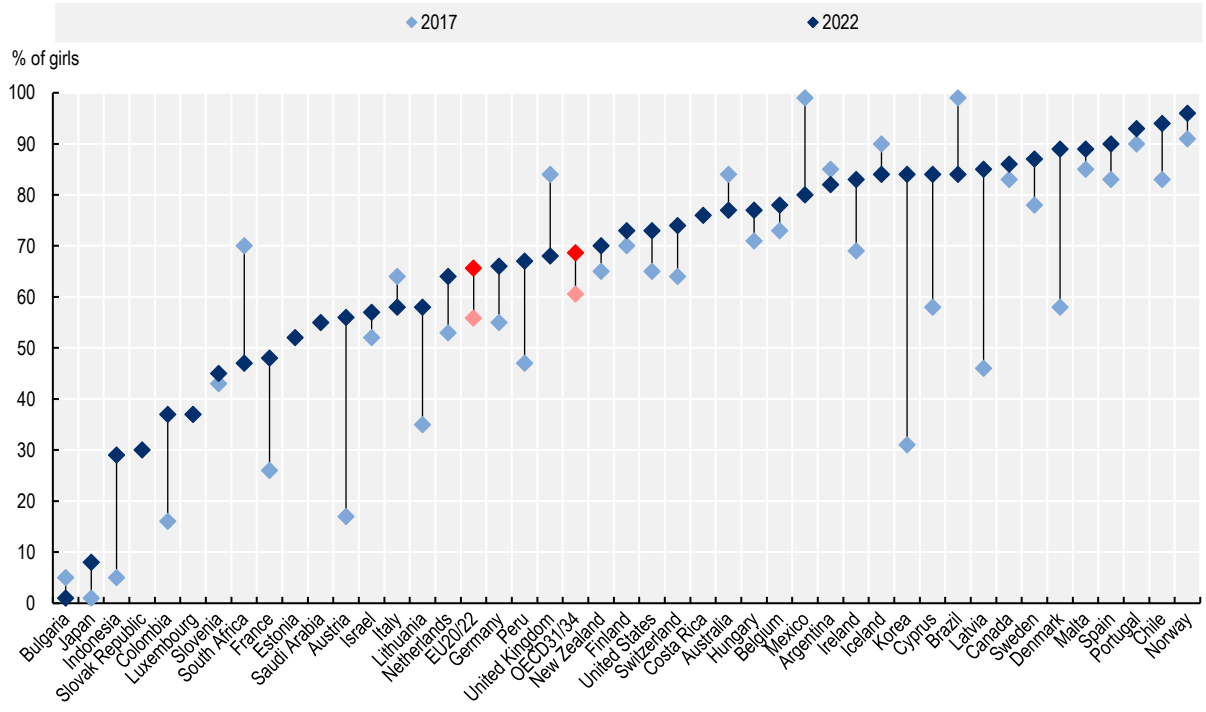
Source: Sassi, F. and J. Hurst (2008[47]), "The prevention of lifestyle-related chronic diseases: an economic framework", https://doi.org/10.1787/243180781313; WHO (2003[48]), *WHO Framework Convention on Tobacco Control*, https://iris.who.int/handle/10665/42811; European Commission (2021[49]), "Pathway to a Healthy Planet for All EU Action Plan: 'Towards Zero Pollution for Air, Water and Soil'", *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions*, https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=COM%3A2021%3A400%3AFIN; OECD (2021[50]), *Preventing Harmful Alcohol Use*, https://doi.org/10.1787/6e4b4ffb-en; WHO (2018[35]), *Global action plan on physical activity 2018-2030: more active people for a healthier world*, https://iris.who.int/handle/10665/272722; OECD (2019[51]), *The Heavy Burden of Obesity: The Economics of Prevention*, https://doi.org/10.1787/67450d67-en; WHO (2015[52]), *Fiscal policies for diet and prevention of noncommunicable diseases: technical meeting report*, https://iris.who.int/handle/10665/250131; Gelius, P. et al. (2020[53]), "What are effective policies for promoting physical activity? A systematic review of reviews", https://doi.org/10.1016/j.pmedr.2020.101095; OECD/WHO (2023[54]), *Step Up! Tackling the Burden of Insufficient Physical Activity in Europe*, OECD Publishing, Paris, https://doi.org/10.1787/500a9601-en; WHO (2023[55]), *More ways, to save more lives, for less money: World Health Assembly adopts more Best Buys to tackle noncommunicable diseases*, https://www.who.int/news/item/26-05-2023-more-ways--to-save-more-lives--for-less-money----world-health-assembly-adopts-more-best-buys--to-tackle-noncommunicable-diseases.

HPV vaccination offers a unique opportunity to protect future generations from cervical cancer and prevent nearly 9 in 10 premature deaths

Vaccines against human papillomavirus (HPV) infection are safe and highly effective in preventing infection with HPV, and the cancers it causes. As a result, they have been added to the national immunisation programmes of nearly all OECD and EU countries. However, the population coverage remains low: only four OECD countries (Spain, Portugal, Chile and Norway) achieved the target of vaccinating at least 90% of girls in 2022 (Figure 1.13). While the average coverage in the OECD was 69% in 2022 (EU 56%), this varied from 8% in Japan to 96% in Norway.

Figure 1.13. HPV vaccination coverage remains well under the 90% target in almost all countries

HPV vaccination programme coverage, first dose, females, in 2017 and 2022

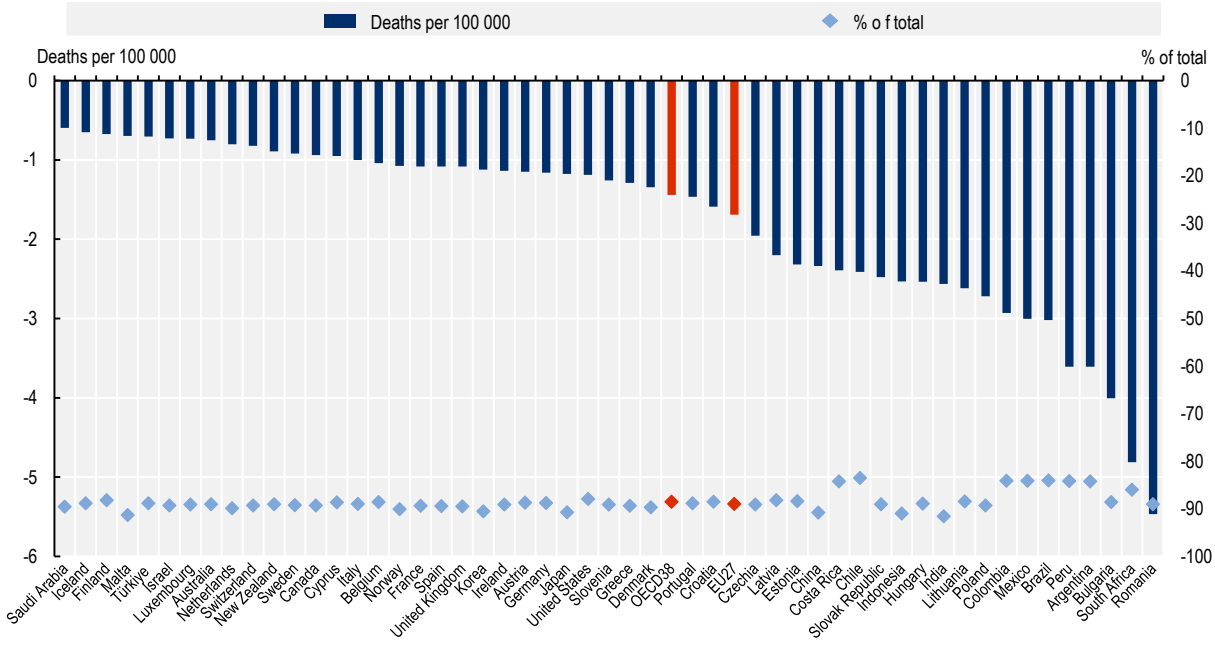


Note: Averages for 2017 covers 20 EU countries and 31 OECD countries, while the 2022 average includes 22 EU and 34 OECD countries.
Source: WHO Immunisation Data (2024[56]) https://immunizationdata.who.int/global/wiise-detail-page/human-papillomavirus-(hpv)-vaccination-coverage?CODE=BGR&YEAR=. See https://stat.link/hycld0.

Optimally implemented vaccination schemes could prevent between 84% and 92% of all cervical cancer cases, and 89% of all premature mortality due to cervical cancer (Figure 1.14). It would also reduce the total burden of cancer on health expenditure by 1.3% on average in OECD (1.6% in the EU), and add the equivalent of 120 000 full-time workers to the OECD workforce (40 000 to the EU). In monetary terms, this equates to a workforce output of EUR PPP 5.7 billion per year in the OECD (EUR PPP 1.6 billion in the EU).

Figure 1.14. Optimally implemented HPV vaccination schemes could prevent nearly nine in ten premature deaths from cervical cancer

Impact of HPV vaccination on premature mortality (deaths in people aged under 75) due to cervical cancer, per 100 000 population and as a percentage of total premature mortality due to cervical cancer, per year, average over 2023-50*



Note: *Estimates cover the period 2023-50, but they assume optimal coverage and protection from cervical cancer from the beginning. In other words, they reflect the maximum potential impact of HPV vaccination, and not a scenario where optimal vaccine uptake is achieved over time, and where the protective effect against cervical cancer is observed down the line. For more information on the methodology, see Annex 6.A of Chapter 6.

Source: OECD SPHeP NCDs model, 2024, using inputs from the ATLAS model by IARC; Bonjour, M. et al., (2021[57]), "Global estimates of expected and preventable cervical cancers among girls born between 2005 and 2014: a birth cohort analysis", https://doi.org/10.1016/S2468-2667(21)00046-3. See https://stat.link/u1je89.

To benefit fully from the impact of HPV vaccination on population health, healthcare expenditure and workforce productivity, countries should increase uptake and coverage by:

- Evaluating the benefits and challenges of adopting a single-dose schemes and considering its implementation based on the national circumstances: while initially a two-dose schedule was advised, a single-dose schedule has recently been found to provide sufficient protection for the primary target of young girls (excluding immunocompromised or HIV-infected people). Moving to a single-dose schedule could provide various benefits, including cost-savings, simplified logistics and increased acceptability by the public.
- Considering catch-up vaccination if and where needed: Catch-up vaccination targets individuals who have not received doses of the vaccine for which they are eligible. This can increase coverage, while improving the resilience of the programme against interruptions.
- Addressing misinformation: Misinformation is a powerful threat to vaccination campaigns, including for HPV. To address this, comprehensive multimedia campaigns are needed, which address the specific concerns of parents; monitor and engage with social media; and benefit from wide and authoritative support.

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2 Cancer – the current and future burden

This chapter presents past, current and future trends in cancer and its risk factors in OECD, OECD accession and selected partner countries, European Union (EU27) member states and Group of 20 (G20) countries. It shows that while age-adjusted cancer incidence and mortality have decreased, population ageing will increase the absolute cancer burden. It also looks at the prevalence of key cancer risk factors, such smoking, alcohol consumption, diet, physical activity, overweight and air pollution, and shows how some population groups are more likely to be exposed to these risks.

In Brief

Despite significant advances, cancer remains a large and growing public health challenge

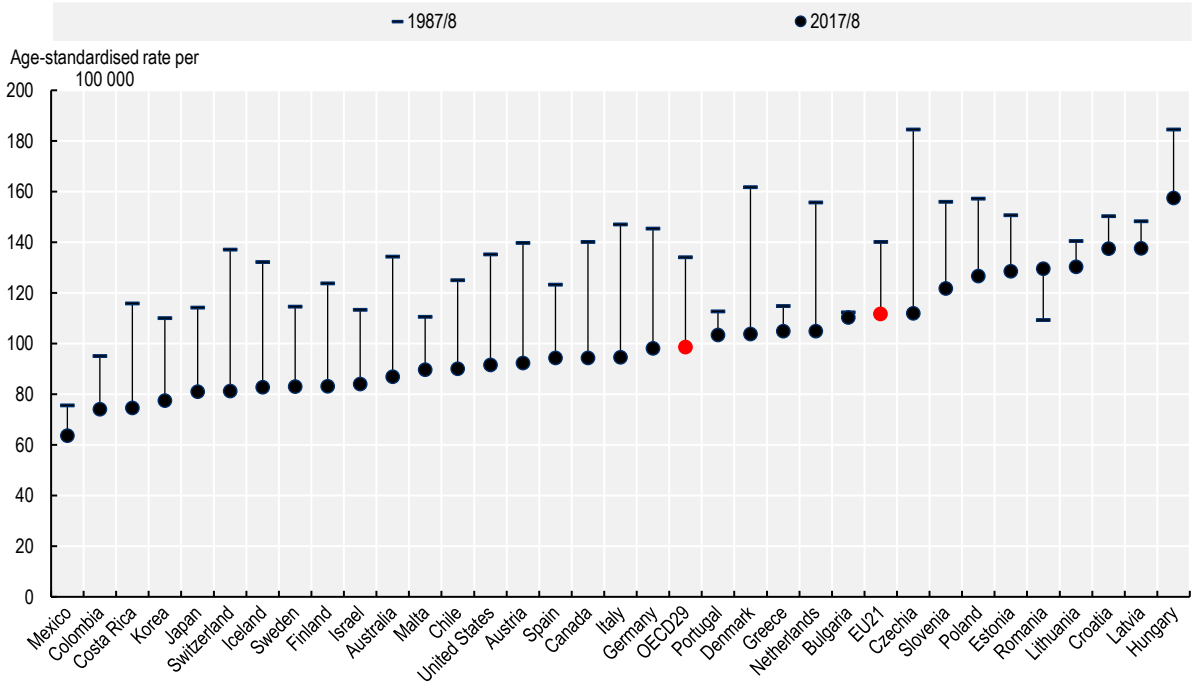
- Our battle against cancer has seen great progress. In almost all OECD countries, age-standardised cancer mortality rates have dropped, with the average decreasing by 26% over the past three decades.
- Despite the advances made in cancer prevention and treatment, cancer remains a leading cause of death and disability. In 2019, 28% of all deaths were due to cancer in the OECD, and 29% in the EU.
- In women, lung, breast and colorectal cancer accounted for nearly half of all cancer deaths in 2019 in OECD and EU countries (46%), while for men, nearly half of all cancer deaths (49%) were from lung, colorectal and prostate cancer.
- Age-standardised cancer incidence rates vary more than 3-fold across OECD countries, which is driven in part by differences in exposure to major cancer risk factors:
  - Tobacco smoking is the leading cause of cancer, and smoking rates vary nearly four-fold across OECD countries, from 7.2% of the population smoking daily in Iceland to 28% in Türkiye.
  - There is considerable variation between countries in alcohol consumption, ranging from nearly zero to over 12 litres of pure alcohol per capita per year, equivalent to 133 bottles of wine.
  - Over half of the population is either pre-obese or obese in most OECD countries.
  - The proportion of adults who meet the WHO recommended 150 minutes of physical activity per week ranges from 5% to 76%.
  - Despite progress on air pollution, exposure to $PM_{2.5}$ remains above the WHO guideline of $5_{\mu g}/m^3$ in all OECD countries, with five-fold variation across countries in 2020.
- There is also variation within countries, as people with lower education and on lower incomes are more likely to be exposed to risk factors and less likely to participate in screening.
- Age is an important factor in determining a person's cancer risk. This means that, as populations continue to age in the future, governments are facing an even larger cancer burden. The number of cancer cases in OECD countries is expected to grow by 44% on average over the next 30 years (30% in the EU).

Cancer remains a leading cause of death and disability in OECD and EU countries

In our battle against cancer (Box 2.1), considerable progress has been made. Our understanding of causes and risk factors has improved, and new treatments are being developed constantly. Because of these advances, the chance of dying from cancer at a certain age has decreased substantially over the last three decades. In almost all OECD and EU countries, age-standardised cancer mortality rates have dropped, with the OECD average decreasing by 26% between 1987/8 and 2017/8 (20% in the EU) (Figure 2.1).

Figure 2.1. Age-standardised cancer mortality has fallen over the past three decades

Age-standardised mortality rates (per 100 000 population) for all cancer sites, in 1987/8 and 2017/8



Note: Age-standardised to world population, all sites excluding non-melanoma skin cancer.
Source: IARC (n.d.[1]), Global Cancer Observatory, https://gco.iarc.fr/.

StatLink https://stat.link/5kevor

Box 2.1. What is cancer?

Cancer is a disease that occurs when the body's cells start to grow uncontrollably. Normally, cells grow, divide, and die in a regulated way. But in cancer, this process goes haywire, and cells keep dividing. This can result in a lump called a tumour. Cancer can start almost anywhere in the human body – there are more than 200 different types of cancer. Treatment often involves removing the tumour, killing the cancer cells, stopping their growth, or preventing them from spreading further.

Cancer is a genetic disease, in that it is caused by changes, or mutations, in genes that control cell growth and division. It is important to note that it typically takes several gene mutations for a cell to become cancerous. These mutations are often in genes involved in cell growth and division, genes that normally suppress cell growth, or genes repairing other genes.

As cancer originates in our genes, genetic predisposition is an important risk factor. Mutations associated with cancer can be inherited from parents. For some cancer types, genes have been identified that significantly increase one's cancer risk. For example, people with a mutation in the BRCA (BReast CAncer) 1 or 2 gene have a 50% chance of getting breast cancer before the age of 70, compared to only 7% in people without such a mutation (CDC, 2023[2]).

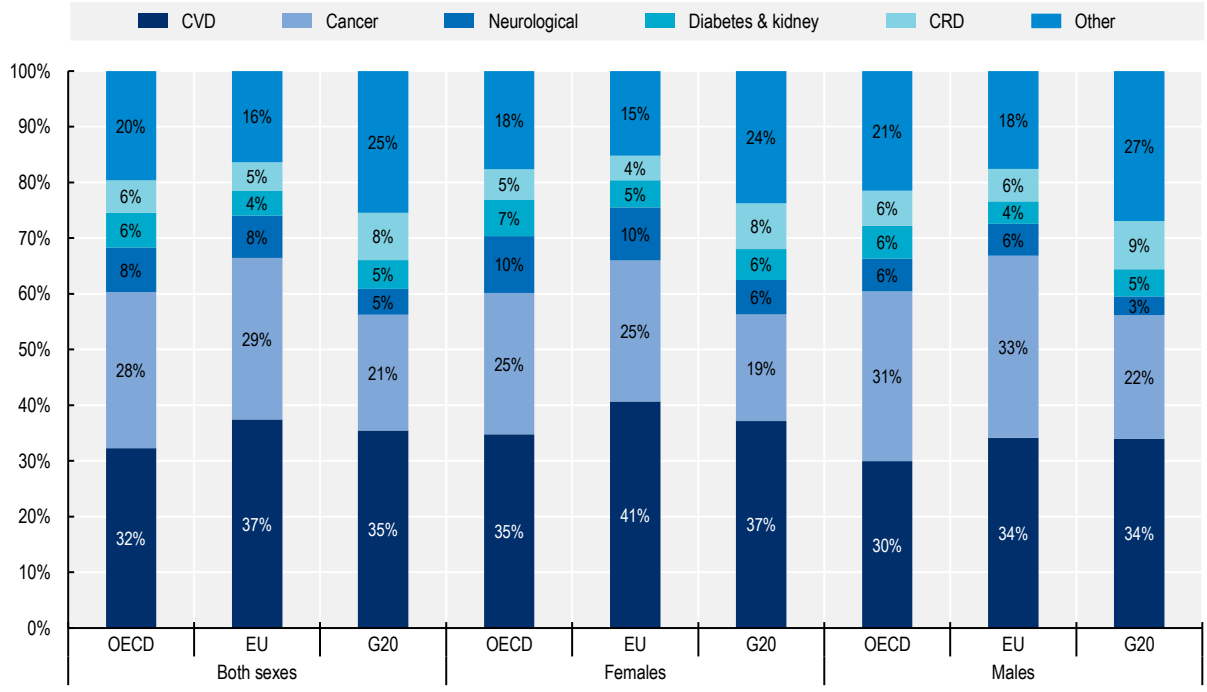
But mutations are not just inherited, they can also be acquired during the lifetime. This can be due to random errors during cell division, or external factors. These can be environment factors (e.g. air pollution, asbestos, or sun exposure) or behavioural factors (e.g. tobacco smoking, alcohol use, diet). Some infections, such as human papillomavirus (HPV) and hepatitis B and C, can also introduce changes in the genetic material.

Source: American Cancer Society (2022[3]), *Gene changes and cancer*, www.cancer.org/cancer/understanding-cancer/genes-and-cancer/gene-changes.html; National Cancer Institute (2021[4]), *What Is Cancer?*, www.cancer.gov/about-cancer/understanding/what-is-cancer; Cancer Research UK (n.d.[5]), *What is cancer?*, www.cancerresearchuk.org/about-cancer/what-is-cancer.

But despite this progress, cancer remains a major public health concern. In women, one in four deaths (25%) are due to cancer in the OECD and EU (Figure 2.2). Men are even more likely to die from cancer, with nearly one in three deaths being due to cancer (31% in OECD, 33% in EU). In the G20, where mortality rates from other causes (e.g. infectious diseases, chronic respiratory disease and injuries) are larger, the relative burden of cancer is smaller. Nevertheless, cancer still accounts for around one in five deaths. Cancer also causes disability among those living with the disease. Combined with its impact on mortality, cancer is responsible for 15% of all disability-adjusted life years (DALYs[1]) lost in women in the OECD and EU, and 19% of DALYs in men (Global Burden of Disease Collaborative Network, 2020[6]).

Figure 2.2. More than one in four deaths are related to cancer in the OECD and EU, and one in five in the G20

Percentage of all deaths by cause, 2019



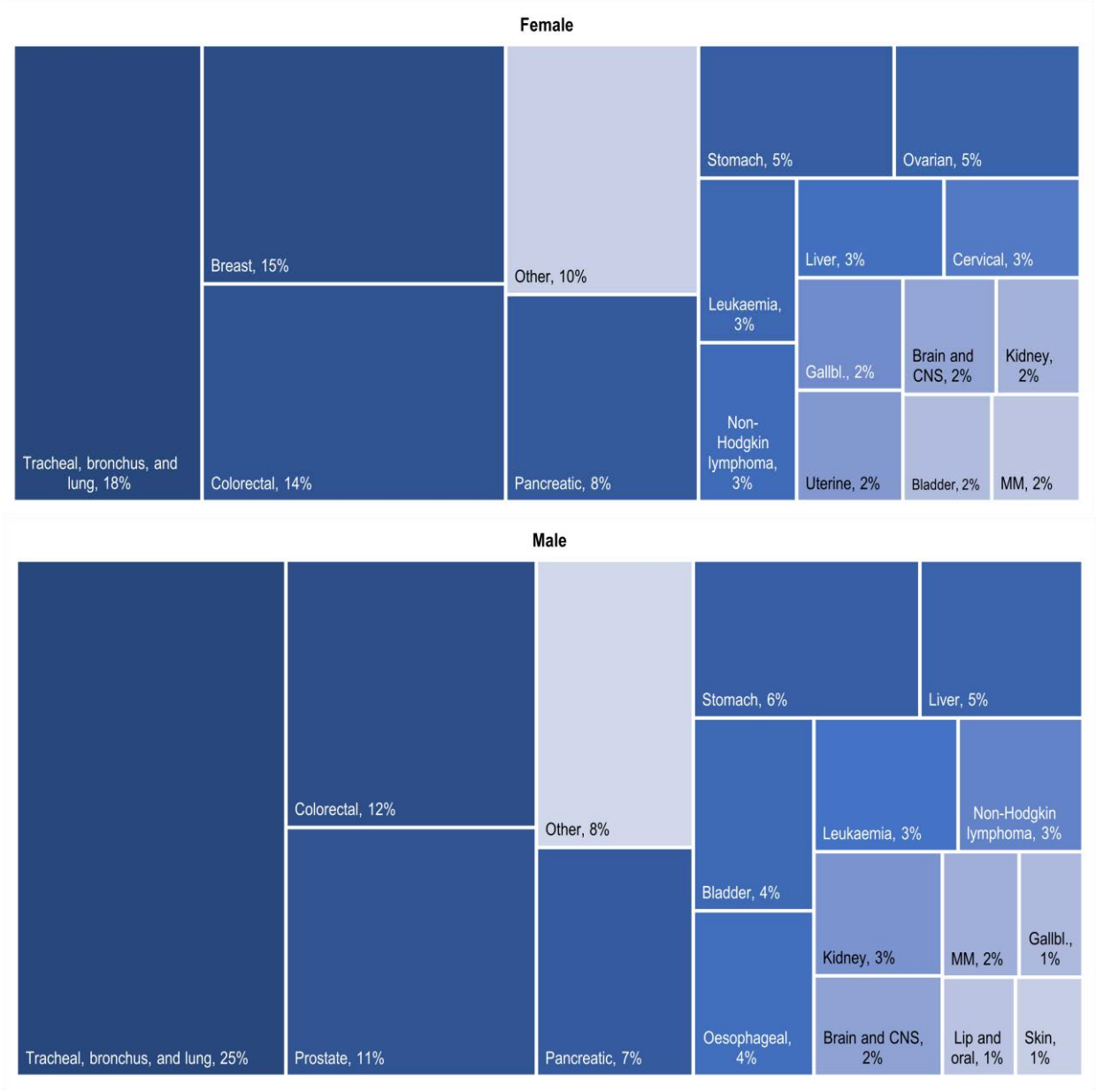
Note: CVD: Cardiovascular disease; CRD: Chronic respiratory diseases.
Source: Global Burden of Disease Collaborative Network (2020[6]), Global Burden of Disease 2019, https://vizhub.healthdata.org/gbd-results/.

StatLink https://stat.link/nyeac2

In women, lung, breast and colorectal cancer accounted for nearly half of all cancer deaths in 2019 in OECD and EU countries (46%) (Figure 2.3). For men, nearly half of all cancer deaths (49%) were from lung, colorectal and prostate cancer.

Figure 2.3. Lung, breast and colorectal cancer are the most common causes of cancer deaths in the OECD and EU

Percentage of all cancer deaths by cancer type, for females and males, in the OECD and EU combined, 2019



Note: CNS: central nervous system; MM: multiple myeloma; Skin: malignant skin melanoma; Gallbl: gallbladder and biliary tract; Bladd: Bladder.
Source: Global Burden of Disease Collaborative Network (2020[6]), Global Burden of Disease 2019, https://vizhub.healthdata.org/gbd-results/.

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Variation in cancer incidence and mortality across countries is driven in part by the prevalence of major cancer risk factors

There are considerable differences between countries in terms of cancer incidence and mortality. Age-standardised cancer incidence rates vary more than 3-fold across OECD countries, and 1.5-fold across EU countries (Figure 2.4). This can be due to genetic predisposition, but it is also driven by different levels of exposure to behavioural and environmental risk factors. In the OECD, 46% of cancer deaths are attributable to risk factors, and 47% of cancer deaths in the EU (IHME, 2019[7]). Major risk factors for cancer include tobacco smoking, alcohol use, diet, low physical activity, overweight and obesity (high body mass index, or BMI), and air pollution – covered below and in Chapter 5. Chapter 6 also looks at the impact of HPV vaccination on preventing cervical cancer. However, it is important to note there are many more risk factors that can be addressed to prevent cancer (Box 2.2).

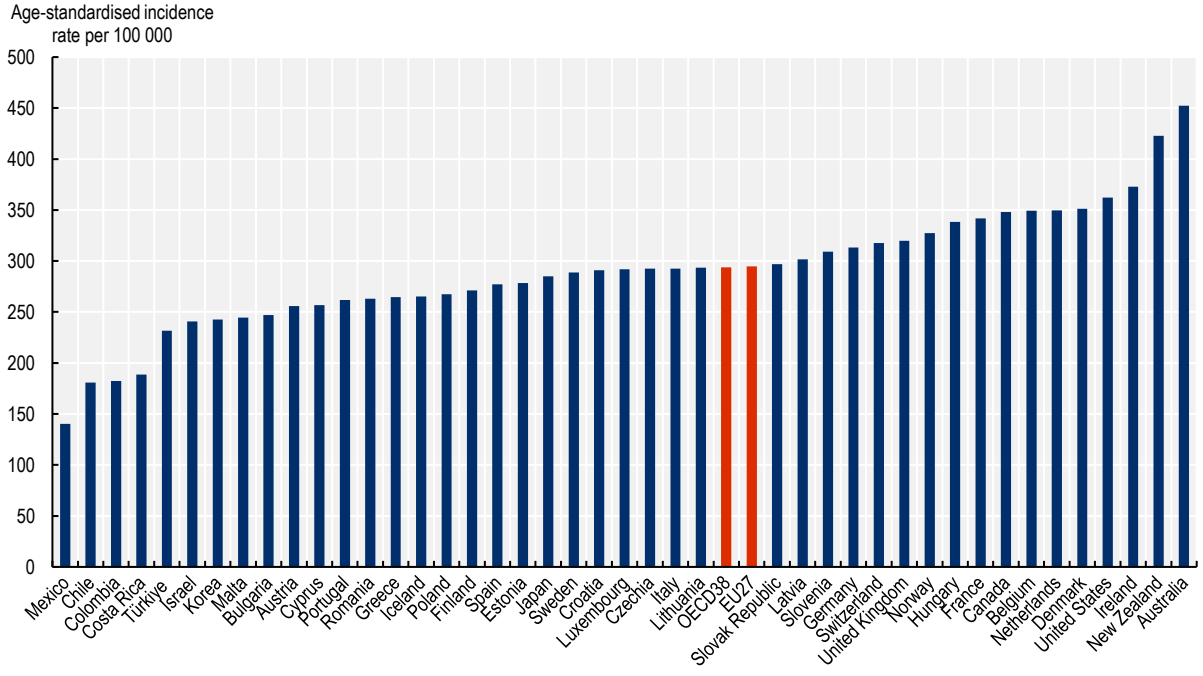
Box 2.2. Other cancer risk factors

Major cancer risk factors covered in this report are tobacco smoking, alcohol use, diet, low physical activity, overweight and obesity, air pollution and infection with the HPV virus. While these risk factors are responsible for the majority of risk-related cancer cases, there are other risk factors that policy makers should consider when developing cancer prevention plans. These include:

- **Sun exposure:** Ultra violet (UV) radiation, which comes from sun exposure and from UV emitting devices such as sunbeds, are the main risk factor for the three main types of skin cancer (Greinert et al., 2015[8]; IARC, 2012[9]).
- **Sedentary behaviour:** Many studies have suggested a direct positive relationship between sedentary behaviour and risk of cancer, independent of BMI or physical activity (Schmid and Leitzmann, 2014[10]; Leitzmann et al., 2015[11]). For example, sitting for six hours or more a day compared to less than three hours was associated with a 55% increase in ovarian cancer risk (Patel et al., 2006[12]; Leitzmann et al., 2015[11]).
- **Hormone replacement therapy:** Long-term use of combined oestrogen-progesterone hormone replacement therapy (HRT), generally used in the treatment of menopause, is associated with an increased risk of breast cancer. Oestrogen-only menopausal therapy has been causally associated with an increased risk of ovarian cancer and endometrial cancer (Friis et al., 2015[13]; Schüz et al., 2015[14]).
- **Hepatitis B infection:** Infection with the hepatitis B virus (HBV) can lead to chronic liver disease and liver cancer (Villain et al., 2015[15]). Age of infection is a key determinant of whether the infection becomes chronic: newborns have an 80-90% probability of developing chronic infection if infected, while adults have a less than 10% risk. Chronic infection can result in liver cancer. The most effective intervention against infection with HBV is vaccination, and the WHO has recommended newborn vaccination for HBV since 1997.
- **Environmental exposures:** Many occupational exposures, including chemicals, physical agents and industrial processes, have been identified that cause cancer in humans (Espina et al., 2015[16]). In addition, there is strong evidence that indoor exposure to radon and its decay products is an important cause of lung cancer, second only to tobacco smoking (McColl et al., 2015[17]). Radon is a radioactive gas with that is colourless, odourless, and tasteless, and it is released from bedrock material and then passes up through soil (IAEA, 2023[18]). Radon does not dilute as quickly in indoor air as outside and tends to accumulate in enclosed spaces where it poses risk to human health.

Figure 2.4. Cancer incidence rates vary across countries, including more than 3-fold across OECD countries

Age-standardised incidence rates (per 100 000 population) for all cancer sites, 2020



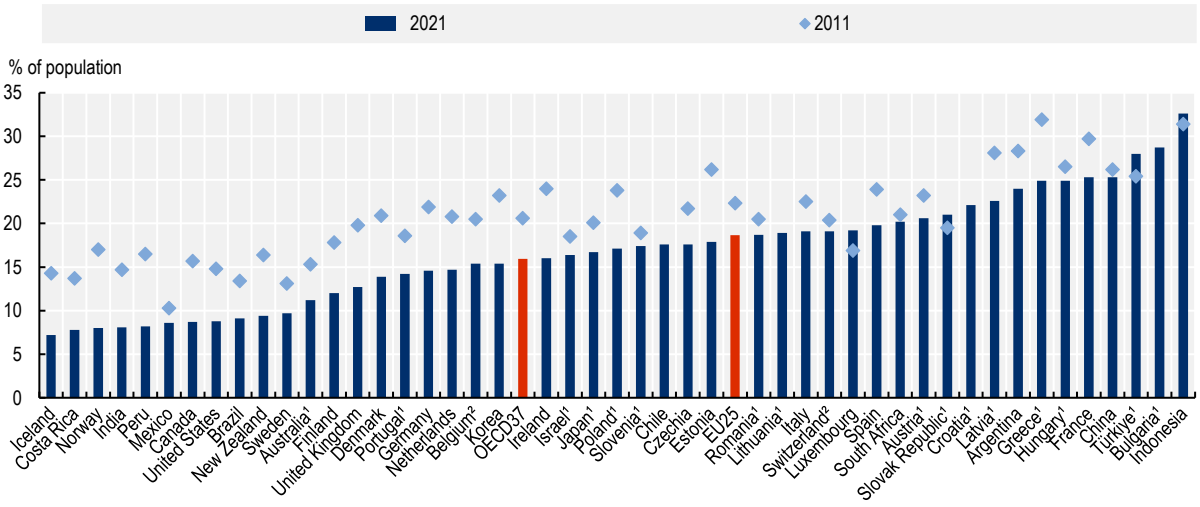
Note: Age-standardised to world population, all sites excluding non-melanoma skin cancer.
Source: IARC (n.d.[1]), Global Cancer Observatory, https://gco.iarc.fr/.

StatLink https://stat.link/wo8ze0

Tobacco smoking is the leading cause of cancer, and 16% of adults smoked daily in 2021 on average in the OECD (Figure 2.5). In some countries, more than one in four adults smoke. Almost all countries saw a decrease in smoking prevalence between 2011 and 2021, but the greatest drops were seen in countries where rates were already lower. As a result, differences between countries have increased, and rates now vary nearly four-fold across OECD countries. Regardless, no country has yet achieved the target of a smokefree society, where the prevalence of smoking is below 5% (Balogun, 2023[19]; European Commission, 2021[20]).

Figure 2.5. The prevalence of tobacco smoking had decreased in recent years but remains high

Population aged 15 and over smoking daily, 2011 and 2021 (or nearest years)



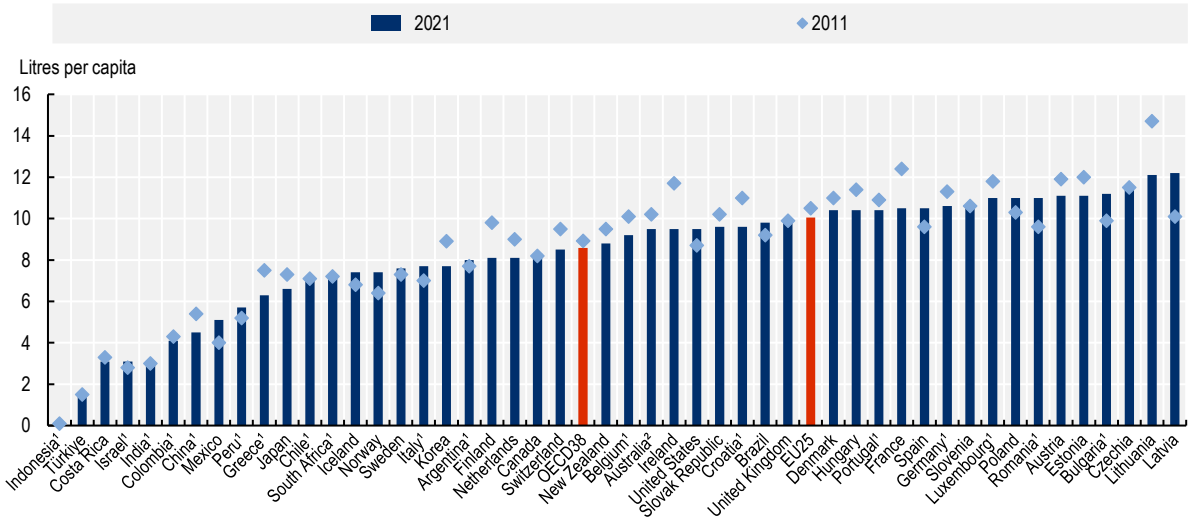
1. Data from 2019. 2. Data from 2017-18.
Source: OECD Health Statistics 2023.

StatLink https://stat.link/fqoun5

Alcohol is linked to seven types of cancer including oral cavity, pharynx, larynx, oesophagus, liver, colon, rectum, and, in women, breast (Boffetta and Hashibe, 2006[21]; Secretan et al., 2009[22]). Contrary to tobacco smoking, alcohol consumption has changed little over the past decade (Figure 2.6). The average per capita consumption in the OECD has gone from 8.9 litres in 2011 to 8.6 in 2021 (10.5 to 10.1 in the EU); and in around 40% of countries the consumption of alcohol increased. There is considerable variation between countries in alcohol consumption, ranging from nearly zero to over 12 litres per capita. Particularly Central and Eastern EU Member States (MS) see high alcohol use.

Figure 2.6. Alcohol consumption has changed little in the past decade

Recorded alcohol consumption (litres per capita) among the population aged 15 and over, 2011 and 2021 (or nearest year)



1. Data from 2019. 2. Data from 2017.
Source: OECD Health Statistics 2023.

StatLink https://stat.link/7j5gai

There is strong evidence that diet plays a causal role in cancer, with significant evidence that a diet high in plant floods and whole grain cereals, and low in red and processed meat, salt and salt-preserved foods, reduces the risk of cancer (World Cancer Research Fund/American Institute for Cancer Research, 2018[23]). This report focuses on specific food groups for which there is a proven link to cancer: fruit, vegetables, whole grains, sodium, processed and red meat. However, it is important to note that cancer risk may also be influenced by specific subgroups of food (e.g. leafy greens), nutritional components of foods (e.g. fibre), the combination of foods eaten (e.g. a Mediterranean diet), and the processing that food undergoes (Box 2.3) (WCRF, n.d.[24]; WCRF, 2023[25]; Morze et al., 2020[26]; Cordova et al., 2023[27]).

Box 2.3. Ultra-processed foods

Ultra-processed foods (UPFs) and highly processed foods are the topic of much discussion in relation to adverse health outcomes (Lawrence and Baker, 2019[28]). The NOVA classification includes four groups, with increasing level of processing (Monteiro et al., 2017[29]):

- Group one refers to unprocessed and minimally processed foods such as fruits and vegetables.
- Group two is processed culinary ingredients such as sugar, vegetable oils and butter.
- Group three is processed foods such as canned vegetables in brine, freshly made breads and cheeses.
- Group four is ultra-processed foods. Ultra-processed foods are formulations of ingredients, mostly of exclusive industrial use, that result from a series of industrial processes (hence “ultra-processed”). Examples include soft drinks, mass-produced industrial-processed breads, sweet or savoury packaged snacks, breakfast “cereals”, reconstituted meat products and read-to-eat/heat foods.

There is emerging evidence suggesting that UPFs are associated with increased cancer risk, cancer mortality and other NCDs. When UPF is considered as a share of total diet, a 10 percentage point higher share in UPF were shown to have (Chang et al., 2023[30]):

- a 2% higher risk of cancer incidence overall,
- a 19% higher risk of ovarian cancer,
- a 6% increased risk of cancer death overall,
- a 16% increased risk of breast cancer death, and
- a 30%increased risk of death from ovarian cancer

UPFs are also associated with other NCDs. Emerging evidence from the EPIC cohort found an increase in cardiovascular disease and diabetes among those with a higher share of UPFs in their diet (Cordova et al., 2023[27]). An umbrella review found that greater exposure to ultra-processed food was associated with a higher risk of adverse health outcomes, especially cardiometabolic, common mental disorder, and mortality outcomes (Lane et al., 2024[31]).

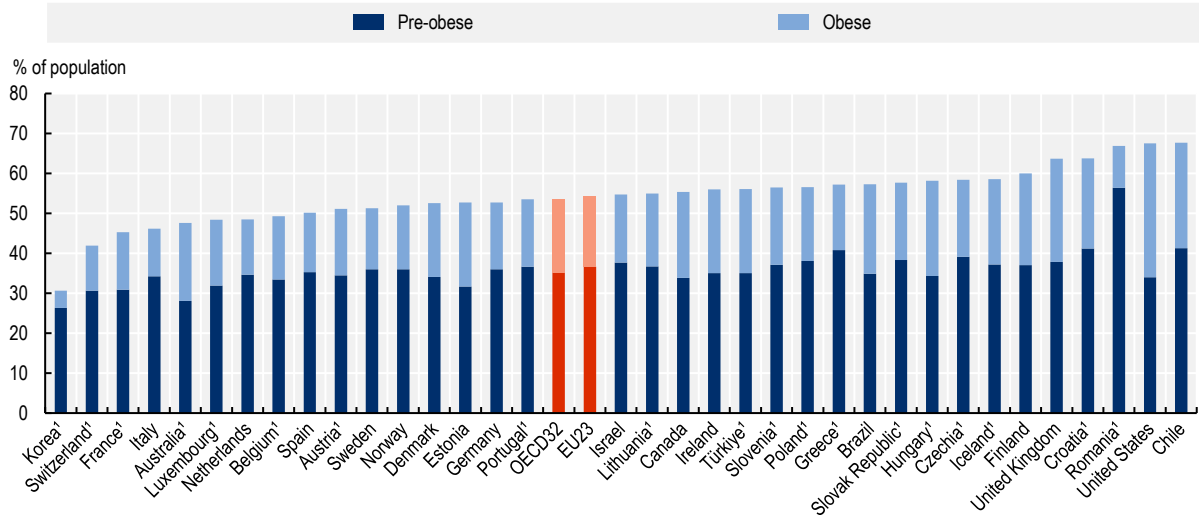
Overall, the study of ultra-processed foods remains an important topic with ongoing research, given its high proportion in diets around the world.

A greater consumption of non-starchy vegetables or fruit protects against a number of cancers (WCRF, n.d.[24]) – yet few people eat enough fruit and vegetables. On average in the OECD, only 15% of adults eats at least five portions of fruit and vegetables daily, ranging from 2% to 33% (OECD, 2023[32]). Central and Eastern EU MS, as well as Türkiye, have particularly low fruit and vegetable consumption. Whole grain intake also varies considerably across countries, but in most European OECD countries the average daily intake falls below a 75g daily, an intake considered adequate by several national agencies (European Commission, 2021[33]).

Being overweight or obese is an established risk factor for 13 different cancer sites and a major contributor to cancer incidence and mortality (World Cancer Research Fund Research/American Institute for Cancer, 2007[34]; IARC, 2002[35]; Lauby-Secretan et al., 2016[36]). Overweight and obesity have been increasing, and over half of the population is now either pre-obese (BMI≥25 and <30) or obese (BMI≥30) in the OECD and EU (Figure 2.7). Obesity among adolescents are also major public health concerns: 18.3% of adolescents aged 15 years were overweight in 2017-18 on average across 27 OECD countries (OECD, 2023[32]).

Figure 2.7. Over half of the population is either pre-obese or obese in many countries

Self-reported pre-obesity and obesity rates among adults, 2021 (or nearest year)



1. 2017-19 data. Pre-obese (people who are overweight but not obese) is defined as a BMI of over 25 but less than 30; while obesity is defined as a BMI of 30 or higher.
Source: OECD Health Statistics 2023.

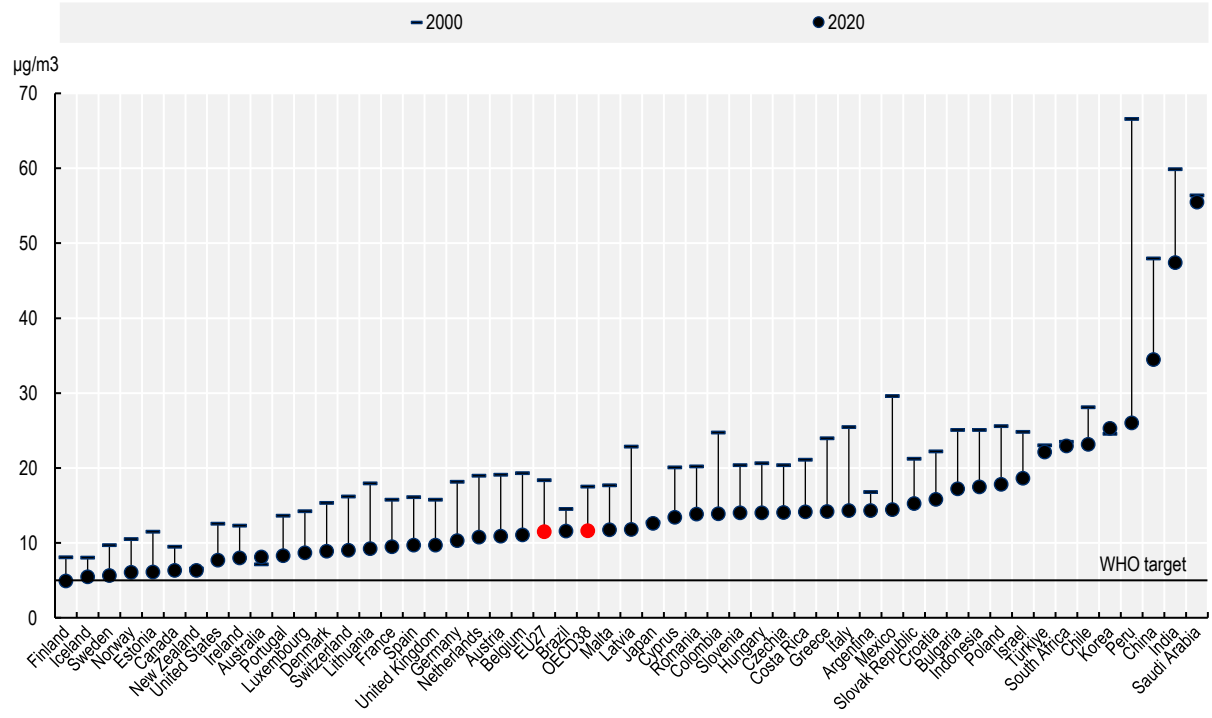
StatLink https://stat.link/bjior5

There is strong evidence that physical activity reduces the risk of developing and dying from various types of cancer (IARC, 2020[37]). This risk reduction is independent of the impact of obesity (Nunez et al., 2017[38]). In other words, although physically activity can help with weight control, which in turn can reduce the risk of cancer, physical activity also decreases the risk of cancer on its own independent of weight. Nevertheless, only 40% of adults in the OECD meets the WHO recommended 150 minutes of physical activity per week. This ranges across countries from 5% to 76%, with notably lower physical activity rates in Central and Eastern EU MS, as well as some Southern EU MS (OECD, 2023[32]).

Air pollution refers to a mixture of pollutants in outdoor (ambient) air, including respirable particulate matter less than 2.5 μm in diameter ($PM_{2.5}$ or fine particulate matter). Exposure to particulate matter in outdoor air pollution has been shown to cause lung cancer (IARC, 2015[39]). Despite progress over the last two decades, in 2020 exposure to $PM_{2.5}$ remained above the WHO guideline of $5_{\mu g}/m^3$ in all OECD countries except for Finland, with five-fold variation across countries (Figure 2.8). Some OECD countries have seen marked drops, such as Mexico (from 29.6 in 2000 to 14.4 in 2020) and Italy (25.4 to 14.3). On the other hand, some countries, including Korea and Australia, saw the average level of air pollution increase.

Figure 2.8. Despite improvements in air quality, few countries meet the WHO air pollution target

Mean population exposure to fine particulates ($PM_{2.5}$) in OECD countries in 2000 and 2020



Source: OECD (2024[40]), OECD Data Explorer: Exposure to air pollution.

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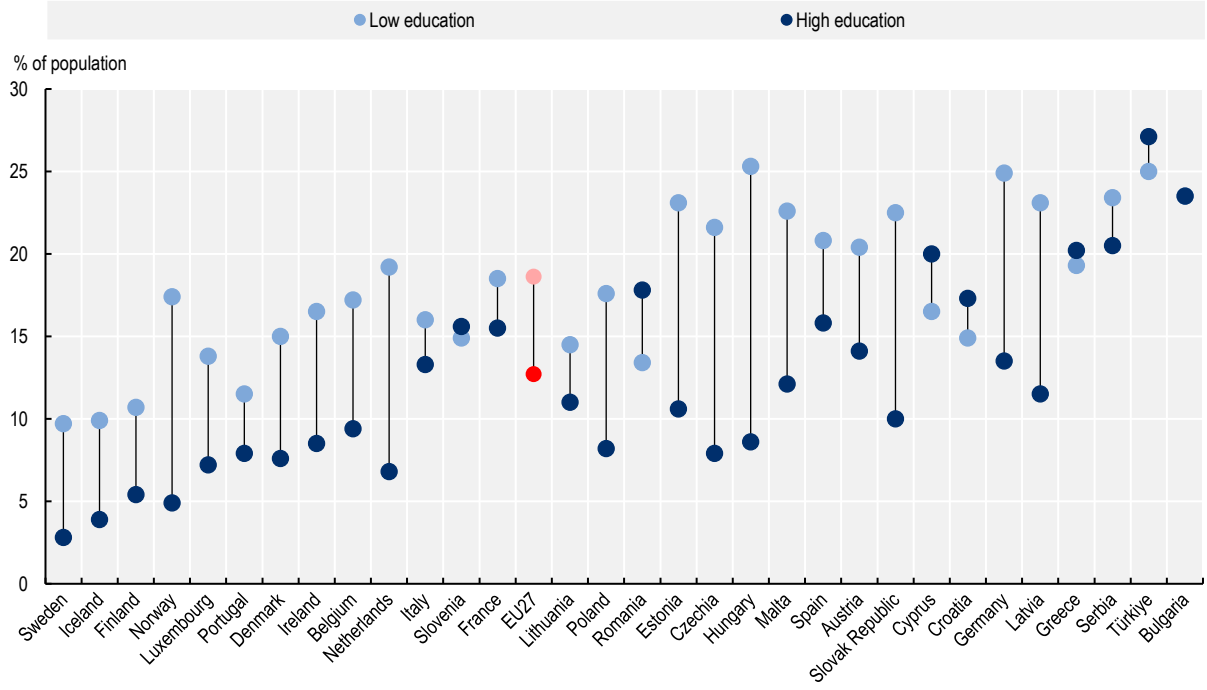
Differences in risk factors and preventive care contribute to inequalities within countries

The same risk factors that drive differences between countries also contribute to differences within countries. The major risk factors for cancer are consistently more prevalent among people with lower socio-economic characteristics, such as lower income and education levels (OECD, 2024[41]). One example is tobacco use. Smoking – a major risk factor for cancer – is notably more prevalent among people with a lower education: on average in the EU, 19% of people with lower secondary education or less smoked, compared to 13% of people with tertiary education (Figure 2.9). This is reflected in lung cancer rates, the primary cancer associated with smoking. Preliminary findings from the EUCanIneq study show that lung cancer mortality rates were 2.6 times higher among men with lower education compared to men with higher education, and 1.7 times higher among women with lower levels of education (OECD, 2024[41]).

Figure 2.9. Smoking, a major cancer risk factor, is more prevalent in people with low education

Daily smokers of cigarettes by educational attainment level, 2019



Note: "low education" is defined as less than primary as well as primary and lower secondary education (levels 0-2); "high education" is defined as tertiary education (Levels 5-8).
Source: Data from the European health interview survey (EHIS), accessed through Eurostat (2022[42]), "Daily smokers of cigarettes by sex, age and educational attainment level", https://ec.europa.eu/eurostat/databrowser/view/hlth_ehis_sk3e/default/table?lang=en.

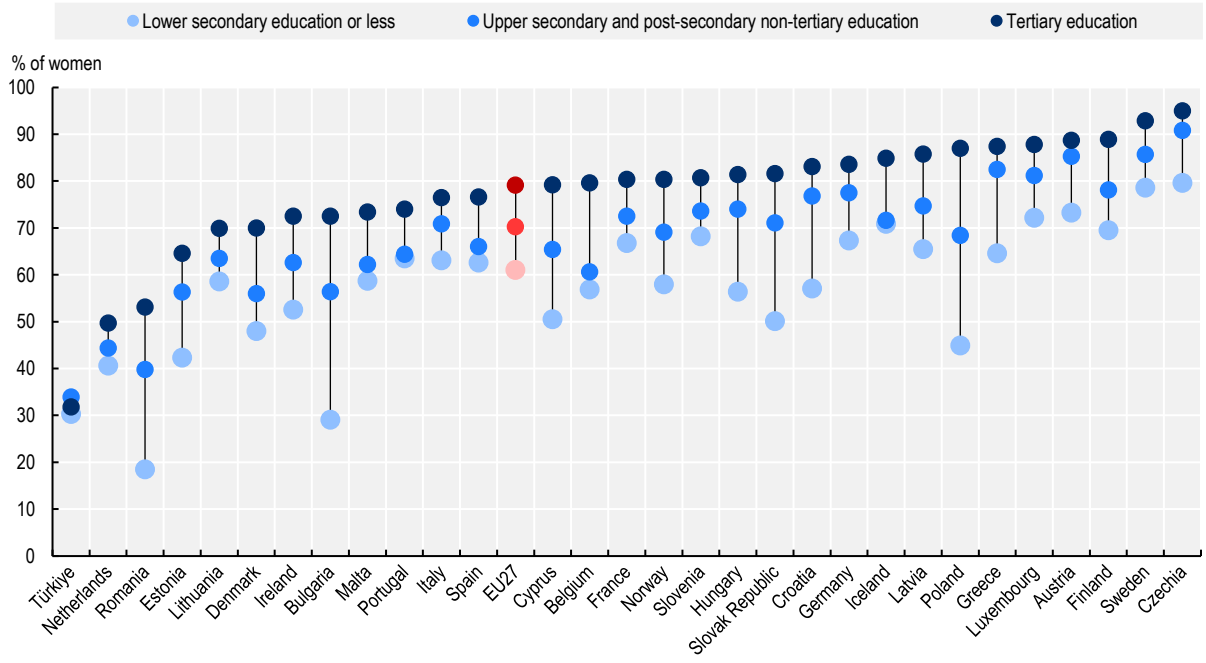
StatLink https://stat.link/r2lacv

In addition to differences in risk factors, differences in preventive care can also contribute to inequalities across population groups. Studies in Europe and the United States have shown that people from ethnic majority populations and with a higher socio-economic status are more likely to get vaccinated against HPV (Fernández de Casadevante, Gil Cuesta and Cantarero-Arévalo, 2015[43]; Xiong et al., 2024[44]).

In addition, people with lower education or income levels are less likely to participate in screening (OECD, 2024[41]). For example, women with lower income are twice as likely to miss out on breast cancer screening: only 7.3% of EU women in the highest income quintile report never having had an X-ray breast examination, compared to 15.2% of women in the lowest income quintile (Eurostat, 2023[45]). Similarly, people with higher educational attainment are more likely to participate in breast, cervical and colorectal cancer screening. Almost 80% of EU women with a tertiary education report having had a cervical smear test within the three years prior, compared to only 61% of women with lower secondary education or less (Figure 2.10). In some countries screening rates among women with higher education are more than double those of women with lower education (Eurostat, 2023[45]).

Figure 2.10. Women with high education are more likely to participate in cervical cancer screening

Proportion of women aged 20 to 69 years having had a cervical smear test within the three years prior to the survey, by educational attainment level, 2019



Note: EU27 average is weighted.
Source: Data from the European health interview survey (EHIS), accessed through Eurostat (2023[45]), "Cancer screening statistics", https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Cancer_screening_statistics#Breast_cancer_screening.

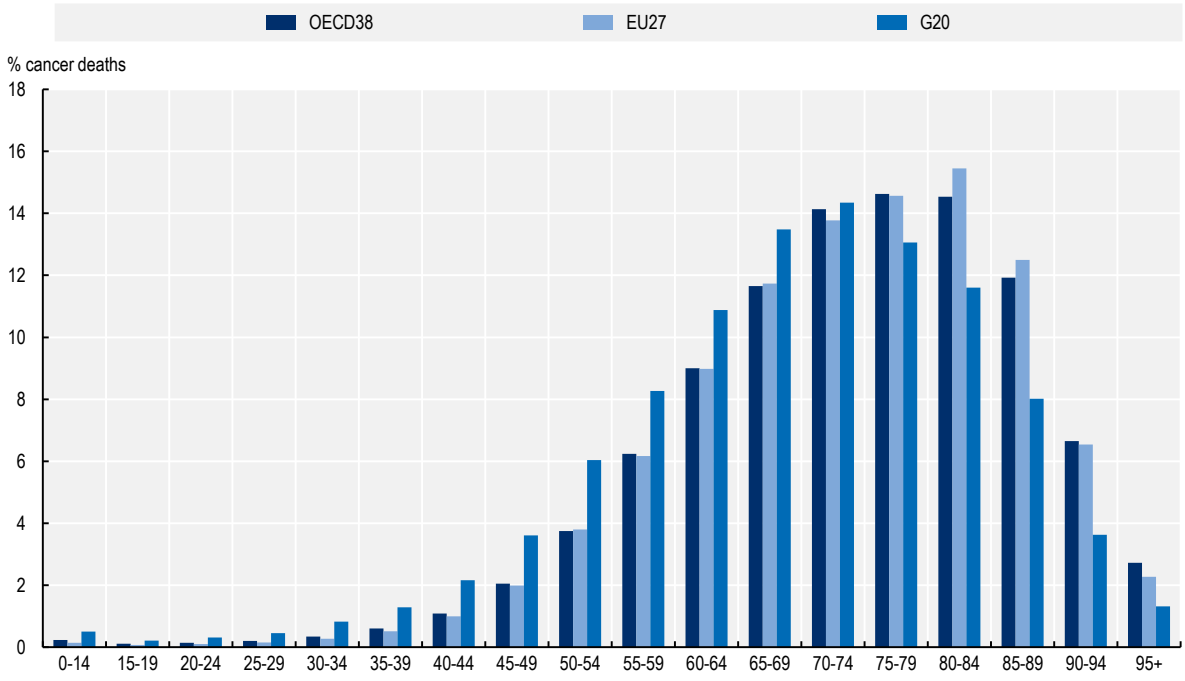
StatLink https://stat.link/pw2kgm

The cancer burden will continue to grow as populations age

Age is an important factor in determining a person's cancer risk. Normally, the body eliminates cells with damaged genes, but its ability to do so diminishes as people age (National Cancer Institute, 2021[4]). Moreover, as people age their cells accumulate genetic mutations over time, increasing the likelihood that they become cancerous. While there is evidence that the incidence rate of cancer in young people has been increasing in recent years (Box 2.4), cancer remains a disease that primarily affects older people: in the OECD, more than 95% of cancer deaths occur in people aged 50 and over, and 50% in people 75 and over (96% and 51%, respectively, in the EU) (Figure 2.11). In the G20, the lower average life expectancy means that there are fewer people in older age bands, and therefore fewer deaths from cancer in those age bands.

Figure 2.11. The vast majority of cancer deaths occur in older people

Distribution of cancer deaths across age groups, percentage of all cancer deaths in 2019



Source: Global Burden of Disease Collaborative Network (2020[6]), Global Burden of Disease 2019, https://vizhub.healthdata.org/gbd-results/.

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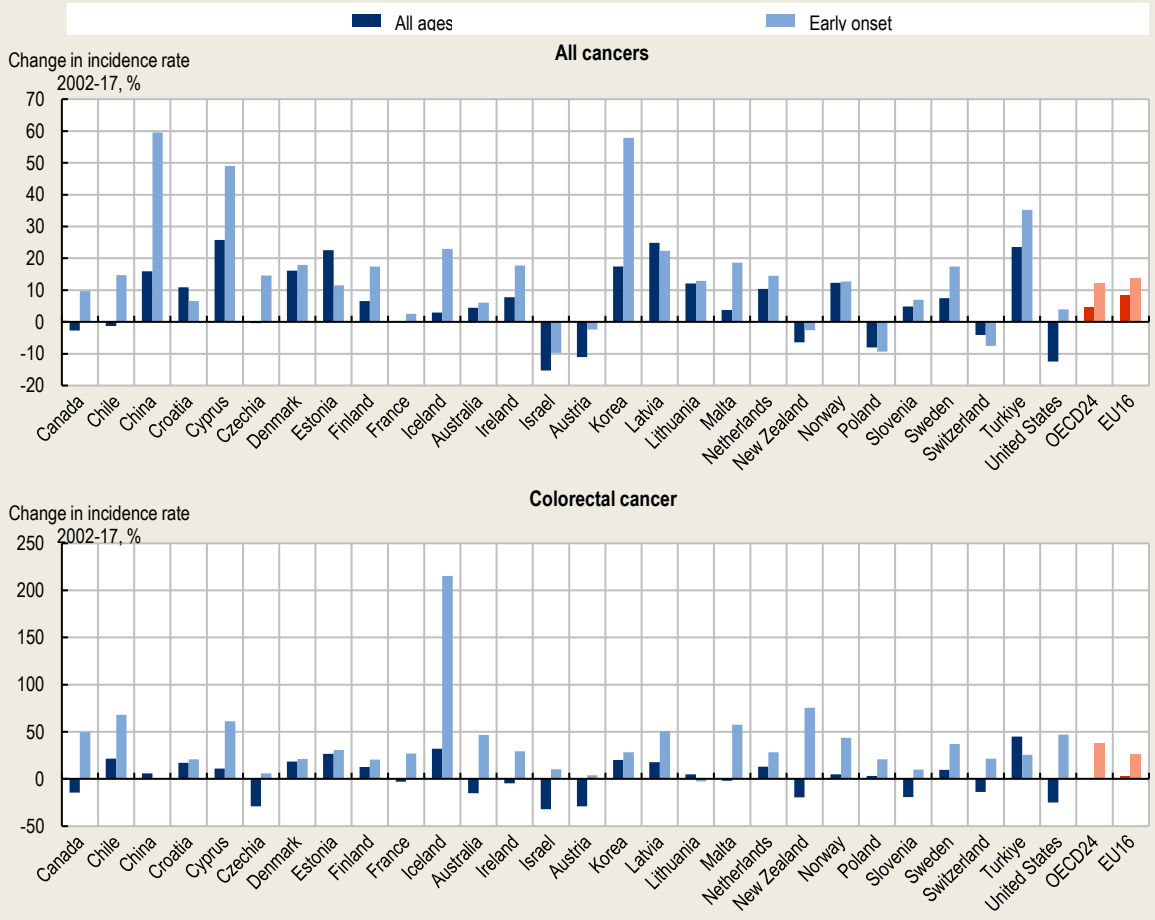
Box 2.4. Early onset cancer is increasing

Rates of early onset cancer (cancer occurring in people under the age of 50) have been rising for the past several decades (Ugai et al., 2022[46]). Across 24 OECD countries, age-standardised cancer incidence rates in young people increased by 12% between 2002 and 2017, compared to a 5% increase in the population as a whole (Figure 2.12). This phenomenon is seen for several cancers, but some of the sharpest rates of increase in early-onset cancer are observed for colorectal cancer, a leading cause of cancer-related mortality worldwide and typically a cancer of older adults (Ledford, 2024[47]) (Siegel et al., 2019[48]). On average across 24 OECD countries, the age-standardised incidence of colorectal cancer remained large stable between 2002 and 2017 in the general population (+1%), while in people under 50 it increased by 38% on average.

Figure 2.12. Cancer incidence rates for younger people have increased more than for the population as a whole

Percentage change in age-standardised incidence rate between 2002-17, for all cancers (excluding non-melanoma skin cancer) and for colorectal cancer, in people of all ages and people under 50 ("early onset")



Note: Based on age-standardised (world population) incidence rates to reflect trends in incidence regardless of demographic changes.
Source: OECD analysis of data from IARC (n.d.[1]), Global Cancer Observatory, https://gco.iarc.fr/.

StatLink https://stat.link/9wu7sg

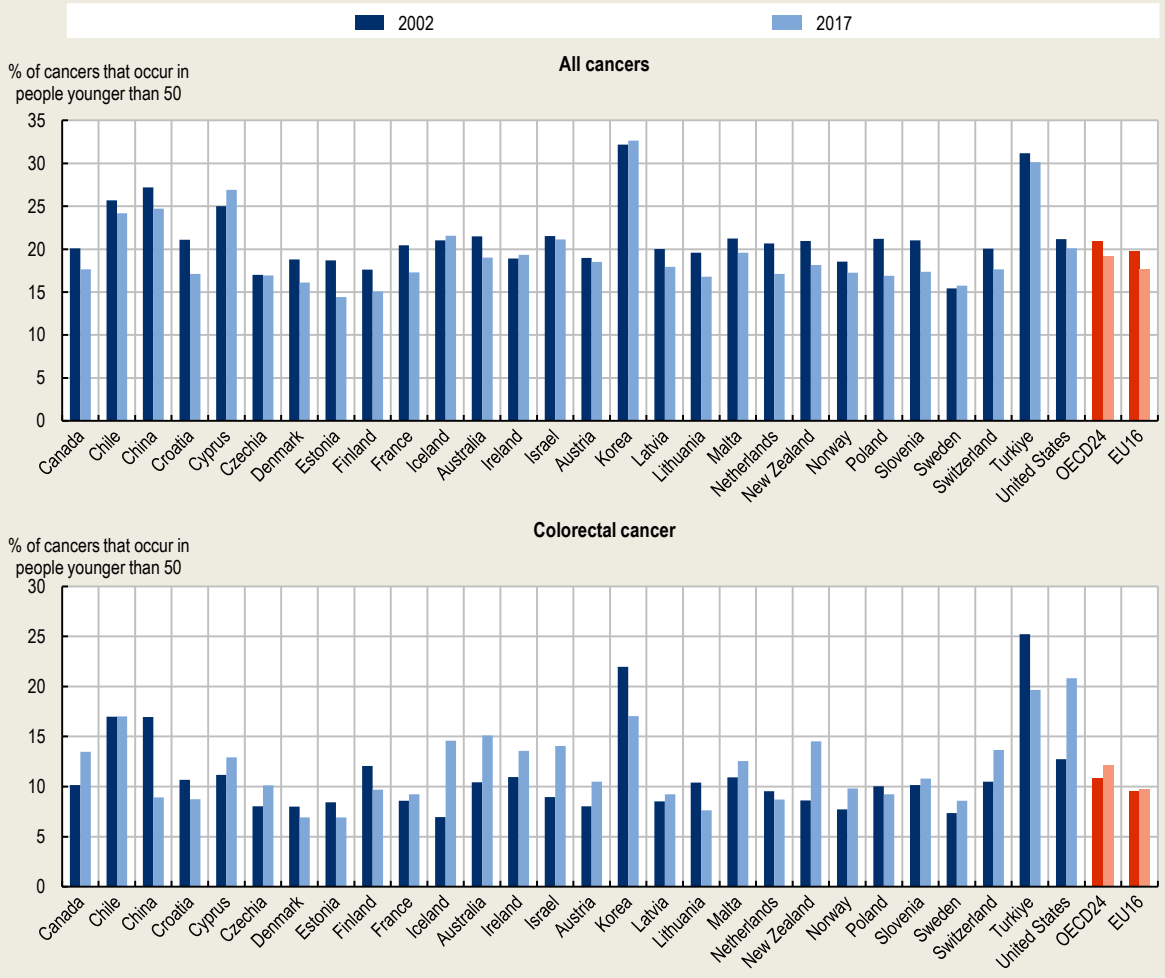
Although the factors causing the rising incidence in younger people are not yet fully known, several theories have been proposed to explain the increase. These include an increased exposure in early life and young adulthood to risk factors such as overweight, physical inactivity, alcohol consumption, unhealthy diet, antibiotics, and environmental chemicals (Ugai et al., 2022[46]; Gupta et al., 2024[49]) One study looking at both genetic and modifiable risk factors found evidence suggesting that higher levels of body size and alcohol drinking increased the risk of early-onset colorectal cancer, in addition to genetic predisposition (Laskar et al., 2024[50]).

It is important to note that the absolute burden of cancer in younger people remains relatively small. While some countries have seen large increases in the age-standardised incidence rate of early-onset cancer, these incidence rates were low to begin with. Moreover, due to population ageing the number of older people has increased, and thus their relative cancer burden. As a result, on average across

24 OECD countries, the proportion of cancer cases occurring in people younger than 50 was 21% in 2002, and in 2017 this was 19% (Figure 2.13). For colorectal cancer, the proportion of cases occurring in younger people saw a slight increase, from 11% in 2002 to 12% in 2017.

Figure 2.13. The relative burden of early onset cancer remains relatively small

The percentage of cancer (excluding non-melanoma skin cancer) and colorectal cancer cases that occur in people under the age of 50, in 2002 and 2017 (based on crude incidence rates)



Note: Based on crude incidence rates to reflect the actual cancer burden in each country.
Source: OECD analysis of data from IARC (n.d.[1]), Global Cancer Observatory, https://gco.iarc.fr/.

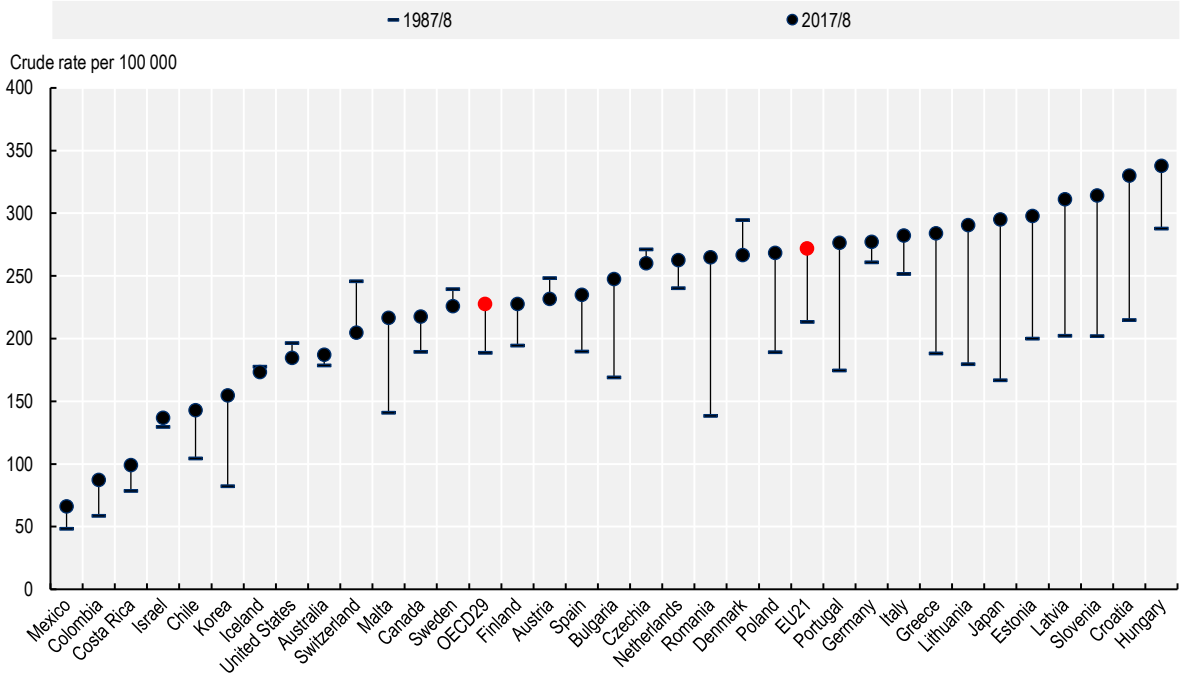
StatLink https://stat.link/sckb4h

Nevertheless, the upward trend in early onset cancer has important implications. If the increased incidence rates are due to higher or earlier exposure to cancer risk factors, public health interventions should be designed to address this. It also has implications for our health systems, society, and economy (Ugai et al., 2022[46]). With increasing cancer survivorship, there will be greater numbers of people living with and surviving cancer for longer periods of time. Questions on fertility and pregnancy in cancer care will become increasingly important. Additionally, as this affects people of working age, it has greater effects on the labour market and places more importance on the re-integration of cancer survivors into the labour force following recovery.

The impact of age on cancer incidence and mortality can be observed in the rising crude mortality rates. Most developed countries are dealing with ageing population. As people now live longer than ever, the chances of eventually developing cancer also increase. So while age-standardised mortality rates have improved over the last three decades due to better prevention and treatment (Figure 2.1), crude rates have increased by 21% on average in the OECD (27% in the EU) (Figure 2.14).

Figure 2.14. Driven by population ageing, crude cancer mortality rates have increased

Crude mortality rates (per 100 000 population) for all cancer sites, in 1987/8 and 2017/8



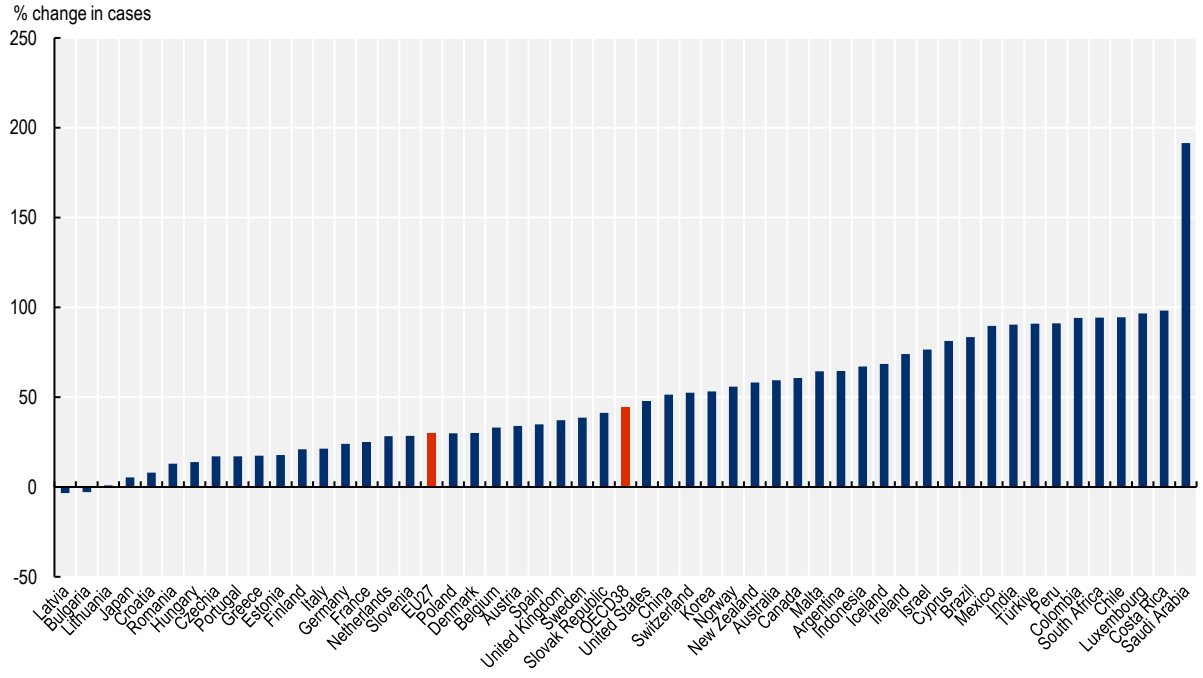
Source: IARC (n.d.[1]), Global Cancer Observatory, https://gco.iarc.fr/.

StatLink https://stat.link/njb6e8

As populations will continue to age in the future, governments are facing an ever-growing cancer burden. Based on population projections, the number of cancer cases in OECD countries is expected to grow by 44% on average over the next 30 years (30% in the EU) (Figure 2.15). In the EU, this is despite a 3% reduction in overall population size (in the OECD the average population size is expected to increase by 4%). Hand-in-hand with this growing cancer burden come increased healthcare cost and an overall loss of societal well-being. It is crucial that policy makers understand the challenge they are facing, and the potential impact that their policies could have.

Figure 2.15. Population ageing is expected to increase the number of cancer cases over the next 30 years

Change in number of cancer cases in 2050 compared to 2022



Note: Projections are based on 2022 estimates of the incidence, mortality, and prevalence of 36 specific cancer types, combined with population projections for 2050.
Source: Ferlay, J. et al. (2020[51]), *Global Cancer Observatory: Cancer Tomorrow*, https://gco.iarc.fr/tomorrow.

StatLink https://stat.link/jsmi9u

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Notes

[1] Disability-adjusted life years (DALYs) combine years of life lost due to premature mortality with the years of life lived in states of less than full health, or years of healthy life lost due to disability. One DALY represents the loss of the equivalent of one year of full health.

3 Understanding cancer's impact on individuals, health systems and society

This chapter provides an overview of the burden of cancer on individuals, health systems and societies. Based on the results of the OECD Strategic Public Health Planning for non-communicable diseases (SPHeP-NCDs) model, the chapter presents the cancer burden for 51 countries, including OECD, European Union (EU27) and Group of 20 (G20) member countries. The burden is calculated as the impact of cancer on population health and mortality; quality of life in terms of mental health and personal financial security; health expenditure; and labour force productivity and participation.

In Brief

Cancer places a large and growing burden on individuals, health systems and society

- Cancer has a profound impact on individual health, wealth and well-being, but its effects extend beyond the individual toll. The growing cancer burden also has far-reaching consequences for population health, the economy and society. Understanding these wider impacts of cancer is helpful to support a whole-of-government approach to improve cancer prevention and treatment. The OECD uses its Strategic Public Health Planning for Non-Communicable Diseases (SPHeP-NCDs – see Box 3.5) model to estimate the impact of cancer on individuals, health systems and society.
- It is estimated that 11 people will be diagnosed with cancer every minute in the OECD over the next 30 years. The impact that this has on the quality of life and income for affected individuals is severe. The emotional toll of cancer, coupled with symptoms and side effects from treatment, can lead to heightened stress, anxiety, and depression. Every year, across the OECD, cancer is estimated to be responsible for an additional 160 000 cases of depression (85 000 in the EU). Cancer also has a significant negative impact on a person's work life, leading to part-time work, unemployment and early retirement. In addition, cancer reduces the opportunities for continuous education and training. As a result, cancer is assessed to reduce the average annual wage of people in employment by EUR PPP 2 955 – roughly three weeks' worth of income (EUR PPP 2 573 in the EU).
- Cancer also places a considerable, and growing, strain on healthcare systems. Based on the results from the OECD SPHeP-NCDs model, health expenditure is estimated to be 6.0% higher in OECD countries relative to a situation where there is no cancer (4.7% in the EU). In total, cancer is estimated to increase health expenditure by EUR PPP 449 billion annually, on average, over the next three decades – more than the total annual health budget of France (EUR PPP 93 billion for the EU). Importantly, as populations age and the risk of developing cancer increases, the per capita health expenditure on cancer is expected to grow by 67% on average in the OECD between 2023 and 2050 (59% in the EU).
- The impact of cancer extends beyond health and health expenditure. Cancer affects all facets of people's lives, and this has consequences for the economy and society. Cancer reduces productivity and workforce participation of people with the disease, resulting in a loss equivalent to 3.1 million full-time workers across the OECD (1.1 million in the EU). This translates into a lost workforce output of EUR PPP 163 billion per year, broadly equivalent to the annual GDP of Hungary (EUR PPP 49 billion for the EU).

Cancer has a profound impact on individual health, economic prosperity and well-being, leading to pain, suffering, disability, and even death. But the impact of cancer extends beyond the individual toll, affecting many different parts of society. Cancer places a strain on healthcare systems, and productivity losses affect the economy.

In recent years, there has been a growing interest among governments and international organisations to measure the wider societal impacts of issues and policies (Stiglitz, Fitoussi and Durand, 2018[1]). For example, in 2018 New Zealand Government introduced the Living Standards Framework (LSF), to support the Treasury in considering the wide range of things that matter to New Zealanders (New Zealand Treasury, 2021[2]). Similarly, in 2021 the Canadian Government launched its Quality of Life Framework to better define and measure success (Government of Canada, 2021[3]). The 2019 conclusion of the Council of the European Union invites member states and the European Commission to include an economy of well-being perspective across all policies and to put people and their well-being at the centre of policy design (Council of the European Union, 2019[4]). The OECD has developed a Well-being framework to understand the full societal impact of policies (OECD, 2020[5]).

To understand the full impact that cancer has on health, the economy and society, this report uses the OECD Strategic Public Health Planning for Non-Communicable Diseases (SPHeP-NCDs) model (Box 3.5). The model quantifies the impact of cancer on population health, health expenditure, workforce, skills, wages, and on quality of life. This creates a comprehensive picture of the effects of cancer, going beyond the health sector. Using this information, policy makers can make the case for a whole-of-government approach to better cancer prevention and treatment.

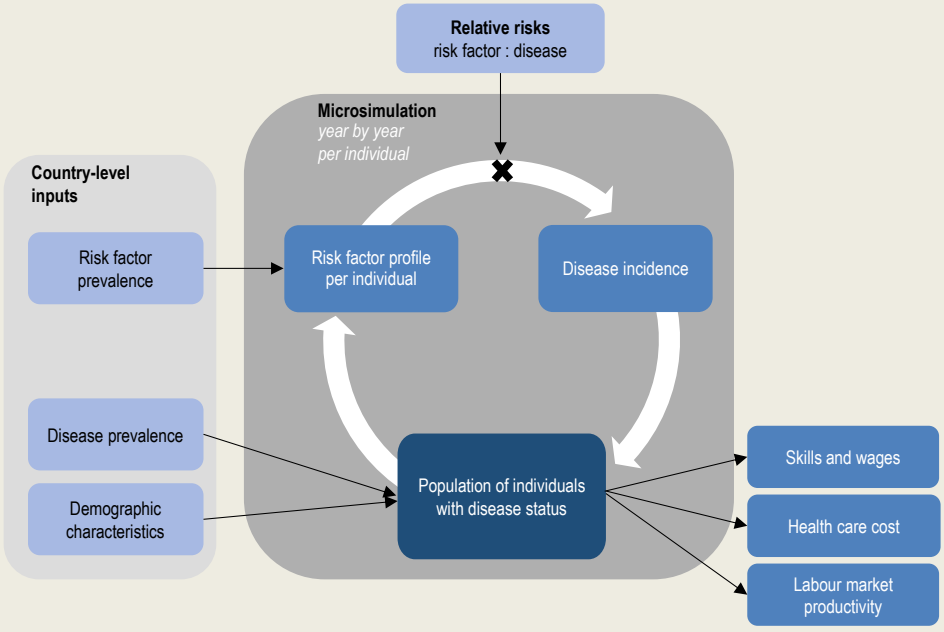
Box 3.5. The OECD SPHeP-NCDs model

The OECD Strategic Public Health Planning for Non-Communicable Diseases (SPHeP-NCD) model is an advanced systems modelling tool for public health policy and strategic planning. The model is used to predict the health and economic outcomes of the population of a country up to 2050. The model consolidates previous OECD modelling work into a single platform to produce a comprehensive set of key risk factors (e.g. obesity, alcohol, tobacco, diet, pollution, physical activity) and their associated NCDs. The model covers 51 countries, including OECD member countries, G20 countries, EU27 countries and OECD accession and selected partner countries (Country coverage).

The model covers 14 types of cancer, selected based on their burden and amenability to public health interventions (e.g. action on risk factors, screening, vaccination): lung cancer, colorectal cancer, breast cancer, liver cancer, oesophageal cancer, pancreatic cancer, prostate cancer, stomach cancer, cervical cancer, malignant skin melanoma, larynx cancer, other pharynx cancer, nasopharynx cancer, and lip and oral cavity cancer. Together they account for around 75% of total cancer disability-adjusted life years (DALYs) and cancer deaths in OECD countries in 2019 (IHME, 2019[6]).

For each of the 51 countries, the model uses demographic and risk factor characteristics by age- and sex-specific population groups from international databases (Figure 3.1). For each cancer type, incidence and mortality data were obtained from the Global Burden of Disease (GBD) study (Murray et al., 2020[7]), and survival rates at 1, 3 and 5 years post diagnosis from IARC (IARC, n.d.[8]). These inputs were used to generate synthetic populations, in which each individual is assigned demographic characteristics and a risk factor profile. Based on these characteristics, an individual has a certain risk of developing a disease each year. These relative risks are based on the GBD study, amongst others, and only consider the direct relation between the risk factor and the disease. For example, the impact of low physical activity on cancer only takes into account the direct link between physical activity and cancer, and does not capture any of the impact that physical activity has on weight, obesity and, consequently, cancer.

Figure 3.1. Schematic overview of the OECD SPHeP-NCD model



Note: This schematic is highly simplified and focuses on the disease component – it does not reflect some other components of the model (including births, immigration, emigration, death, remission and fatality).

For each year modelled, a cross-sectional representation of the population can be obtained, to calculate health status indicators such as life expectancy, disease prevalence, mortality, and DALYs. The disease and demographic profile of the population also form the basis for the healthcare cost, labour market and other well-being outputs. Note that the model uses population predictions to adjust the size and demographic profile of country populations in the future, but maintains current (age- and gender-specific) rates for risk factors. In other words, it does not predict any future trends in risk factor prevalence with the exception of those caused by demographic changes.

Healthcare costs of disease treatment are estimated based on a per-case annual cost, which is extrapolated from national health-related expenditure data. The additional cost of multimorbidity is also calculated and applied, as is the extra cost of end-of-life care. In the model, people not dying from cancer can continue to consume medical care for other conditions (e.g. diabetes) and so continue to incur medical costs (for more details, see Box 3.9).

The labour market module uses relative risks to relate disease status to the risk of absenteeism, presenteeism (where sick individuals, even if physically present at work, are not fully productive), early retirement, employment, and contracted hours (e.g. working part-time or full-time). All these changes are combined using full-time equivalents. Average annual 2022 wages, adjusted for purchasing power parities (PPPs), are used to estimate the lost economic output.

To quantify the health, economic and the broader societal burden of cancer, a status-quo scenario (e.g. the current situation, with current cancer incidence rates) is compared to a hypothetical scenario in which there is no cancer (e.g. cancer incidence is set at zero). The difference between the two scenarios is the burden of cancer. Other chapters look at the impact of interventions (such as achieving certain risk factor targets), by comparing those scenarios to the status-quo.

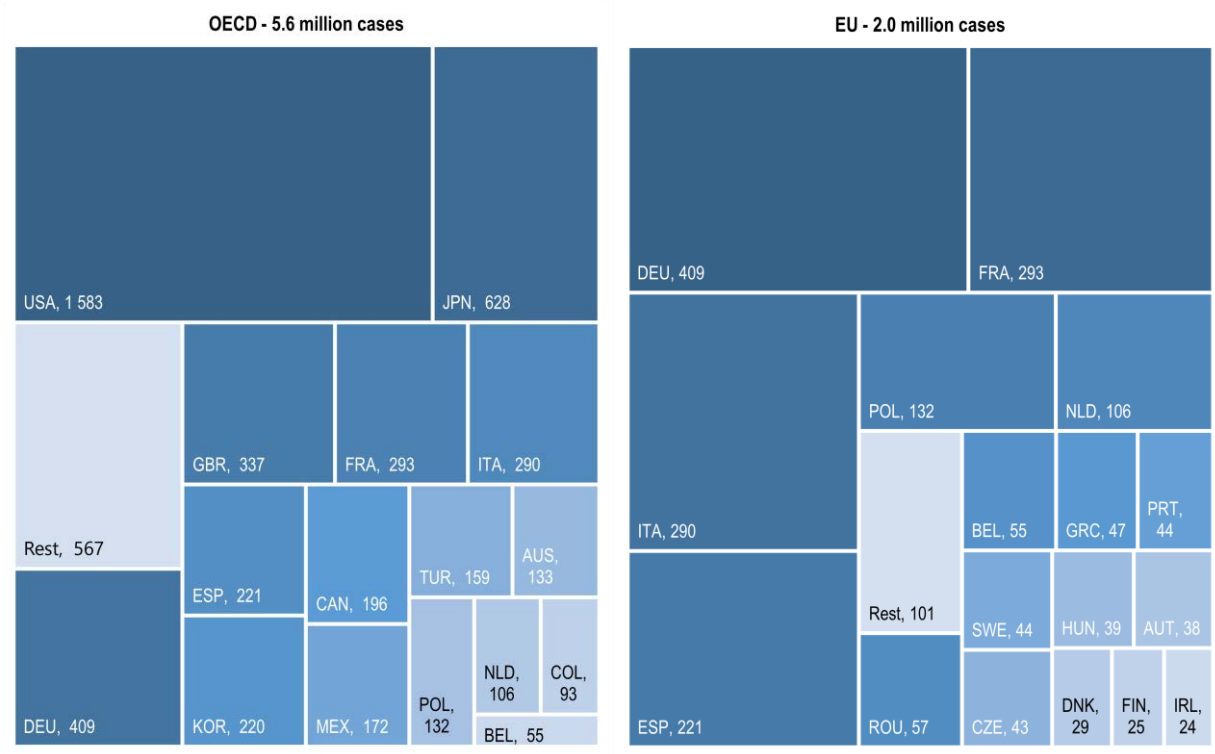
For more information on the OECD SPHeP-NCDs model, see the SPHeP-NCDs Technical Documentation, available at: http://oecdpublichealthexplorer.org/ncd-doc.

The impact of cancer on population health

Cancer is one of the main causes of death and disability in OECD countries (IHME, 2020[9]). Based on estimates from the OECD SPHeP NCDs model, there will be an estimated 5.6 million cases of cancer per year over the next three decades across the OECD – approximately one every 11 minutes -, and 2.0 million in the EU (Figure 3.2). Larger countries have a larger burden of cancer, with the United States facing 1.6 million new cases of cancer every year.

Figure 3.2. OECD countries will face an estimated 5.6 million new cases of cancer every year, and EU countries 2.0 million

Number of cases of cancer (thousands) per year, per country, average over 2023-50



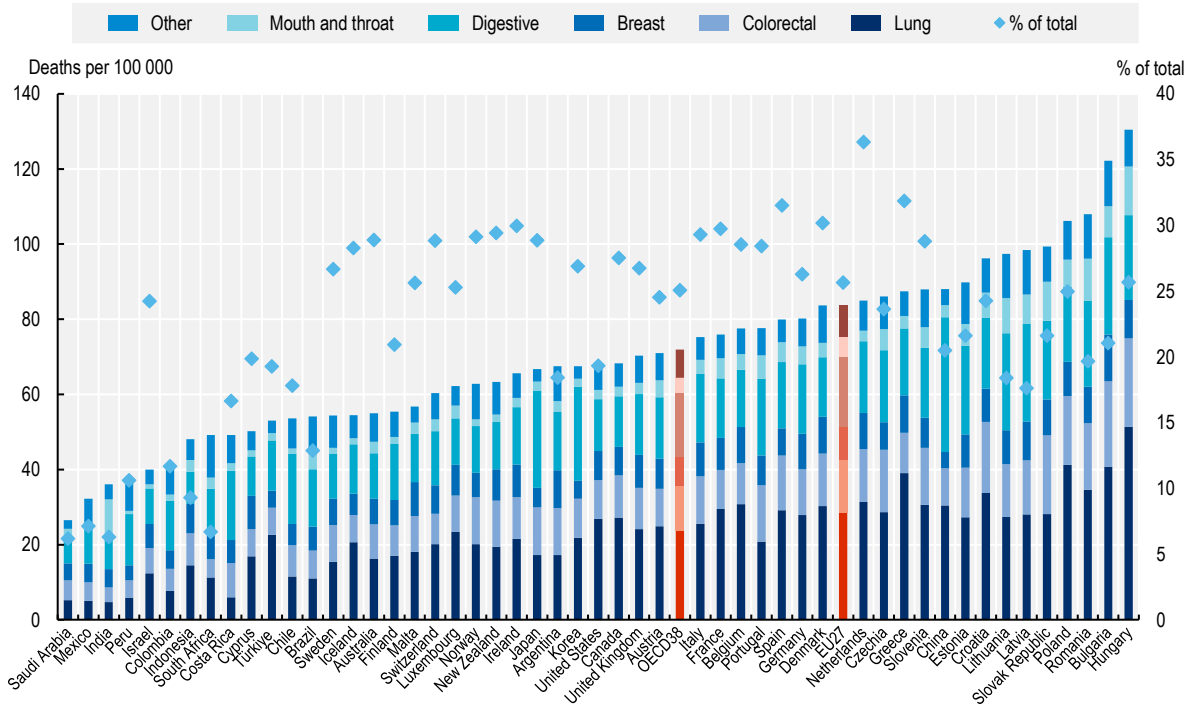
Note: Rest for OECD includes GRC (47); CHL (47); PRT (44); SWE (44); CZE (43); CHE (41); HUN (39); AUT (38); DNK (29); NZL (27); NOR (26); FIN (25); ISR (25); IRL (24); SVK (22); CRI (15); LTU (9); SVN (9); LVA (6); EST (6); LUX (3); ISL (1). Rest for EU includes BGR (23); SVK (22); HRV (17); LTU (9); SVN (9); LVA (6); EST (6); CYP (5); LUX (3); MLT (2). Number of cases is limited to the 14 cancer types included in the OECD SPHeP NCDs model.
Source: OECD SPHeP NCDs model, 2024.

StatLink https://stat.link/yk10ef

The vast majority of cases and deaths occur in older people. Nevertheless, people of all ages are at risk of dying from cancer. The OECD and Eurostat define premature or avoidable mortality as deaths occurring before the age of 75 (OECD/Eurostat, 2022[10]). Overall, cancer is estimated to account for 25% of all premature mortality in the OECD (26% in the EU) (Figure 3.3). The premature mortality rate from cancer is particularly high in Central and Eastern EU MS. High cancer premature mortality rates result from a combination of high cancer incidence (due to high risk factor prevalence for example, see also Chapter 5), low survival rates (due to less effective prevention and treatment, see also Chapter 4), and fewer competing causes of death (deaths from other non-communicable diseases (NCDs), infectious diseases and injuries). Central and Eastern EU MS tend to have relatively high levels of tobacco and alcohol use, lower than average survival rates, and a lower burden of infectious diseases and injuries than some other countries such as India, Indonesia, Mexico and Peru (OECD, 2023[11]; IHME, 2020[9]).

Figure 3.3. Cancer is estimated to cause around one in four premature deaths across 51 countries

Premature mortality (deaths in people under the age of 75) due to cancer, per 100 000 population and as a percentage of total premature mortality, per year, average over 2023-50



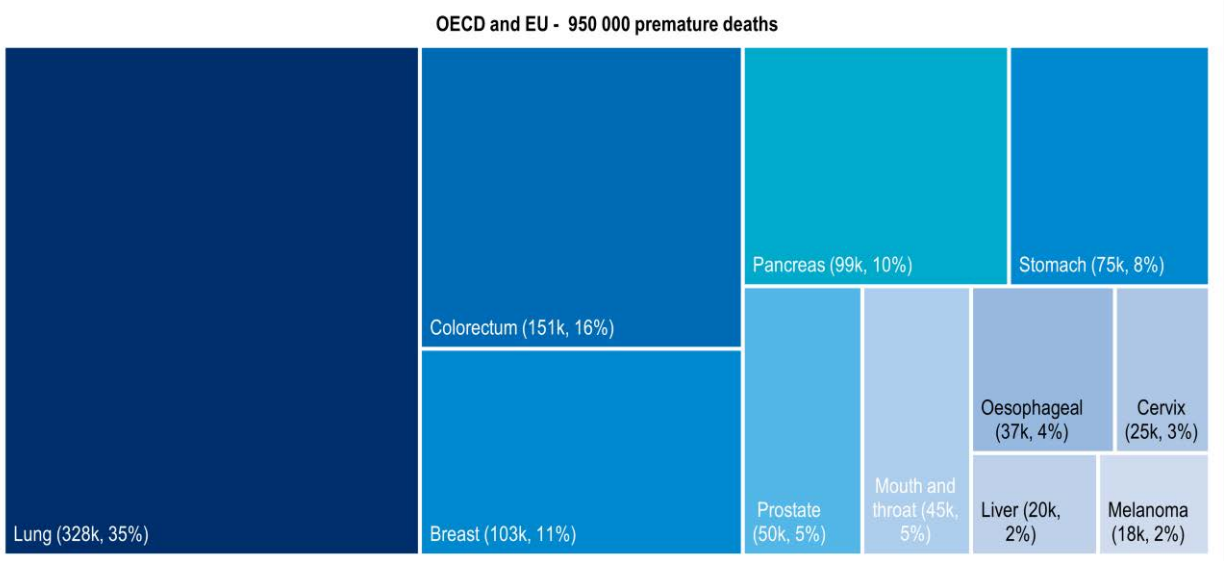
Note: Digestive includes liver, oesophageal, pancreatic, and stomach cancer; head and neck includes lip and oral cavity, larynx, other pharynx, and nasopharynx cancer; and other includes prostate, cervical cancer and malignant skin melanoma.
Source: OECD SPHeP NCDs model, 2024.

StatLink https://stat.link/jycmd7

Across the 51 countries included in this report, 3.1 million people will die prematurely from cancer every year, over the next 30 years – of which 920 000 in OECD countries and 361 000 in EU countries. Lung cancer is by far the largest cause of premature deaths, accounting for 35% of all premature cancer mortality in OECD and EU countries, followed by colorectal and breast cancer (Figure 3.4).

Figure 3.4. Lung, colorectal and breast cancer together are estimated to account for over 60% of all premature cancer deaths in the OECD and EU

Premature mortality (deaths in people under the age of 75) by cancer type in OECD and EU countries, total number of deaths and as a percentage of overall cancer premature mortality, per year, average over 2023-50



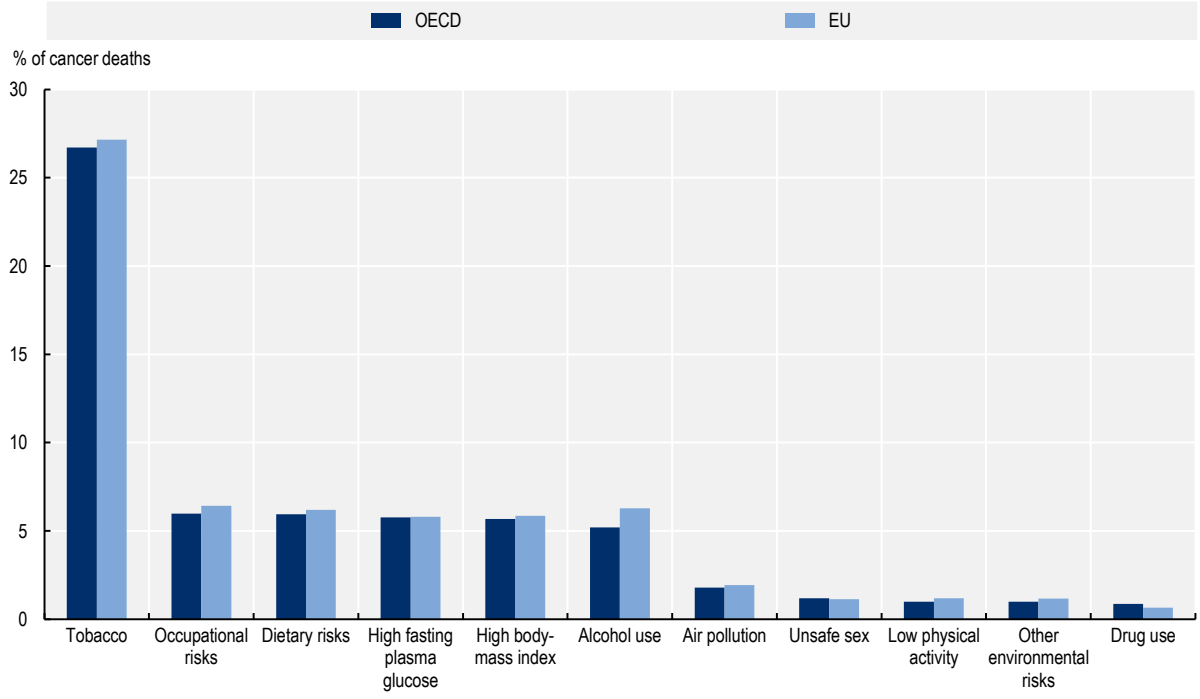
Note: Number of cases is limited to the cancers included in the OECD SPHeP NCDs model, which covers an estimated 75% of DALYs.
Source: OECD SPHeP NCDs model, 2024.

StatLink https://stat.link/1ahi7y

In the OECD, 46% of cancer deaths are attributable to risk factors, and 47% of cancer deaths in the EU (IHME, 2019[6]). Tobacco is by far the most important risk factor for cancer, responsible for 27% of cancer deaths in the OECD and the EU (Figure 3.5). Occupational risks, diet, high fasting plasma glucose, high body-mass index (BMI) and alcohol use all account for around 5 to 6% of cancer deaths.

Figure 3.5. Tobacco is by far the most important risk factor for cancer

Percentage of cancer deaths attributable to risk factors, 2019



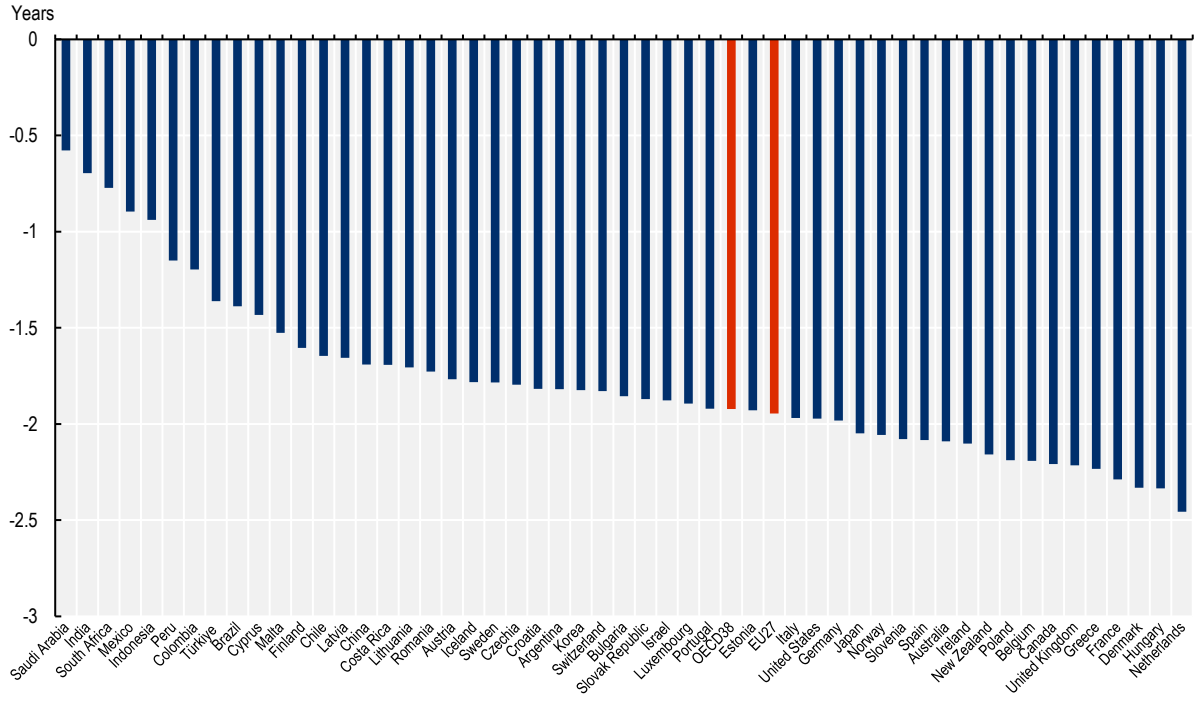
Note: Due to overlap between risk factors, their sum is greater than the total proportion of cancer deaths attributable to risk factors. Air pollution refers to ambient particulate matter pollution.
Source: IHME (2019[6]), *Global Burden of Disease 2019*, http://ghdx.healthdata.org/gbd-results-tool.

StatLink https://stat.link/2ezyao

Resulting from the increased mortality, the overall life expectancy of OECD and EU populations is nearly 2 years lower than if there had been no cancer (Figure 3.6). This is more than a decade of progress in life expectancy: prior to the pandemic, life expectancy in OECD member countries increased on average 1.7 years between 2010 and 2019 (OECD, 2023[11]). In countries with a higher overall life expectancy, people are more likely to live to an older age and thus more likely to develop cancer. Therefore, cancer has a greater impact on mortality and, consequently, life expectancy.

Figure 3.6. The average life expectancy over the next 30 years is estimated to be around 2 years lower due to cancer across 51 countries

The impact of cancer on the average population life expectancy in years, average over 2023-50



Source: OECD SPHeP NCDs model, 2024.

StatLink https://stat.link/u3thrn

The impact of cancer on people's quality of life

The impact of cancer on the quality of life for affected individuals is severe. Simple tasks such as eating, sleeping, and engaging in leisure activities may become arduous due to symptoms like fatigue, pain, or nausea. This leads to significant disability, and consequently a reduction in healthy life expectancy (the number of years that a person lives in "full health", which takes into account years lived in less than full health due to disease, see also Box 3.2). In the OECD and EU, cancer reduces healthy life expectancy by 1.6 years on average, but in some countries this is as high as 2 years (Figure 3.7).

Box 3.2. Life expectancy and healthy life expectancy

Life expectancy is a measure of mortality, as it reflects the age at which individuals are expected to die. Healthy life expectancy combines mortality with morbidity. It uses disease-specific disability weights to measure a disability-adjusted life expectancy.

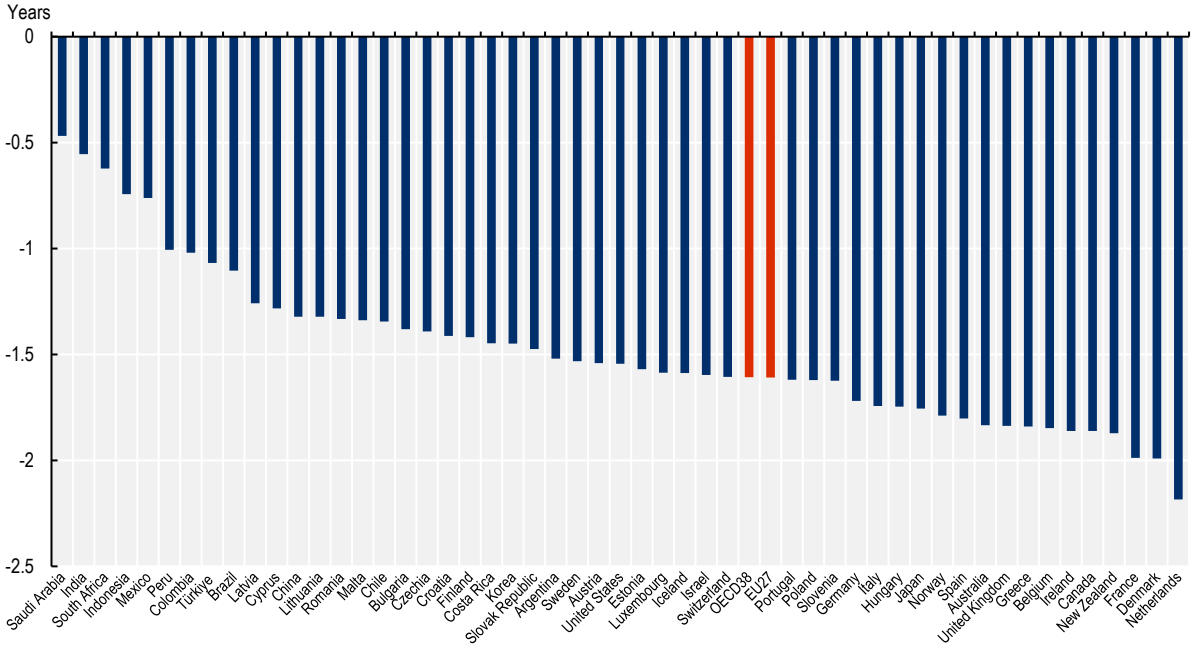
For example, if someone is expected to die at the age of 60 years due to cancer, their life expectancy is 60 years. If they spend the last 2 years of their life with a cancer that has a disability weight of 0.5, their healthy life expectancy is 59 years (58 years in full health + 2 years at 50% reduced health).

Note that while healthy life expectancy is per definition lower than life expectancy, the *change* in life expectancy (as presented in Figure 3.6 and Figure 3.7) can be greater than the *change* in healthy life expectancy. This is because the disability weights of other diseases can "discount" life-years gained.

Going back to the previous example, if the same person lives to 80 years in the "no cancer" scenario, this would be a gain of 20 life years. In the absence of other diseases, the gain in health life expectancy would be 21 years (80-59). However, if at 70 they develop a different disease and live 10 out of the 20 additional years with a disability weight of 0.5, their new healthy life expectancy would be 75 (70 years in full health + 10 years at 50% reduced health). In this case, the gain in healthy life expectancy would be only 16 years (75-59) – less than the gain in life expectancy. The presence of the other disease discounts the gain in life years.

Figure 3.7. Cancer is estimated to reduce healthy life expectancy by 1.5 years on average across 51 countries

The impact on the average population healthy life expectancy in years, average over 2023-50



Note: Healthy life expectancy is the number of years that a person lives in "full health". Years lived with disease are discounted based on a disability weighting specific for that disease.
Source: OECD SPHeP NCDs model, 2024.

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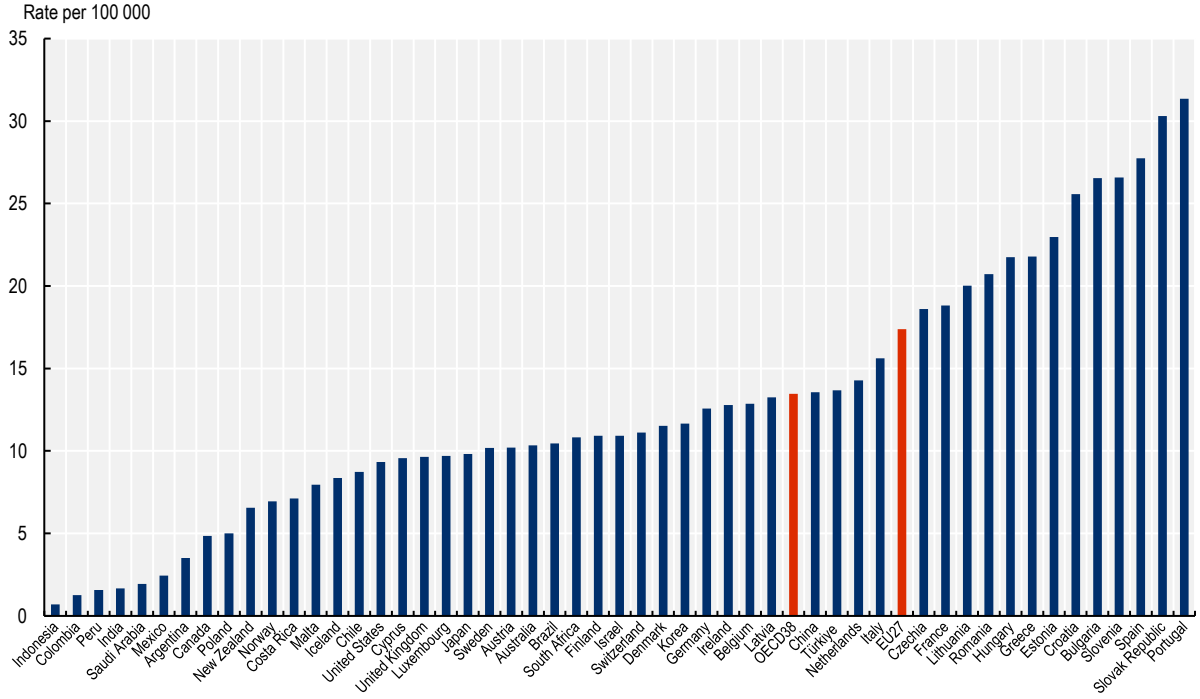
Cancer and mental health

In addition to disability and death, cancer also affects patients' mental health. The emotional toll of cancer, coupled with symptoms and side effects from treatment, can lead to heightened stress, anxiety, and depression. Evidence shows that depression is more common in cancer patients (Hartung et al., 2017[12]) and cancer survivors (Firkins et al., 2020[13]). A new diagnosis of cancer is associated with increased rates of depression for many reasons, including a fear of death, changes in social roles, physical health, life plans and work (Alwhaibi et al., 2017[14]). This higher risk of depression is persistent for more than five years after diagnosis (Maass et al., 2015[15]) (Firkins et al., 2020[13]).

It is estimated that cancer causes an additional 160 000 cases of depression annually in the OECD. The EU sees 85 000 additional cases of depression due to cancer per year. In the OECD, this equates to an age-standardised rate of 13 cases per 100 000 people, per year (Figure 3.8). This rate varies significantly across countries, from roughly 1 per 100 000 in Indonesia and Colombia to more than 30 in the Slovak Republic and Portugal.

Figure 3.8. Cancer is estimated to cause an additional 160 000 cases of depression per year in the OECD, and an additional 370 000 cases across 51 countries

The impact of cancer on the number of depression cases (age-standardised to OECD population, rate per 100 000 population) per year, average 2023-50



Source: OECD SPHeP NCDs model, 2024.

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Improving the mental health and quality of life of people living with cancer is a policy priority for many countries. This includes palliative and end-of-life care (Box 3.3), as well as follow-up care for cancer survivors. Cancer survivors face a number of challenges, including unmet psychosocial needs, emotional distress and obstacles to return to work among others (see also Box 4.6 in Chapter 4).

Box 3.3. Palliative and end-of-life care

Palliative care aims to relieve suffering and improve the quality of life of patients with life-threatening illness, without addressing the causes of the condition (WHO, 2020[16]). End-of-life care (EOLC) refers to the provision of palliative care in the last stages of life, while also including curative care (OECD, 2023[17]). Both are essential to provide physical, emotional, social, and spiritual support to those suffering serious illness. With ageing population and the rising prevalence of NCDs, the number of people requiring EOLC in the OECD is expected to grow from 7 million in 2019 to 10 million by 2050 (OECD, 2023[11]).

Despite the importance of EOLC, many countries face challenges in delivering accessible, people-centred, high quality and appropriately financed services (OECD, 2023[17]). Less than 40% of those who need EOLC receive it in OECD countries. Despite a preference to die at home, half of all deaths happen in hospital, often due to a lack of in-home and community-based support. Quality of care is often suboptimal as many people receive undertreatment of their symptoms, insufficient psychological care despite high levels of distress, anxiety and depression, or aggressive treatment that is not likely to provide comfort, prolong life or be cost-effective (OECD, 2023[17]).

To address these issues, it is crucial that countries invest in training on EOLC across different professionals and care settings. (OECD, 2023[17]). This can help improve access to palliative care as well as its quality, as healthcare professionals who received training on end-of-life care are less likely to provide overtreatment and aggressive care at the end of life.

Improving payment systems to encourage the provision of more cost-effective services is paramount to ensure that end-of-life care is high-quality and financially sustainable. Evidence from Belgium, Canada and the United States shows that access to palliative care out of hospital settings reduced the use of intensive care units, medication, and overall health expenditures (OECD, 2023[17]).

Several countries have reformed financing to better align with patient wishes on their preferred location of care and death. For example, England introduced personal health budgets for end-of-life in five areas, which has resulted in 82% of people dying their preferred places, while being cost-neutral and even cost-saving compared to the normal approach of EOLC. Australia announced in 2021 an investment of AUD 56 million to improve the provision of palliative care at home, and France announced in 2022 a reinforcement of mobile teams to promote palliative care at home, as part of its action plan on end of life (OECD, 2023[17])

Finally, more research into EOLC at a local and national level is needed. This includes identifying workforce capacity needs, training needs, and linking data to give a fuller picture of end-of-life care across services. This could lead to better co-ordinated and more evidence-based services.

Source: OECD (2023[17]), *Time for Better Care at the End of Life,* https://doi.org/10.1787/722b927a-en.

A key focus of Europe's Beating Cancer plan is the quality of life of cancer survivors. It aims to address the holistic needs of cancer survivors and promote their well-being by providing comprehensive survivorship care, supporting their social and economic integration, and advancing research and innovation in survivorship care (European Commission, 2021[18]). In Norway, both labour market reintegration and psychological support for patients with a history of cancer are important aspects of the cancer strategy Living with Cancer (2019-22) (OECD, 2023[19]). In England, cancer alliances work with hospitals and primary care to offer health and well-being information and support before, during and after cancer treatment (NHS England, 2024[20]).

Cancer, work and earnings

Employment and income are crucial to the quality of life of an individual. The financial distress associated with low or no income can have detrimental effects on mental health and on quality of life. It also has knock-on effects on other essential needs, like housing and healthy food. Moreover, being unemployed can lead to social isolation, and can halt personal and professional skill development.

Unfortunately, cancer can have a significant negative impact on a person's work life. Individuals diagnosed with cancer often require time off work for treatment, recovery, and medical appointments. Moreover, individuals may experience fatigue, cognitive difficulties, and other side effects that can affect their ability to perform at their usual level. The emotional and mental toll of cancer can have an impact on a person's ability to cope with work-related stress and interpersonal relationships in the workplace. All of these factors can impact job performance and attendance, skills acquisition, career progression and income (potentially compounding the financial impacts of cancer-related out-of-pocket expenditures (Box 3.4)).

Box 3.4. Catastrophic health spending and financial hardship due to cancer

Health systems provide adequate financial protection when payments for healthcare do not expose people to financial hardship. A lack of financial protection can reduce access to healthcare, undermine health status, deepen poverty, and exacerbate health and socio-economic inequalities. It can also lead to catastrophic health spending (CHE), where out-of-pocket payments exceed a predefined percentage of the resources available to a household to pay for healthcare (OECD, 2023[11]).

In addition to out-of-pocket spending on medical care, cancer patients can be faced with cost related to home care tasks, such as cleaning; making necessary home modifications for ease of living; as well as transport costs, parking fees, and accommodation for overnight stays and meals when health services are located far from a patient's home (Alzehr et al., 2022[21]) (Bygrave et al., 2021[22]).

A substantial proportion of cancer patients and survivors experience financial hardship due to CHE (Gordon et al., 2016[23]). A systematic review found that an average of 23% of cancer patients incurred CHE in countries with a very high Human Development Index (Korea and the United States) (Doshmangir et al., 2021[24]). A survey of US cancer patients found that financial hardship was reported by 49% of participants (Khera et al., 2022[25]); while a Canadian survey found that high levels of financial burden exist for 33% of cancer patients (Longo et al., 2021[26]).

The consequences of financial hardship associated with cancer are both psychological (increased anxiety, depression, fatigue, and reduced quality of life) and medical, with high treatment costs adversely affecting patient adherence (Khan, Ramsey and Shankaran, 2023[27]).

Evidence shows that people with cancer are significantly less likely to be employed (Blinder and Gany, 2020[28]; Barnay et al., 2015[29]; Jeon, 2016[30]; de Boer et al., 2009[31]; Thandrayen et al., 2021[32]). In addition, even when a person remains in employment, cancer increases the likelihood of choosing part-time work and an early retirement (Thandrayen et al., 2021[32]; Mehnert, 2011[33]). Another study found that, within the five years following diagnosis, cancer patients had more absenteeism and more presenteeism (Soejima and Kamibeppu, 2016[34]). In France, 20% of people aged 18 to 54 who were employed at the time of their diagnosis were not in employment five years later (Institut National du Cancer, 2018[35]).

These impacts can be worse among people of minority or lower socio-economic backgrounds. A study in the United States found that African American patients, and publicly insured or uninsured patients with breast cancer were more likely to experience diminished employment after 2 years of follow-up (Ekenga et al., 2018[36]). For breast cancer patients in Canada, a lower level of education was shown to be statistically significantly associated with a higher loss in wages (Lauzier et al., 2008[37]).

OECD analysis of the SHARE dataset – a survey covering over 20 European countries – and other longitudinal datasets shows that, adjusted for confounders, men and women with cancer are 7% and 10% less likely to be employed compared to people without cancer, respectively. Moreover, men and women with cancer who are in employment work on average 92% and 81% of the full-time equivalent, respectively, compared to 95% and 83% for men and women without any NCDs.

A reduction or loss of employment has a direct impact on a person's income. A study of women with breast cancer in Canada found that women with unemployment, retirement and reduced working hours due to their cancer lost on average 27% of their annual income, even after taking into account various types of compensation (e.g. salary insurance, paid sick leave) (Lauzier et al., 2008[37]).

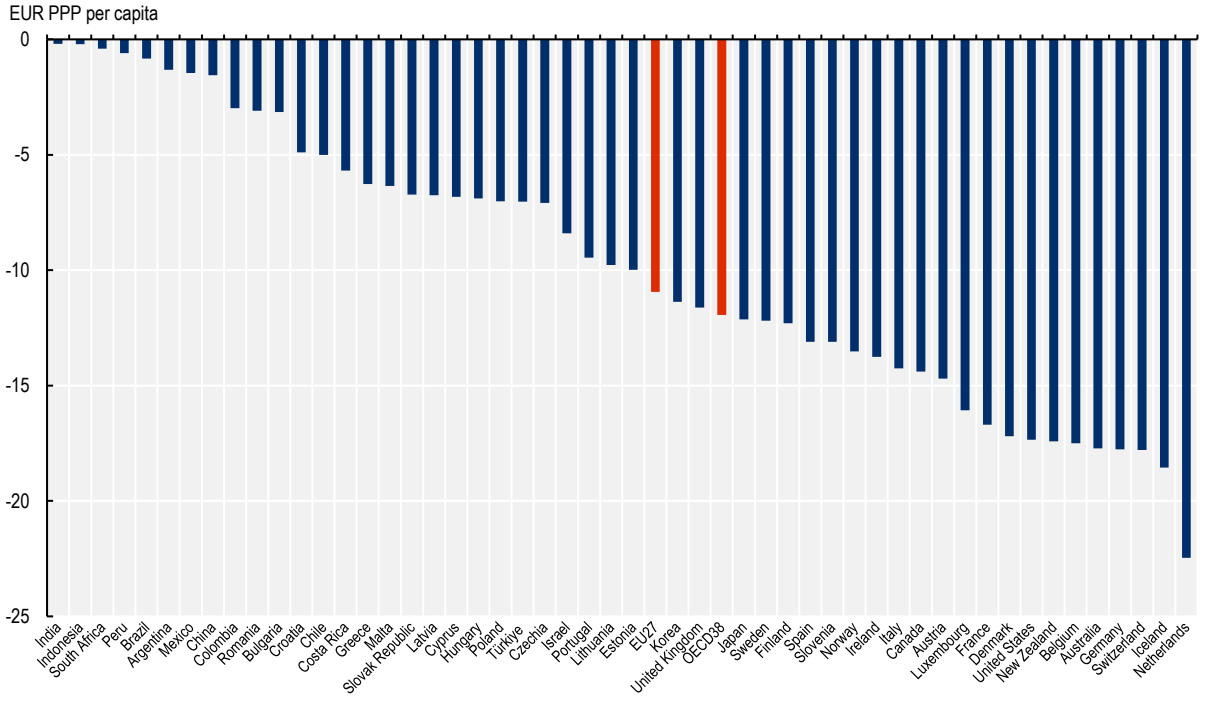
Even if they are employed, earnings of people with cancer are lower than those of people without cancer (Jeon, 2016[30]; Syse, Tretli and Kravdal, 2008[38]; Vaalavuo, 2021[39]). In the first post-diagnosis year, cancer survivors in employment were found to earn 10% less than their counterparts (Jeon, 2016[30]). The effect is stronger in people with low education, which can exacerbate existing financial inequalities (Syse, Tretli and Kravdal, 2008[38]; Vaalavuo, 2021[39]). While the bulk of the effect appears to only last two to three years after diagnosis (Vaalavuo, 2021[39]) (Jeon, 2016[30]), there is evidence showing that income remains slightly below that of non-cancer survivors for up to five years (Vaalavuo, 2021[39]).

It is difficult to say exactly how cancer reduces income. One way could be through its effect on participation in continuous education and training, and the associated skills acquisition. Participation in work-related training has been shown to be associated with higher wages (Goerlitz, 2010[40]; Denzler, Ruhose and Wolter, 2022[41]). As many cancer patients will experience a leave of absence (Kang et al., 2022[42]; Ferrier et al., 2021[43]), they may be less likely to participate in training compared to their peers. In addition, the psychological distress associated with cancer, as well as the impact of certain treatments, can diminish cognitive performance, such as impaired attention, processing speed, memory or executive functions (Kaiser et al., 2019[44]; Fleming, Edison and Kenny, 2023[45]). This could result in some cancer patients changing roles or missing out on promotions.

It is estimated that the impact of poor health on skills reduces the average annual wage by EUR PPP 2 955 for people with cancer (EUR PPP 2 573 in the EU), and by EUR PPP 12 on average for all people in employment (EUR 11 in the EU) (Figure 3.9)(see Annex 3.B for details on the methodology). This is a reduction in the annual wage received by individuals, not theoretical lost wage due to lower productivity or participation (for this, see Figure 3.12). At the population level this has noticeable consequences: across the OECD, nearly EUR PPP 7 billion in personal income is lost annually due to the impact of cancer on skills, and consequently wages. Countries with higher life expectancy and higher average wages see greater impacts of cancer on wages.

Figure 3.9. The impact of cancer on wages is particularly high in countries with higher life expectancy and higher average wages

The impact of skills lost due to cancer on the average annual wage, EUR PPP per capita, average 2023-50



Note: Average wages are calculated only for people in employment – the theoretical lower wages of people in very poor health who are unemployed do not contribute. For more details on the analysis, please see Methodology linking health and cancer to skills, work and income
Source: OECD SPHeP NCDs model, 2024.

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Addressing issues of unemployment, low wages and skill acquisition in people with cancer is crucial for promoting economic prosperity and security, at both individual and societal level. There are steps that employers and governments can take to reduce the impact of cancer on people's work life and income. Workplace accommodations, such as modified workstations, modified schedules, and reduced hours have been shown to significantly increase continued employment after a cancer diagnosis (Alleaume et al., 2020[46]). Evidence suggests that psycho-social interventions, including workshops, training, or counselling, can also have a positive effect on employment status (Fong et al., 2015[47]). Physical activity interventions, which aim to help decrease fatigue and emotional distress levels, have been shown to increase the return-to-work rate of cancer survivors (Wilson et al., 2022[48]).

The health expenditure associated with cancer

Cancer carries direct cost for societies in the form of health expenditure on cancer care. As the burden of cancer is set to increase with ageing populations, so are the treatment costs associated with it. In addition, cancer affects health expenditure through its links to other diseases (notably depression, which is more prevalent among people with NCDs, including cancer). Moreover, people who do not develop and die from cancer may develop other conditions that may also require treatment. These additional effects are taken into account in calculations of how the burden of cancer affects overall health expenditure, using the OECD SPHeP NCDs model (Box 3.9).

Box 3.9. Health expenditure in the OECD SPHeP NCDs model

In the OECD SPHeP NCDs model, health expenditure includes curative care, rehabilitative care, preventative care, ancillary services and medical goods. Importantly, it does not include long-term care.

Total health expenditure is predicted for each patient, based on age, gender and disease status. The total cost is the sum of disease-specific cost, residual cost (which captures costs unrelated to risk factors, for example, the costs of treating migraines or common colds), and, where relevant, the cost of comorbidities and end-of-life related cost. Patient-level cost data from France, Estonia and the Netherlands was used to create the cost prediction formula.

The cost from France, Estonia and the Netherlands (the "anchor countries") were extrapolated to other countries based on OECD data on inpatient curative and rehabilitative care spending per capita; outpatient curative and rehabilitative care spending per capita; and medical goods spending per capita. These three factors were weighted for each diseases using weights based on the OECD System of Health Accounts (SHA) data on the expenditure by disease, as well as the relative spend across the three for the anchor countries.

The burden that cancer exerts on overall health expenditure is calculated by comparing the baseline scenario to a hypothetical scenario in which there is no cancer. In the hypothetical scenario, people who would have otherwise died from cancer will live on and incur cost for other diseases. It also takes into account the impact that cancer has on other diseases, such as depression, and the cost associated with their treatment, as well as macro-trends in demographics and diseases. For these reasons, the cost of cancer presented in this report is not directly comparable to estimates which rely on allocating historic health spending to different diseases, such as those estimated under the SHA Framework.

For scenarios that focus on the impact of risk factors on cancer, only the cost associated with treating cancer are considered. This way the impact of cancer can be isolated from other NCDs also associated with the risk factors.

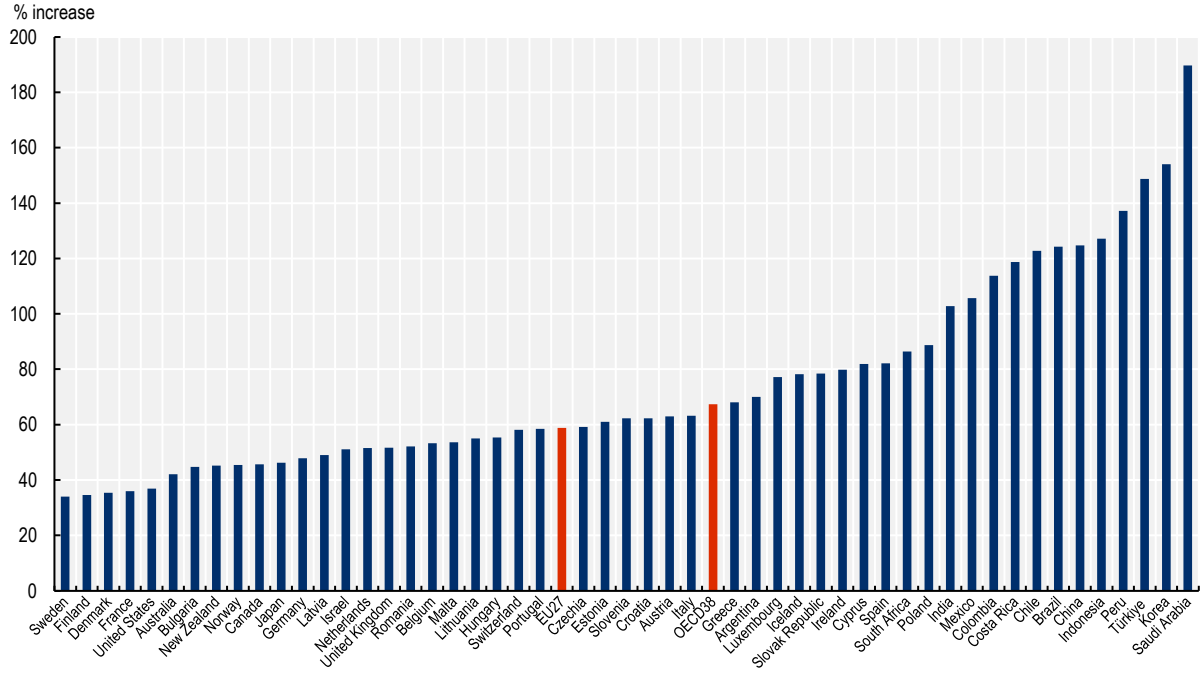
For more information, please refer to the online documentation for the OECD SPHeP NCDs model: http://oecdpublichealthexplorer.org/ncd-doc/.

The increase in health expenditure on cancer care between 2023 and 2050

As populations age and the cancer burden grows, so does the health expenditure needed to treat cancer. The per capita health expenditure on cancer care is expected to grow by 67% on average in the OECD (59% in the EU) between 2023 and 2050 (Figure 3.10). This is assuming the current standard of care and cost per case of cancer remain the same. Some countries, with a relatively low current burden of cancer, or with high expected ageing, see cancer cost grow even sharper: by around 150% in Türkiye and Korea, and by 190% in Saudi Arabia.

Figure 3.10. Per capita cancer costs will increase by 75% over the next three decades, on average across 51 countries

The percentage increase in cancer-specific per capita health expenditure, in 2050 vs. 2023



Note: Health expenditure includes curative care, rehabilitative care, preventative care, ancillary services and medical goods; and does not include long-term care. This graph shows cancer-specific health expenditure, which only looks at the treatment cost of cancer, and not changing in health expenditure on other diseases.
Source: OECD SPHeP NCDs model, 2024.

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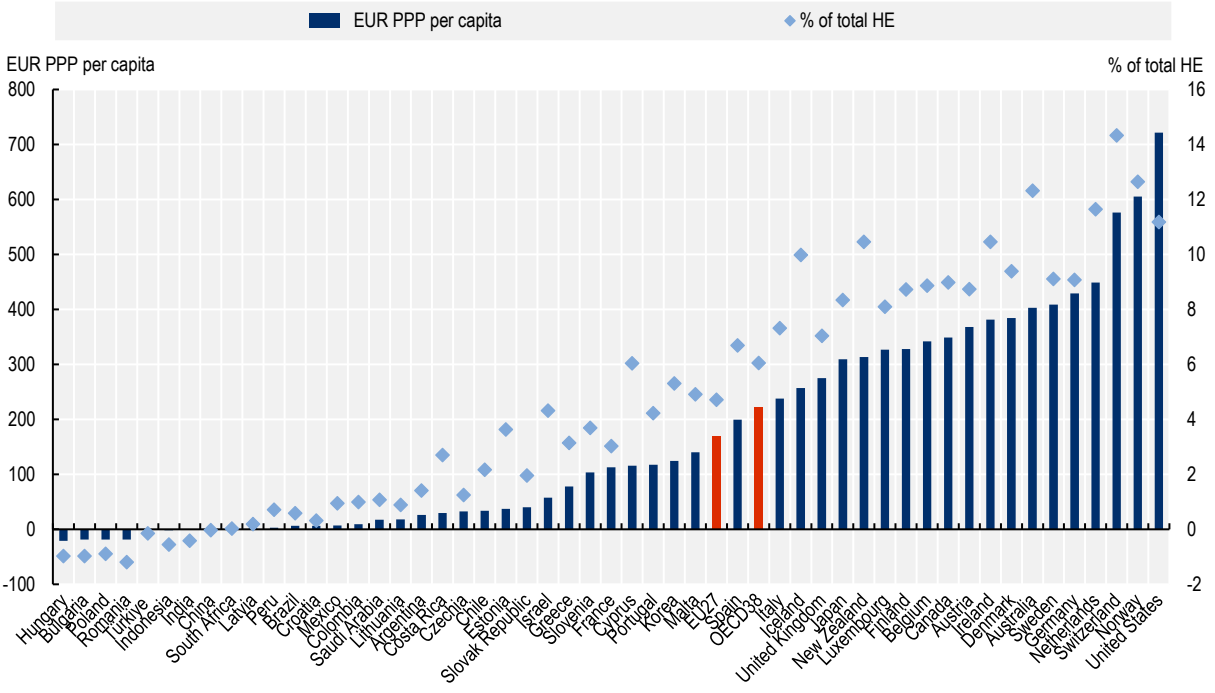
The burden exerted by cancer on overall health expenditure

The burden of cancer on overall health expenditure not only includes the cost associated with treating cancer, it also takes into account cancer's impact on other healthcare expenditures. As cancer negatively affects mental health, there are additional cost for the treatment of depression. On the other hand, people who die prematurely from cancer do not incur other medical expenses later on in life.

On average over the period 2023-50, health expenditure in OECD countries is estimated to be 6.0% higher due to the presence of cancer, and 4.7% higher in the EU (Figure 3.11). Per person, this equates to EUR PPP 222 per year in the OECD (EUR PPP 170 in the EU). This adds up to a total of EUR PPP 449 billion per year – more than the total annual health budget of France (EUR PPP 93 billion for the EU). Countries with higher average health expenditure, like the United States, Norway, Switzerland, and the Netherlands, also see a high per capita spend on cancer.

Figure 3.11. Health expenditure is 6% higher due to cancer in OECD countries, and 5% on average across 51 countries

The impact of cancer on overall health expenditure, in EUR PPP per capita and as a percentage of total health expenditure, per year, average over 2023-50



Note: Health expenditure includes curative care, rehabilitative care, preventative care, ancillary services and medical goods; and does not include long-term care. The estimates are calculated by comparing the baseline scenario to a hypothetical scenario in which there is no cancer, and therefore take into account the cost of other diseases as well as population dynamics. This can lead to an overall increase in health expenditure if, for example, people who do not develop cancer live longer and develop other diseases.
Source: OECD SPHeP NCDs model, 2024.

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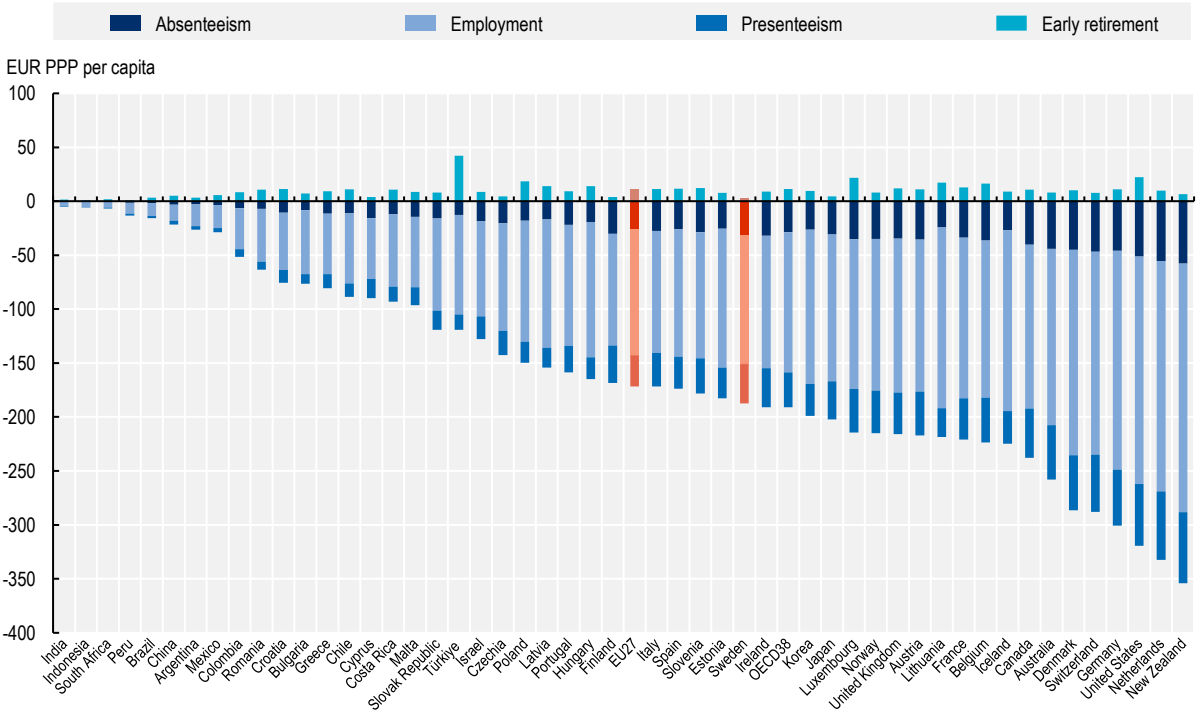
The societal cost of cancer

Reducing cancer incidence and improving outcomes is not just a health issue: it benefits the wider economy and society. The impact of cancer on a person's work life, as discussed above, also has a societal cost. Through its impact on unemployment, part-time work, absenteeism, presenteeism and early retirement, cancer reduces a country's workforce participation and productivity. When these effects are combined, OECD and EU countries lose the equivalent of 3.1 million and 1.1 million full-time workers due to cancer, respectively. Based on the country average wage, adjusted for purchasing power parities (PPPs), this equates to a loss in workforce output of EUR PPP 163 billion per year for OECD countries, broadly equivalent to the annual GDP of Hungary (EUR PPP 49 billion for the EU).

On a per capita basis, OECD countries lose on average EUR PPP 180 per year (EUR PPP 161 in the EU) (Figure 3.12). Countries with high wages combined with a high cancer incidence due to a higher life expectancy see greater impacts, up to EUR PPP 347 per capita per year in New Zealand. Although cancer increases the chance that a person retires early, it actually reduces the overall rate of early retirement in the population. This happens because cancer can cause people to die earlier, meaning fewer people make it to the age where they would typically retire early.

Figure 3.12. Cancer lowers the OECD workforce output by EUR PPP 180 per capita per year, and EUR PPP 142 on average across 51 countries

The impact of cancer on the workforce output through absenteeism, early retirement, employment (combining unemployment and part-time work) and presenteeism, EUR PPP per capita (working age), average over 2023-50



Source: OECD SPHeP NCDs model, 2024.

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Annex 3.A. Country coverage

Annex Table 3.A.1. Countries included in the report (n=51)

Country	OECD	OECD accession and selected partner countries	EU27	G20
Argentina				X
Australia	X			X
Austria	X		X	
Belgium	X		X	
Brazil		X		X
Bulgaria		X	X	
Canada	X			X
Chile	X			
China		X		X
Colombia	X			
Costa Rica	X			
Croatia		X	X	
Cyprus			X	
Czechia	X		X	
Denmark	X		X	
Estonia	X		X	
Finland	X		X	
France	X		X	X
Germany	X		X	X
Greece	X		X	
Hungary	X		X	
Iceland	X			
India		X		X
Indonesia		X		X
Ireland	X		X	
Israel	X			
Italy	X		X	X
Japan	X			X
Korea	X			X
Latvia	X		X	
Lithuania	X		X	
Luxembourg	X		X	
Malta			X	
Mexico	X			X
Netherlands	X		X	
New Zealand	X			
Norway	X			
Peru		X		
Poland	X		X	
Portugal	X		X	
Romania		X	X	
Saudi Arabia				X
Slovak Republic	X		X	
Slovenia	X		X	
South Africa		X		X
Spain	X		X	
Sweden	X		X	
Switzerland	X			
Türkiye	X			X
United Kingdom	X			X
United States	X			X

Annex 3.B. Methodology linking health and cancer to skills, work and income

Most of the literature on the human capital-health relationship looks at educational attainment in children and young people, for example years of schooling attended or educational qualifications. Few studies look at the effect of health on skill development that occurs throughout the life course due to formal and informal learning. However, cancer and other NCDs are much more likely to affect older people than children in school. Therefore, the SPHeP-NCD model analyses the impact of poor health on skills in adult.

Health is linked to skills based on an analysis of the German "Nationale Bildungspanel"/"National Education Panel Study" (NEPS) data (NEPS Network, 2022[49]). This survey follows a cohort of adults and collects data on their skills, job outcomes and self-rated health. In this analysis, skills were measured using Warm's weighted mean Likelihood Estimate (WLE) reading scores – a measure of literacy skills. Self-rated health was measured using a Likert rating on a scale of 1 (very good) to 5 (very poor). Models were adjusted for age, gender, socio-economic background and educational level. The analysis found that people with very poor self-reported health had 0.64 lower literacy scores compared to people in better health, even when adjusting for confounding factors.

People in the very poor health group accounted for approximately 1% of the total sampled German population in the NEPS Cohort 6. However, this is likely an underestimation of the actual proportion of people in very poor health, assuming that people in this group are less likely to participate in a survey study. In the OECD SPHeP-NCDs model, very poor health was defined as having any active cancer; or the first year of a stroke; or two or more NCDs. According to this definition, the proportion of people in very poor health in the working age population is around 2% in Germany for the baseline scenario.

An analysis of PIAAC data shows that, on average, a one-standard-deviation increase in numeracy skills is associated with a 10% wage increase among prime-age workers, when correcting for educational level (Hanushek et al., 2015[50]). The evidence suggests that numeracy and literacy scores are closely correlated, both in PIAAC and NEPS (Lechner et al., 2021[51]). Since the standard deviation of the literacy score is 1 (Lechner et al., 2021[51]), a difference of 0.64 is therefore assumed to results in a 6.4% drop in wages. This drop was applied to data on country-specific average monthly wages from the International Labor Organization.

As health is also linked to the likelihood of being employed, and the number of contracted hours, the change in wages can be combined with a change in the employment rate and the hours worked, to estimate the impact of health on total income (income = wages x time in employment).

4 The benefits and costs of improving cancer care

This chapter shows the potential impact and cost of improving cancer care. It shows how cross-country variation in cancer survival rates suggests that there remains scope to improve cancer screening, diagnosis and treatment. The chapter presents results from OECD Strategic Public Health Planning (SPHeP) for Non-Communicable Diseases (NCDs) model, which was used to quantify the potential impact of aligning survival rates to the best performing country. It also discussed the impact of improved survival on healthcare expenditure.

In Brief

Cancer care can be further improved, but the gains will come at a cost

- While cancer care has improved significantly over the past decades, there remains scope for improvement. There are considerable differences in survival rates between countries. For example, there is more than seven-fold variation in lung cancer survival rates in EU and OECD countries, ranging from 5% to 33%.
- Reducing the inequalities in survival rates would have significant benefits for population health. Using the OECD SPHeP NCDs model, it is estimated that, if all countries were to improve cancer screening, diagnosis and treatment to attain the best possible survival rates observed within the OECD and EU, a quarter of all premature deaths due to cancer would be prevented (25% and 26% in the OECD and EU, respectively). This would increase life expectancy by half a year.
- It would also have a significant economic benefit. Thanks to improved labour market participation and productivity of affected individual, workforce outputs would be EUR PPP 7.3 billion higher annually in the OECD over the next three decades – roughly equivalent to half the annual gross domestic product of Malta (EUR PPP 2.7 billion in the EU)
- To give patients the best chance for survival, no matter where they live, countries should focus efforts on improving cancer screening, early diagnosis and access to effective treatment.
    - Screening plays a pivotal role in the fight against certain cancers. While most OECD and EU countries have programmes for breast, cervical and colorectal cancer screening, there remain considerable differences in screening rates. To improve uptake, countries should identify and address the drivers and barriers to uptake, which can range from lack of knowledge or fear, to practical constraints or poor relationships with healthcare professionals, increase awareness, and optimise the design of screening invitation and delivery.
    - Early diagnosis and treatment improve patients' chances of survival. Countries should address access delays by increasing awareness of the initial signs of cancer among patients; diagnosis delay by increasing this awareness among healthcare workers; and improve referral from primary care through to specialist oncology care to reduce treatment delays.
    - High-quality cancer diagnosis and treatment is crucial to ensure better outcomes. Policymakers can improve access to effective care by reducing co-payments, introducing collaborative Health Technology Assessment at a multinational level to help provide timely access to cost-effective medicines, improving the use of targeted treatments by increasing access to companion diagnostics and next generation sequencing technologies, and establishing Comprehensive Cancer Centres.
- There is a clear case for continuing to improve cancer care, and various ways in which policymakers can do so. The resulting longer lifespans will mean higher health spending: the impact of improved survival rates on life expectancy will increase per capita health expenditure by EUR PPP 35 per year on average in the OECD (EUR PPP 37 in the EU) – even if there is no additional per case expenditure associated with the improved treatment outcomes. This is a total of EUR PPP 52 billion per year – equivalent to the total annual health budget of Belgium (EUR PPP 17 billion in the EU).

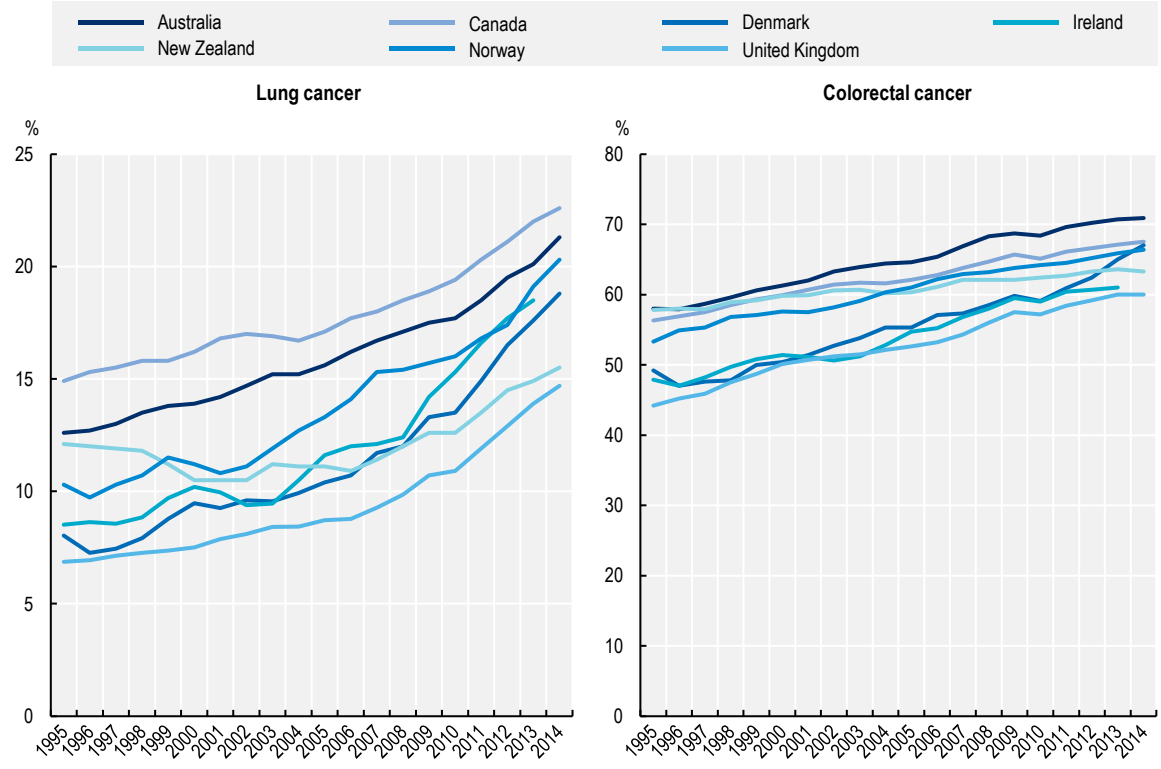
- This increase in health expenditure comes on top of the expected rise due purely to population ageing. Between 2023 and 2050, per capita health expenditure on cancer in the OECD is estimated to increase by 67% due to population ageing, and improved survival rates would add another 15% to this (59% and 16% in the EU). In addition, there may be increases in per-case cancer treatment cost due to new technologies and medicines, and additional cost associated with providing follow-up care for a growing number of cancer survivors.
- While advancements in cancer treatment have undoubtedly improved patient outcomes, the financial burden associated with managing the disease places significant strain on healthcare systems worldwide. As the trajectory of cancer treatment costs continues to rise, more effective care models are needed to ensure the sustainability of health services.

There remains considerable scope to improve cancer survival rates

When cancer was first written about, in an ancient Egyptian textbook from 3 000 BC, it was said that there was no treatment (American Cancer Society, 2018[1]). But as the medical sciences developed, and with the invention of anaesthesia, cancer became operable in the 19th century. Other inventions, including x-rays and mustard gas, lead to the development of radiation and chemotherapy treatment. As the field of cancer treatment continued to develop, more and more people now survive their cancer diagnosis. In just two decades, between 1995 and 2014, the proportion of people alive five years after their lung cancer diagnosis (5-year survival rate) increased from 10% on average across 7 OECD countries, to 19% (Figure 4.1) (Arnold et al., 2019[2]). In the same period, the 5-year survival rate of colorectal cancer has gone from 52% in 1995, to 66% in 2014.

Figure 4.1. Cancer survival rates have increased considerably in recent years

5-year survival rate of lung cancer, and colorectal cancer in selected OECD countries



Note: The availability of internationally standardised data on cancer survival trends over time is limited. Country coverage in this graph is limited to countries participating in the International Cancer Benchmarking Partnership (ICBP) SURVMARK-2 project, which provides comparable survival data for the period 1995-2014.

Source: Arnold, M. et al. (2019[2]), *ICBP SURVMARK-2 online tool: International Cancer Survival Benchmarking*, IARC, Lyon, http://gco.iarc.fr/survival/survmark (accessed on 6 October 2023).

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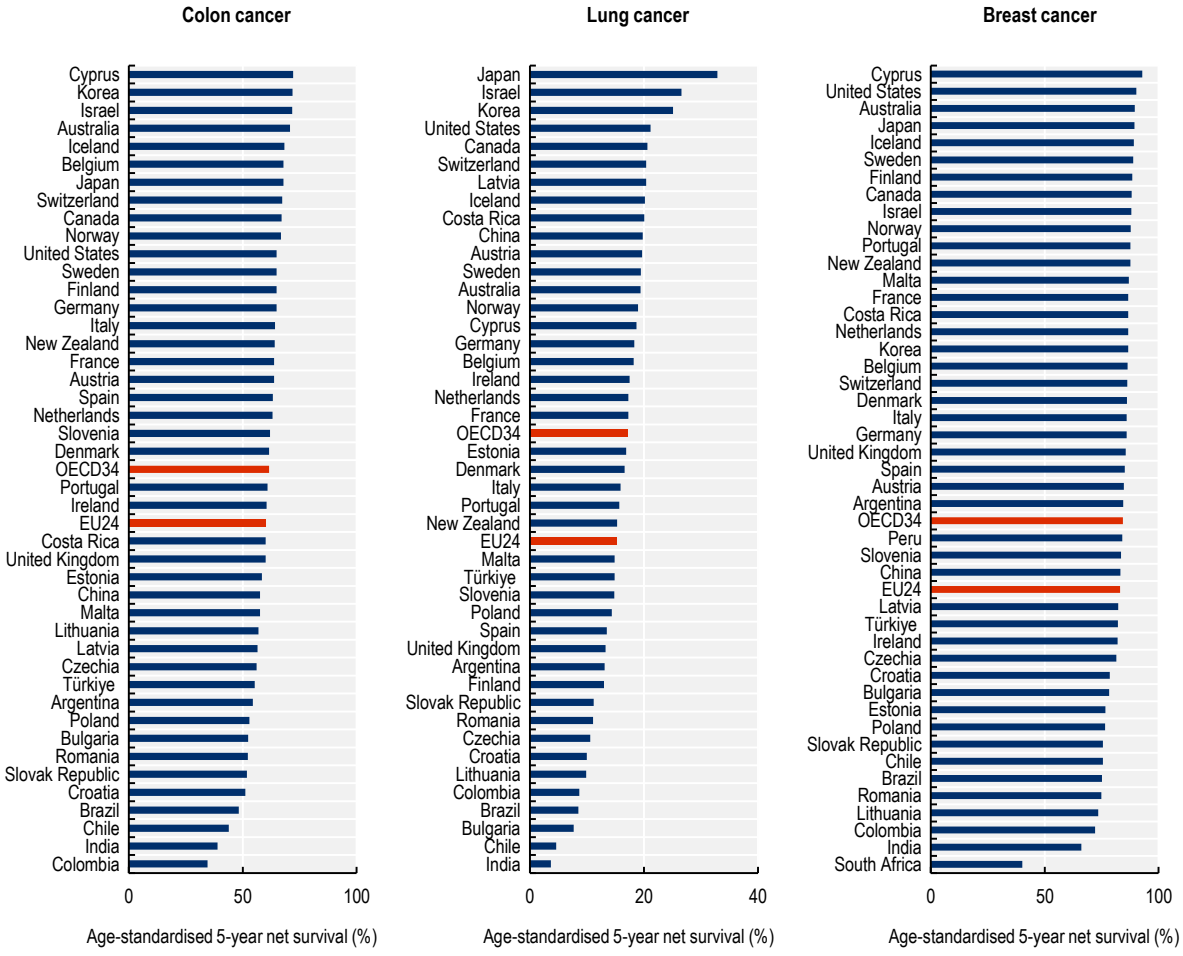
But despite overall improvements, there remain considerable differences between countries in survival rates (Figure 4.2). On average in the OECD and EU, around 60% of people survive for five years after their colon cancer diagnosis, but this varies two-fold, from 35% in Colombia to 72% in Cyprus. There is more than seven-fold variation in lung cancer survival rates across OECD and EU countries, ranging from 5% in Chile to 33% in Japan. Survival rates for breast cancer are higher on average and there is only 1.3-fold variation across OECD and EU countries. Nevertheless, in Colombia and Lithuania only 7 in 10 women survive for five years after being diagnosed with breast cancer, while 9 in 10 women survive in the United States and Cyprus. These intercountry differences highlight that much more can be done, and should be done, to increase cancer survival rates.

Figure 4.2. Cancer survival rates

Age-standardised 5-year net survival (%) for colon, lung and breast cancer, 2010-14



Source: Allemani, C. et al. (2018[3]), "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.

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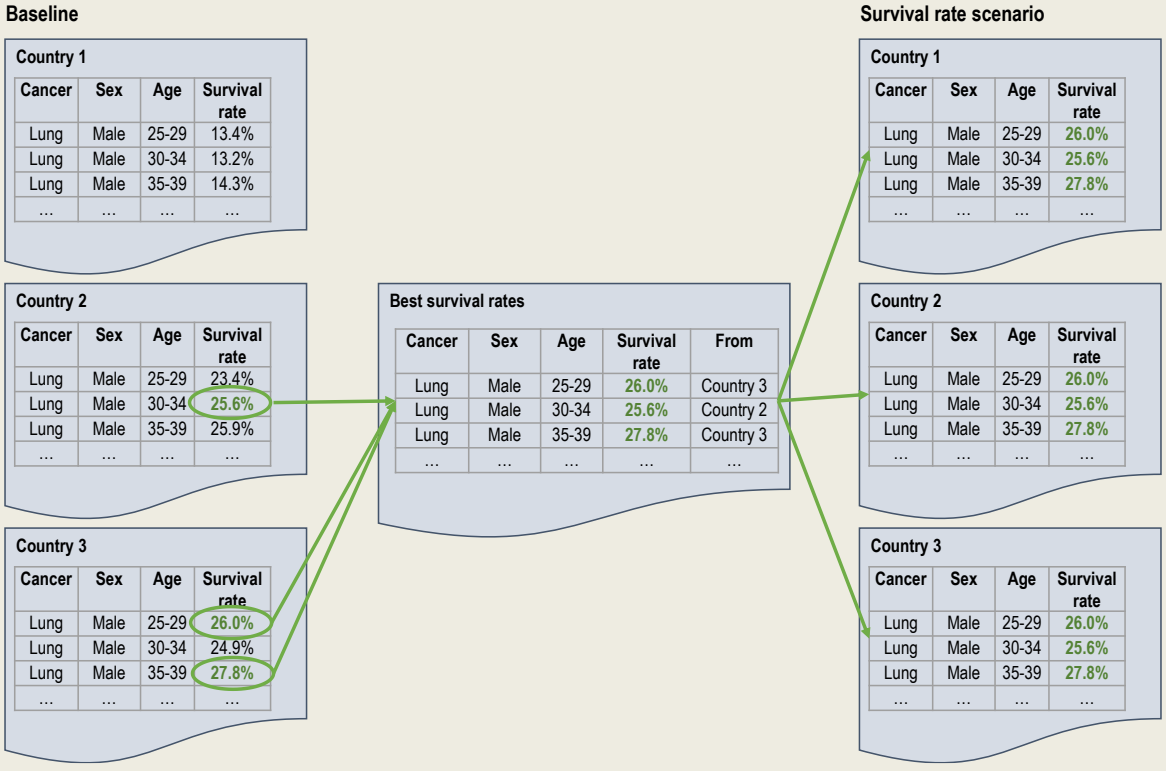
The OECD SPHeP NCDs model was used to evaluate the potential impact of reducing variation in cancer survival rates (Box 4.1). It is estimated that, if all countries improved their screening, diagnosis and treatment of cancer, to the point at which they achieved the best possible 5-year survival rates observed within the OECD and EU, this would save over 201 000 premature deaths due to cancer per year in the OECD, and 89 000 premature deaths in the EU. This is a quarter of all premature deaths due to cancer (25% and 26% in the OECD and EU, respectively). Countries with lower survival rates, including Mexico and Colombia, would see even greater reductions in cancer premature mortality if they achieved the best survival rates (Figure 4.4). Countries with a high baseline cancer premature mortality rate, including Central and Eastern EU Member States (MS), would also see the greatest improvement in these rates.

Box 4.1. Estimating the impact of improving cancer care in the OECD SPHeP NCDs model

Differences in cancer survival rates between countries are largely driven by differences in cancer care. Aligning to the highest observed survival rates can therefore reflect the potential impact of improving cancer care to meet the highest standards. In the OECD SPHeP NCDs model, the impact of improving cancer care was estimated by setting the age- and sex-specific survival rates for each cancer type in a given county with the highest survival rate observed across OECD and EU countries (Figure 4.3).

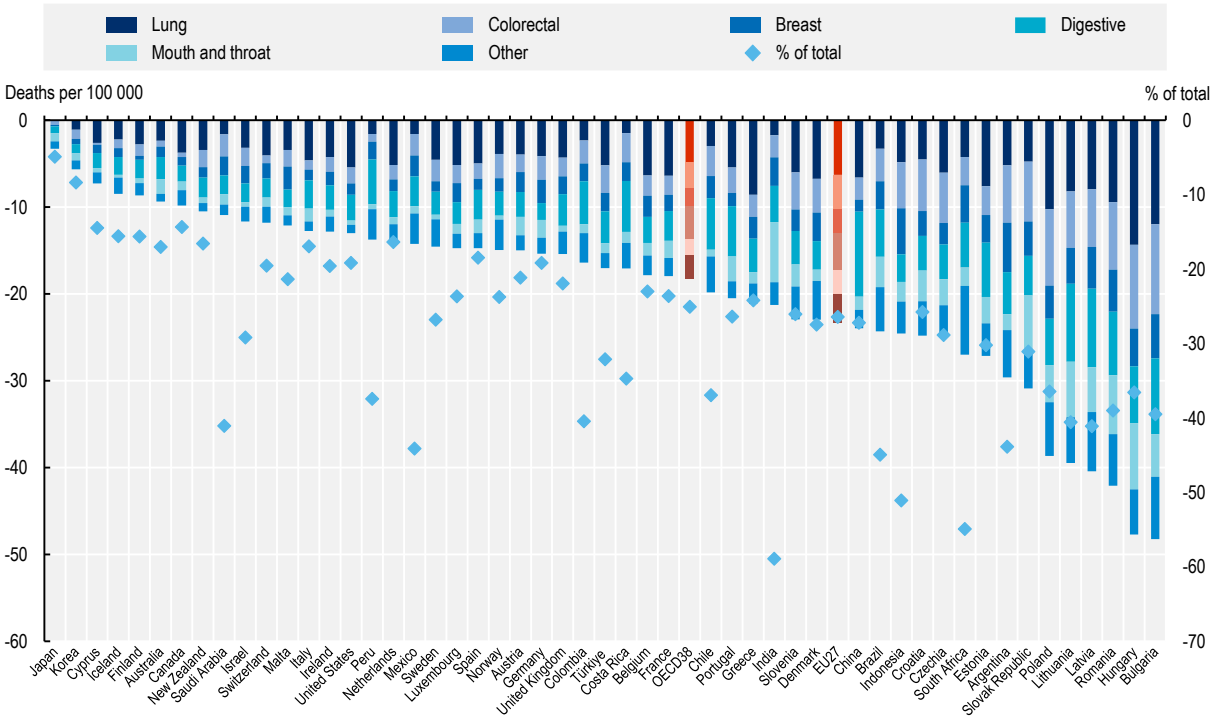
Figure 4.3. Illustrative example of the scenario to align survival rates



Note: Illustrative example of cancer survival rates, with dummy data and countries.

Figure 4.4. Achieving the highest survival rates would prevent one in four premature deaths from cancer

The impact of achieving the highest cancer survival rates observed across the OECD and EU on premature mortality (deaths in people aged under 75) due to cancer per 100 000 population; and as a percentage of total premature mortality due to cancer; per year, average over 2023-50



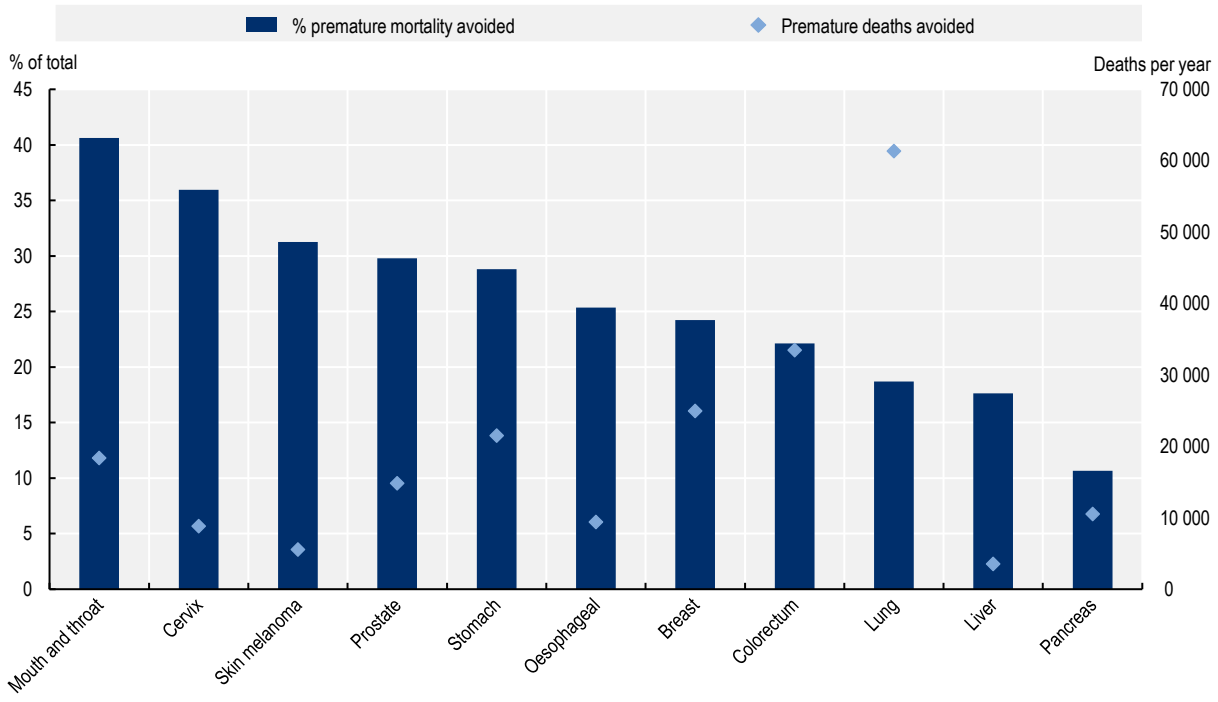
Note: Digestive includes liver, oesophageal, pancreatic, and stomach cancer; head and neck includes lip and oral cavity, larynx, other pharynx, and nasopharynx cancer; and other includes prostate, cervical cancer and malignant skin melanoma.
Source: OECD SPHeP NCDs model, 2024.

StatLink https://stat.link/nvqyks

For mouth and throat cancer, around four in ten premature deaths (41%) could be avoided if the highest survival rates were to be attained across the 43 OECD and EU countries (Figure 4.5). Improved survival rates would also prevent around one in three premature deaths due to cervical cancer (36%) and skin melanoma (31%). However, in absolute terms the impact on lung cancer is the largest, with 61 000 premature deaths avoided every year – nearly 30% of the total impact – followed by 33 000 premature deaths due to colorectal cancer.

Figure 4.5. Mouth, throat and cervical cancer see the greatest relative impact on premature mortality from improved survival rates

The impact of improved cancer survival rates on premature mortality (deaths in people aged under 75), as percentage of total premature mortality and number of premature deaths per year, by cancer type, for the 43 OECD and EU countries combined, average over 2023-50



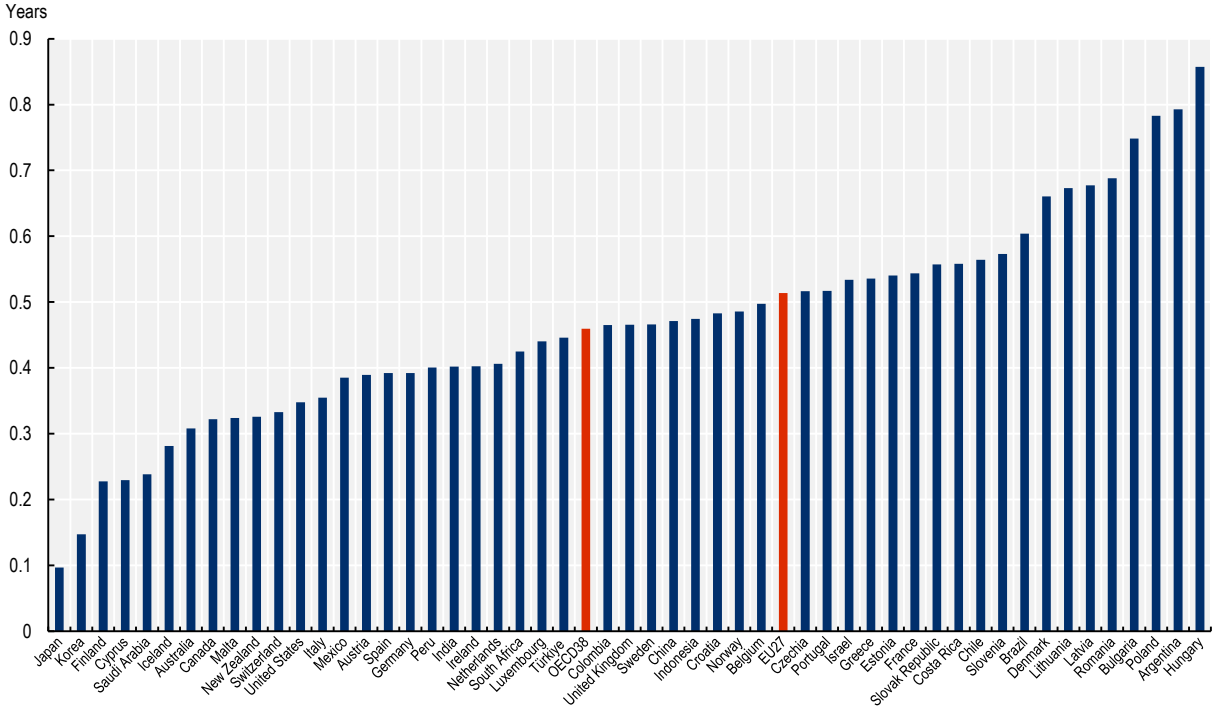
Source: OECD SPHeP NCDs model, 2024.

StatLink https://stat.link/suvtb5

As premature mortality decreases, the average life expectancy is estimated to increase in all countries, and by half a year in OECD and EU countries (0.46 and 0.51 years respectively) (Figure 4.6). Countries with the greatest improvement in premature mortality rates also see the greatest impact on life expectancy.

Figure 4.6. The impact of achieving the best 5-year cancer survival rates in the OECD and EU on average population life expectancy across 51 countries

Average over 2023-50



Source: OECD SPHeP NCDs model, 2024.

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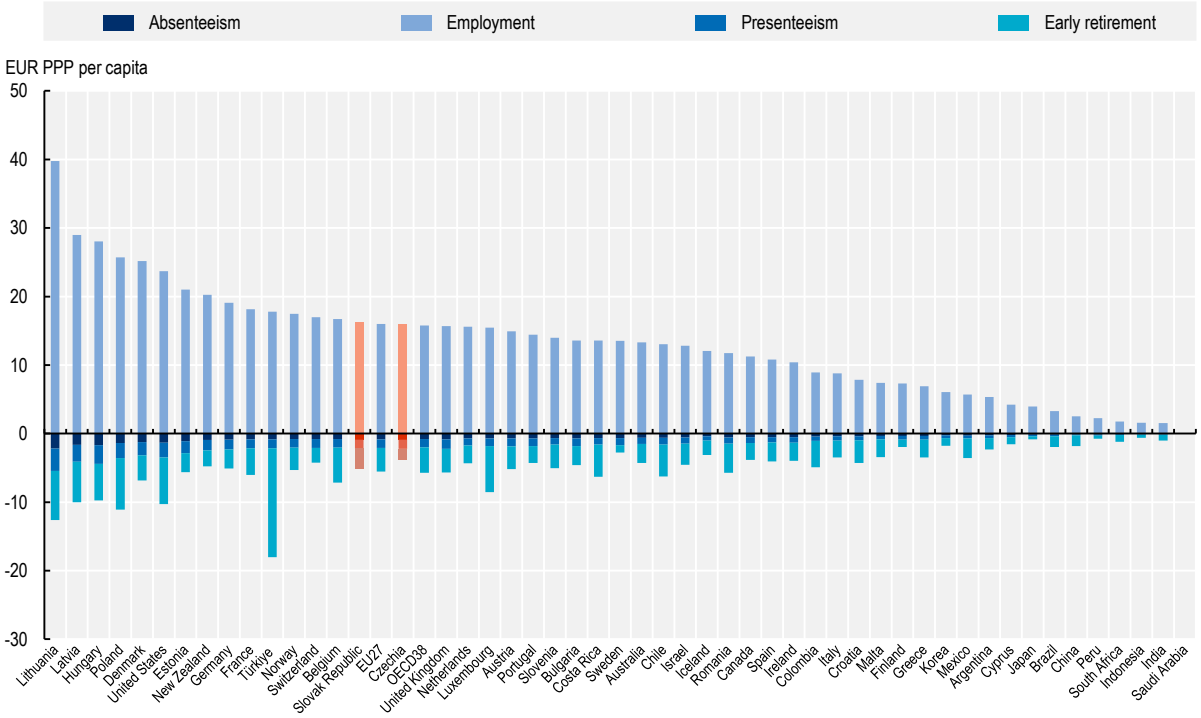
Improved cancer survival would increase the size and output of the workforce. In the OECD, it is estimated that the equivalent of 270 000 additional full-time workers (105 000 in the EU) would be available due to increased employment. Improved cancer survival does mean that the workforce would include more people living with cancer and older people who are more likely to have other non-communicable diseases (NCDs). As a result, there would also a reduction in workforce output due to increased absenteeism, presenteeism, and early retirement. However, these impacts do not outweigh the increased employment. Based on annual wages, per capita output would increase by EUR PPP 10 in the OECD and EU on average – including an increase of EUR PPP 16 due to employment (Figure 4.7). In total, improved cancer survival rates would increase the workforce output by EUR PPP 7.3 billion in the OECD – equivalent to more than half the annual gross domestic product of Malta (EUR PPP 2.7 billion in the EU).

Figure 4.7 The impact of achieving the best 5-year cancer survival rates in the OECD and EU on workforce output across 51 countries

The impact on the workforce through absenteeism, early retirement, employment (combining reductions in unemployment and part-time work) and presenteeism, expressed in EUR PPP per capita (working age) based on the average annual wage per country, average over 2023-50



Source: OECD SPHeP NCDs model, 2024.

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To give patients the best chance for survival, countries should improve cancer screening, diagnosis and treatment

An important factor driving differences in survival rates is the quality and timeliness of cancer care (Arnold et al., 2019[4]). Early diagnosis improves survival chances: on average in the United Kingdom, a lung cancer diagnosed at stage one has a 5-year case fatality rate of 43%, compared to 97% when an otherwise similar case lung cancer is diagnosed at stage four (Crosby et al., 2020[5]; Office for National Statistics, 2019[6]). Delays in cancer treatment are also associated with increased case fatality rates: patients with colon cancer, head and neck or bladder cancer whose surgical treatment is delayed by one month are 6% more likely to die compared with those without this delay. Patients with breast cancer have an 8% increased risk of death (Hanna et al., 2020[7]; BMJ, 2020[8]). The availability of, and access to, effective diagnostics and treatments can also influence outcomes.

To ensure everyone has the same chance of survival, no matter where they live, countries should continue to improve the access to as well as the quality and timeliness of cancer care. This includes 1) more effective screening, 2) investing in programmes for early diagnosis, and 3) more effective treatments.

Effective screening

Screening plays a pivotal role in the fight against certain cancers. The WHO includes screening for cervical, breast and colorectal cancer on their Best Buys for NCDs list (WHO, 2022[9]) (WHO, 2023[10]), and several countries are also exploring the potential of lung cancer screening (Box 4.2). The purpose of screening is to identify those individuals who have a disease, but do not yet have symptoms, so that an early treatment or intervention can be offered to improve chances of survival. Screening is different to early diagnosis, because screening invites people without symptoms to undergo testing, whereas early diagnosis aims to detect conditions as early as possible in people with symptoms (WHO Regional Office for Europe, 2020[11]).

Box 4.2. Lung cancer screening

While not currently included in the WHO recommendations for cancer screening programmes, an increasing number of EU/EEA countries have pilot programmes for lung cancer screening. For example, pilots are under way in Belgium, Czechia, Italy, Norway, Slovenia, Spain and Sweden, and planned in Denmark, Estonia and Germany.

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). This group will be referred by their general practitioner (GP) to a pulmonary specialist for a lung examination and will receive a low-dose computed tomography (CT) scan.

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.

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.

In **Estonia**, a feasibility study was conducted in 2021 in three family doctor practices in Tartu, targeting individuals aged 55-74. 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 Federal Office for Radiation Protection (BfS), 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.

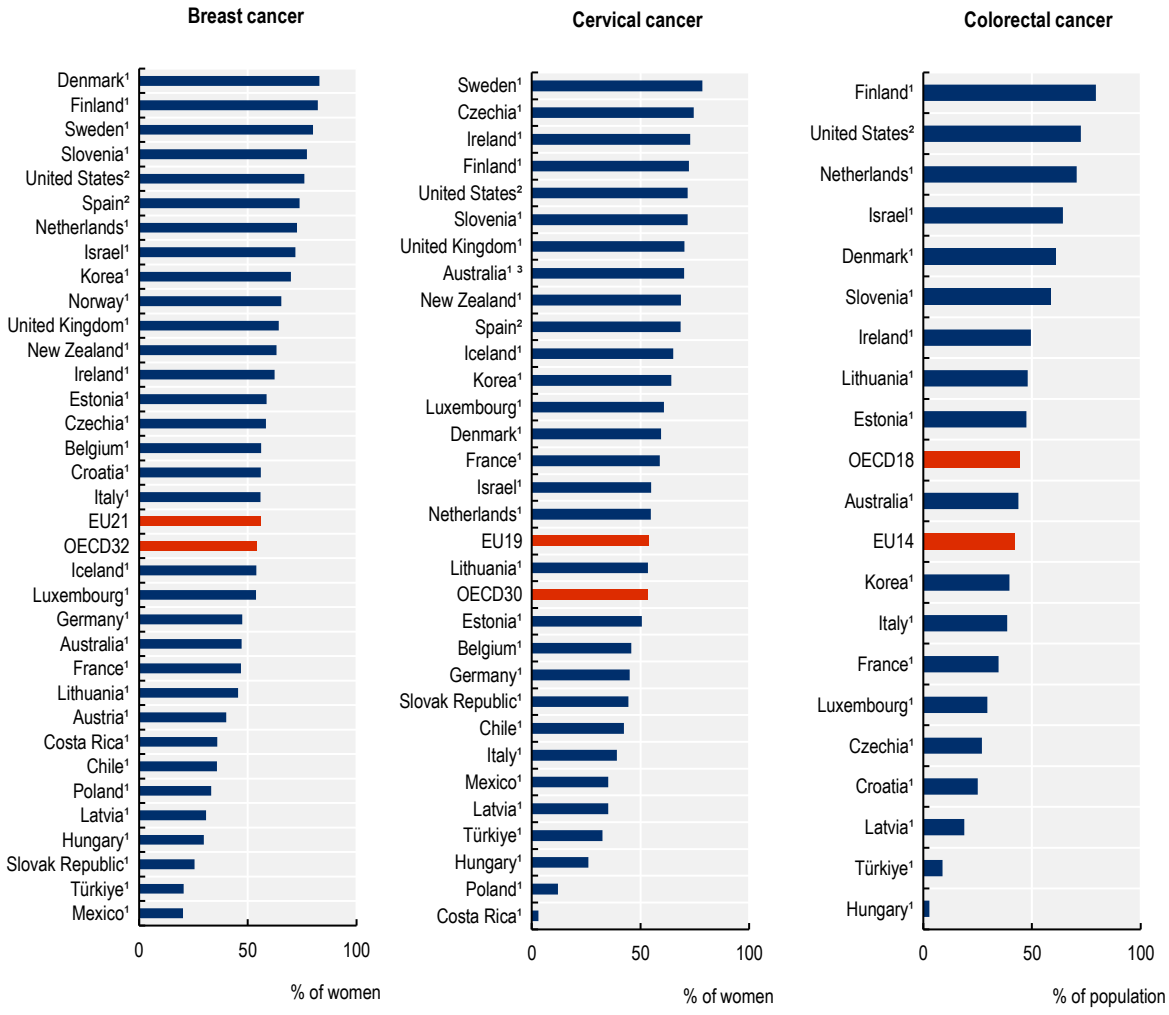
Two European trials will inform health policy concerning lung cancer screening in the coming years. The SOLACE Project was launched in April 2023 under Europe's Beating Cancer Plan, with funding from EU4Health. It aims to facilitate implementation of and reduce inequalities in lung cancer screening programmes across Europe. 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, 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.

Source: OECD (2024[12]), *Beating Cancer Inequalities in the EU: Spotlight on Cancer Prevention and Early Detection*, https://doi.org/10.1787/14fdc89a-en.

While the characteristics in terms of target population and frequency vary, most OECD and EU countries have programmes for breast, cervical and colorectal cancer screening in place (OECD, 2023[13]; OECD, 2024[12]). However, there are considerable differences in screening rates across countries: breast cancer screening rates vary four-fold, from 20% in Mexico to 83% in Denmark (Figure 4.8).

Figure 4.8. Cancer screening rates

Population coverage of breast, cervical and colorectal cancer screening programmes, 2021



1. Programme data. 2. Survey data. Breast cancer: Mammography screening in women aged 50-69 within the past two years; Cervical cancer: Cervical cancer screening in women aged 20-69 within the past three years; Colorectal cancer: colorectal cancer screening coverage of population aged 50-74 who report having had faecal occult blood tests over the past two years.
Source: OECD Health Statistics 2023.

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Screening coverage also varies considerably within countries. In the EU, nearly 80% of women with tertiary education had participated in cervical cancer screening in 2019, versus only 61% of women with lower secondary education or less (Eurostat, 2023[14]). In some countries, for example in Romania, this inequality was even larger, with three times more women with high education than low education having a cervical smear test. Screening rates also varied across income groups: women with a low income were twice as likely to miss out on breast cancer screening compared to women with a high income. Finally, people living in rural areas also had a significantly lower likelihood of receiving breast and colon cancer screening than those living in urban areas (OECD, 2024[12]).

To improve screening uptake, it is important to understand what the drivers and barriers to participation are. For colorectal cancer screening, barriers range from a lack of knowledge and not feeling screening is personally necessary; active aversion to screening (fear, discomfort, disgust or not wanting to know); and contextual barriers of the healthcare system such as practical constraints or poor relationships with healthcare professionals (Le Bonniec et al., 2023[15]). Younger people, women, people with a lower level of education, lower income and ethnic minorities are less likely to participate in colorectal screening (Wools, Dapper and Leeuw, 2016[16]). Increasing awareness, particularly among socially vulnerable populations is key to address some of these barriers (Box 4.3).

Box 4.3. Policy actions 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).

Source: OECD (2024[12]), *Beating Cancer Inequalities in the EU: Spotlight on Cancer Prevention and Early Detection*, https://doi.org/10.1787/14fdc89a-en.

There are various ways in which screening invitation and delivery can be improved to increase screening uptake. Invitation by a general practitioner (GP) letter rather than another authority, letters with fixed appointments rather than open invitations (Box 4.4), and personalised invitations compared to standard invitations were all more successful in encouraging uptake (Staley et al., 2021[17]). Reminders have also been shown to increase uptake, with reminders delivered by letter or email even more effective than phone call or text message. Facilities with flexible appointment times and with female providers were shown to have higher uptake of breast and cervical cancer screening (Plourde et al., 2016[18]). For women who are uncomfortable seeing a health worker for a cervical smear test, self-testing can help. HPV self-testing was found to be effective in increasing uptake among lower socio-economic groups in France (Sancho-Garnier et al., 2013[19]).

Box 4.4. Increasing response rates to breast cancer screening invitations using pre-arranged appointments

In Denmark, Finland, Germany, Ireland, Italy, the Netherlands, Spain, Sweden and the United Kingdom, mammography screening invitation letters include a fixed appointment date. In these countries women in the breast cancer screening target group received a letter, or a follow up letter after a first missed appointment, with a pre-arranged date, time and location for screening already filled out. This approach is consistent with European Commission Initiative on Breast Cancer Guidelines, which recommend that women are invited to breast cancer screening with a letter including a fixed appointment, followed by a phone or written reminder.

A randomised control trial in England found that women who did not attend their first offered appointment and were invited again for breast cancer screening with a letter with a pre-arranged time were nearly twice as likely to attend screening than women in a control group who received an invitation letter with a telephone number to call to book their new screening appointment (Allgood et al., 2017[20]).

Source: OECD (2020[21]), *OECD Reviews of Public Health: Latvia: A Healthier Tomorrow,* https://doi.org/10.1787/e9f33098-en.

Early diagnosis and treatment

Once people have symptoms, the outcome of their disease can be improved through early diagnosis and timely access to appropriate treatment. Early diagnosis refers to the detection patients with symptoms at the earliest possible stage so they have the best chance for successful treatment (WHO, 2017[22]; OECD, 2024[12]). This includes the access to medical care delay ("access delay"), the delay in time from visit to diagnosis ("diagnosis delay"), and the delay between diagnosis and receiving treatment ("treatment delay").

Access delays can be reduced by increasing awareness of the initial signs of cancer among patients. A study in the Netherlands found that while many people recognise changes in bowel habits, changes of a mole and breast lumps as signs of cancer, less than half recognised dysphagia (difficulty swallowing) as a potential symptom of cancer (Sijben et al., 2024[23]). A study in the United Kingdom found that only 51% of women correctly identified nipple rash as a symptom of breast cancer (Green, Lloyd and Smith, 2023[24]). Access delay can also be reduced by addressing barriers to seeking access, such as not wanting to make a fuss, waiting to see if a symptom will pass on its own, or difficulties making an appointment with the doctor (Green, Lloyd and Smith, 2023[24]) (Boswell et al., 2023[25]).

Reducing diagnosis delay involves increasing awareness of the initial signs of cancer among healthcare workers, improving accessibility and affordability of diagnostic services, and improving the referral process from first to secondary and tertiary levels of care (WHO Europe, 2010[26]). Clinicians can also be supported in making a cancer diagnosis, for example through electronic clinical decision support tools (eCDSTs) (Box 4.5).

Box 4.5. Electronic clinical decision support tools (eCDSTs) in cancer

The diagnosis of cancer in primary care can be complex and challenging as patients can present with non-specific symptoms (Astin et al., 2011[27]; Chima et al., 2019[28]). eCDSTs use epidemiological data, symptoms and test results to improve cancer diagnosis (Chima et al., 2019[28]; OECD, 2024[12]). Information on the patient is entered into the eCDST by the GP, or automatically populated from the patient's electronic health record. Based on an algorithm, the eCDST then produces recommendations, prompts, or alerts for the GP to consider (Chima et al., 2019[28]).

In some countries, these tools are incorporated into GP software systems to calculate the risk of a patient having an undiagnosed cancer during consultations (OECD, 2024[12]). 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 (OECD, 2024[12]; Price et al., 2019[29]).

Improved referral from primary care through to specialist oncology care can reduce treatment delays. Several countries such as Denmark, Ireland, Latvia, Lithuania, Poland, Slovenia and Sweden have developed fast track referral mechanisms (OECD, 2024[12]). Latvia introduced fast-track access for people with cancer (called the green corridor) in 2016. It is paid in full by the state budget and aims to streamline diagnosis and treatment decisions for suspected cancer cases by requiring specialist consultation and diagnostic examination within ten working days of the date of referral (OECD, 2024[12]). 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[30]; OECD, 2024[12]).

Access to effective diagnostics and treatment

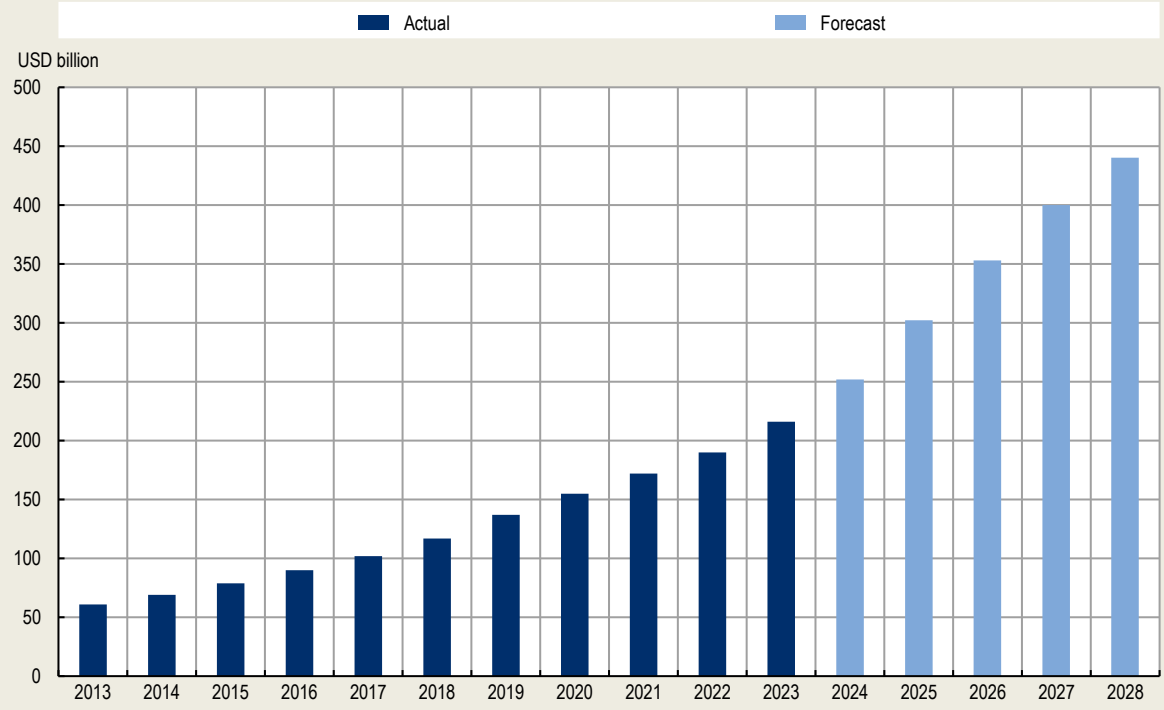
High-quality cancer diagnosis and treatment is crucial to ensure better outcomes. Advancements in cancer treatment have long been a focal point of medical research and innovation. However, policymakers should ensure that these advancements become available to the public. In addition, to deal with increasing drug cost (Box 4.6) and care for a rising number of people with cancer in a sustainable way, countries need to seek effective and efficient ways of delivering high-quality cancer care.

Box 4.6. The rising cost of cancer drugs

Recent years have witnessed rising prices of new cancer medicines (Chapman, Paris and Lopert, 2020[31]). Moreover, newer drug classes of targeted therapies and immunotherapies may complement rather than replace older chemotherapy options, and tend to have longer treatment durations, which increases the costs per patient per treatment (Hofmarcher, Berchet and Dedet, 2024[32]). This has resulted in a growing spend on cancer drugs, which is expected to continue: between 2024 and 2028, global spending on oncology drugs is expected to grow by 14 to 17% per year, while most other drug classes are growing in mid-single digits (Figure 4.9) (IQVIA, 2024[33]).

Figure 4.9. Global spending on cancer medicines

USD billions



Source: IQVIA (2024[33]), *Global Use of Medicines: Outlook to 2028*, www.iqvia.com/-/media/iqvia/pdfs/institute-reports/the-global-use-of-medicines-2024-outlook-to-2028/iqvia-institute-global-use-of-medicines-2024-forweb.pdf.

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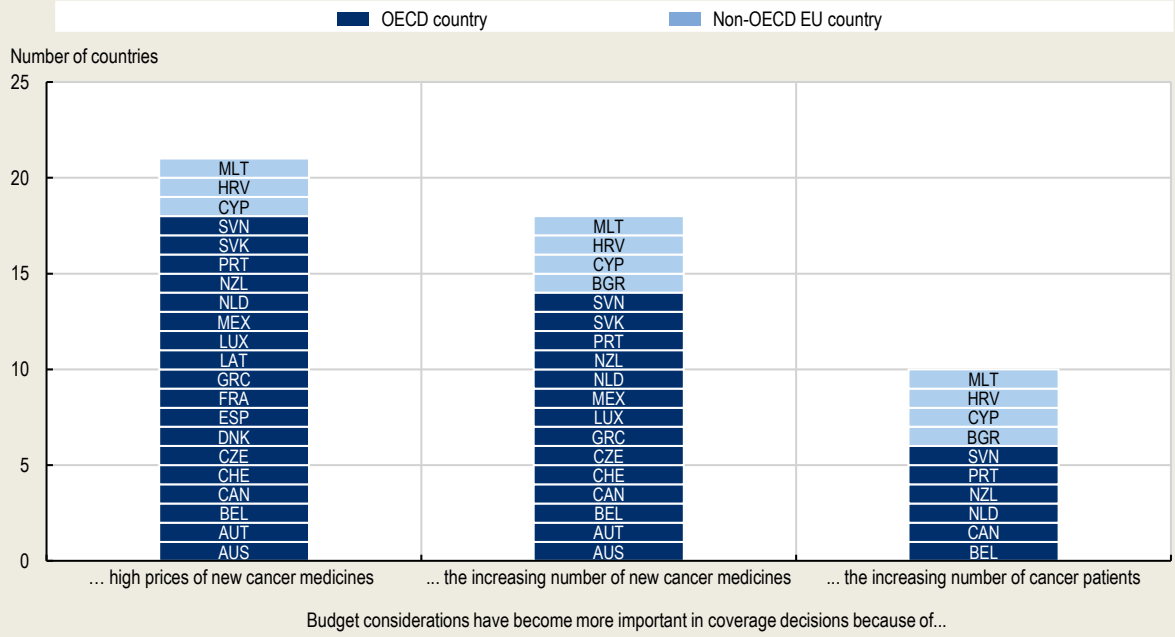
However, it has been argued that it is not always guaranteed that high prices of novel medicines are justified by the health benefits they confer (OECD, 2018[34]) (Brinkhuis et al., 2024[35]). To manage the budget impact, it is critical to ensure "value-for-money" through the systematic use of health technology assessment (HTA) in the pricing and reimbursement process of new cancer drugs. When it comes to making decisions on reimbursement or coverage of new cancer medicines, 21 out of 27 OECD and EU countries indicate that the budget impact is increasingly important (Hofmarcher, Berchet and Dedet, 2024[32]). While the increasing number of cancer patients and new cancer drugs contribute to this, most countries point to the rising prices of new medicines as the driver (Figure 4.10).

Figure 4.10. Many countries indicate that the budget impact of new cancer medicines is increasingly influencing their coverage/reimbursement decisions

Countries indicating that the budget impact of new cancer medicines has become more important for public coverage/reimbursement decisions in the last five years; based on responses from 27 countries (multiple options possible per country).



Note: Even if countries did not indicate an increasing importance of the budget impact for coverage/reimbursement decisions, it does not mean that the budget impact is not a concern in these countries. In Estonia, the importance of the budget impact has remained at the same level, yet the impact of higher prices of medicines on the financing of the budget has increased. In Iceland, the budget impact has been important for a long time, especially in the aftermath of the financial crisis in 2008 but has become less important – yet remaining important overall – as the country recovered financially.

Source: Hofmarcher, T., C. Berchet and G. Dedet (2024[32]), "Access to oncology medicines in EU and OECD countries", https://doi.org/10.1787/c263c014-en.

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There are various options to increase access to effective treatment. The use of generics and biosimilars can help reduce costs. Collaborative Health Technology Assessment (HTA) can bring new medicines to patients quicker. The availability of companion diagnostics and Next Generation Sequencing (NGS) technologies is key to unlocking precision medicine and providing targeted therapies to patients. Finally, the establishment of Comprehensive Cancer Centres (CCCs) can streamline efforts towards better patient management.

Encouraging the entry and use of generics and biosimilars

The use of generics and biosimilars can help lower prices for oncology treatment when the originator product has gone off patent or lost market exclusivity. The steep increase in the number of new cancer medicines in the past two decades means that the opportunities to achieve savings through the use of generics and biosimilars will rise in the coming years (Godman et al., 2019[36]).

However, there are significant differences across countries in the share of 19 biosimilars for three reference medicines (bevacizumab, rituximab, trastuzumab) that has public reimbursement/coverage. In Estonia, all biosimilars are used in hospitals, while in Malta only three biosimilars (16%) – one for each reference medicine – are available (OECD, 2024[12]).

The mean time from EMA approval to public reimbursement/coverage of biosimilars also exhibits great variation between countries, ranging from around 200 days in 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 (OECD, 2024[12]).

Different policies exist to stimulate the utilisation of generics and biosimilars when they become available in clinical practice (Hofmarcher, Berchet and Dedet, 2024[32]; Vogler et al., 2021[37]). This includes pricing policies of various forms, such as internal reference pricing, where medicines with identical or similar active substances are clustered into groups and a common price is defined for all medicines within those groups. Prices of generics/biosimilars might also be linked to the price of the originator product through a system where mandatory discounts apply to generics/biosimilars which might increase with the number of generics/biosimilars entering the market. The price of the originator product might also face a mandatory price cut upon market entry of generics/biosimilars (Godman et al., 2019[36]; Moorkens et al., 2017[38]).

Increasing access to new medicines

Oncology research is highly active and new, more effective treatments for cancers are constantly emerging. Between 2004 and 2022, 152 new cancer medicines were granted centralised marketing authorisation by the European Medicines Agency (EMA) (Hofmarcher, Berchet and Dedet, 2024[32]). However, access to new medicines is unequal across countries, both in terms of overall access to cancer medications and in terms of the time taken to access these medicines. When looking at the reimbursement of cancer medicines with a high clinical benefit that received marketing authorisation after 2016, Germany, the Netherlands, Bulgaria and Sweden covered 85% of more, while Cyprus and Latvia only covered a small proportion of indications (both 31%) and Malta covered none (Hofmarcher, Berchet and Dedet, 2024[32]). The total time between EMA marketing authorisation and reimbursement/coverage decision ranged from less than 100 days in Germany and Sweden to over 1 100 days in Cyprus, Latvia and Lithuania (Hofmarcher, Berchet and Dedet, 2024[32]).

Collaborative health technology assessment (HTA) at a multinational level could help improve timely access to cost-effective medicines. The number of new cancer medicines has been increasing over the last decade, upping the workload for HTA agencies and pricing and reimbursement bodies. Joint evaluations of (relative) effectiveness of selected cancer medicines by regional co-operations, such as BeNeLuxA and FINOSE, have already been done. The joint European HTA applicable for cancer medicines from 2025 should be used as an opportunity to decrease work at the national level with the assessment of (relative) effectiveness rather than result in a duplication of work (Hofmarcher, Berchet and Dedet, 2024[32]). Additionally, value frameworks such as the European Society for Medical Oncology (ESMO)-Magnitude of Clinical Benefit Scale (MCBS) can offer additional support in the prioritisation of access to cancer medicines and assist in the HTA process (OECD, 2024[12]).

Increasing access to targeted therapies

There has been an increase in the development of targeted therapies for cancer: of the 42 approvals of new cancer medicines between 2020 and 2022, 34 approvals (81%) concerned targeted therapies (Hofmarcher, Berchet and Dedet, 2024[32]). Targeted therapies are designed to act on specific genetic features of the cancer. For example, about 40% of people with colorectal cancer have KRAS gene mutations, and so may respond better to a type of cancer treatment specifically designed for that mutation (Zhu et al., 2021[39]).

However, to be able to effectively use these new treatments, governments need to ensure access to their companion diagnostic. A companion diagnostic identifies whether a patient has a certain genetic feature, and would benefit from a specific targeted treatment. Fewer than half of EU countries currently have an automatic link between the coverage/reimbursement decision for a medicine and its companion diagnostic, meaning that it is possible that a treatment is covered by insurance while its companion diagnostic is not (Hofmarcher, Berchet and Dedet, 2024[32]).

Increasing access to companion diagnostics can be cost-saving in the long-run. The French National Cancer Institute tested EGFR biomarkers in 16 724 lung cancer patients and found that only about 10% of patients would have responded to the available treatments at that time (gefitinib or erlotinib). The cost of running these test was less than EUR 2 million, versus an estimated savings of EUR 69 million from not treating the 15 000 nonresponding patients with that medication (Draghia-Akli, 2012[40]; Gill et al., 2020[41]).

A next step in ensuring access to innovative cancer treatments is through the use of next generation sequencing (NGS) technology. NGS sequences millions of DNA fragments at the same time, allowing clinicians to test for multiple genetic mutations rather than testing one-by-one (Kamps et al., 2017[42]). This way they can identify which personalised treatments would work for a specific patient. Research looking at the use of NGS in patients with lung cancer, colorectal cancer or melanoma in France found that 20% of patients had a change in the care pathway following the NGS results (Coquerelle et al., 2020[43]).

Establishing Comprehensive Cancer Centres

CCCs, which combine comprehensive, multidisciplinary care with research and education, can provide high-quality cancer care. In Europe, the Organization of European Cancer Institutes (OECI) and the European Academy of Cancer Sciences have established complementary quality accreditation systems to test the clinical and research excellence of CCCs (Oberst, 2019[44]). A benefit of these centres is increased collaboration in innovative clinical trials. For example, in Finland, four CCCs are working together on a clinical trial to determine the efficacy and toxicity of targeted anticancer drugs (OECD, 2023[45]; ClinicalTrials.gov, 2023[46]).

A flagship measure of Europe's Beating Cancer Action Plan is to establish an EU Network of national Comprehensive Cancer Centres, with the aim of increasing patient access to high quality diagnosis, care and innovative treatment across the EU (European Commission, 2021[47]). At present, the number and coverage of accredited centres varies considerably in the EU, with some countries not having any accredited centres yet and others, such as Finland, having almost full coverage (Leemrijse et al., 2021[48]). The Joint Action for Creation of National Comprehensive Cancer Centres and EU-Networking (CraNE) in Europe will help to link CCC networks in the EU (CraNE, 2023[49]).

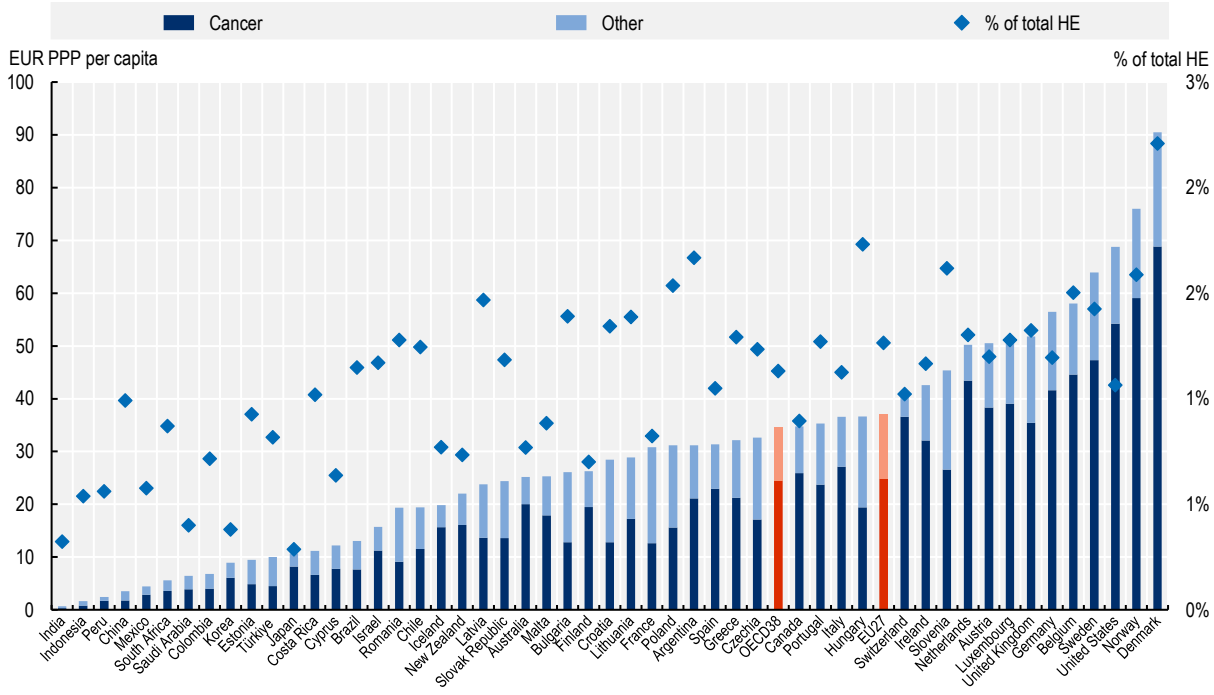
Healthcare costs will increase, and so will the need to improve value for money

There is a clear case for continuing to improve cancer care, and various ways in which policymakers can do so. Longer lifespans will increase healthcare cost. Even if there is no additional expenditure associated with the improved treatment outcomes (an unlikely scenario), healthcare cost will go up as more people survive: people will live for longer, they can get cancer again and they can incur cost for other diseases.

In the scenario where all countries improve cancer care and attain the best possible survival rates observed within the OECD and EU, per capita health expenditure will increase by EUR PPP 35 per year on average in the OECD, even without additional per case costs (EUR PPP 37 in the EU) (Figure 4.11). This includes EUR PPP 24 per capita in costs related to cancer treatment, as well as EUR PPP 10 for the treatment of other diseases. This is a 1.1% increase in overall health expenditure on average in the OECD, or a total of EUR PPP 52 billion – equivalent to the total annual health budget of Belgium (EUR PPP 17 billion and 1.3% in the EU).

Figure 4.11. The impact of achieving the best 5-year cancer survival rates in the OECD and EU on health expenditure across 51 countries

The impact of improved survival rates on cancer-specific and other health expenditure, in EUR PPP per capita and as a percentage of total health expenditure, per year, average over 2023-50



Source: OECD SPHeP NCDs model, 2024.

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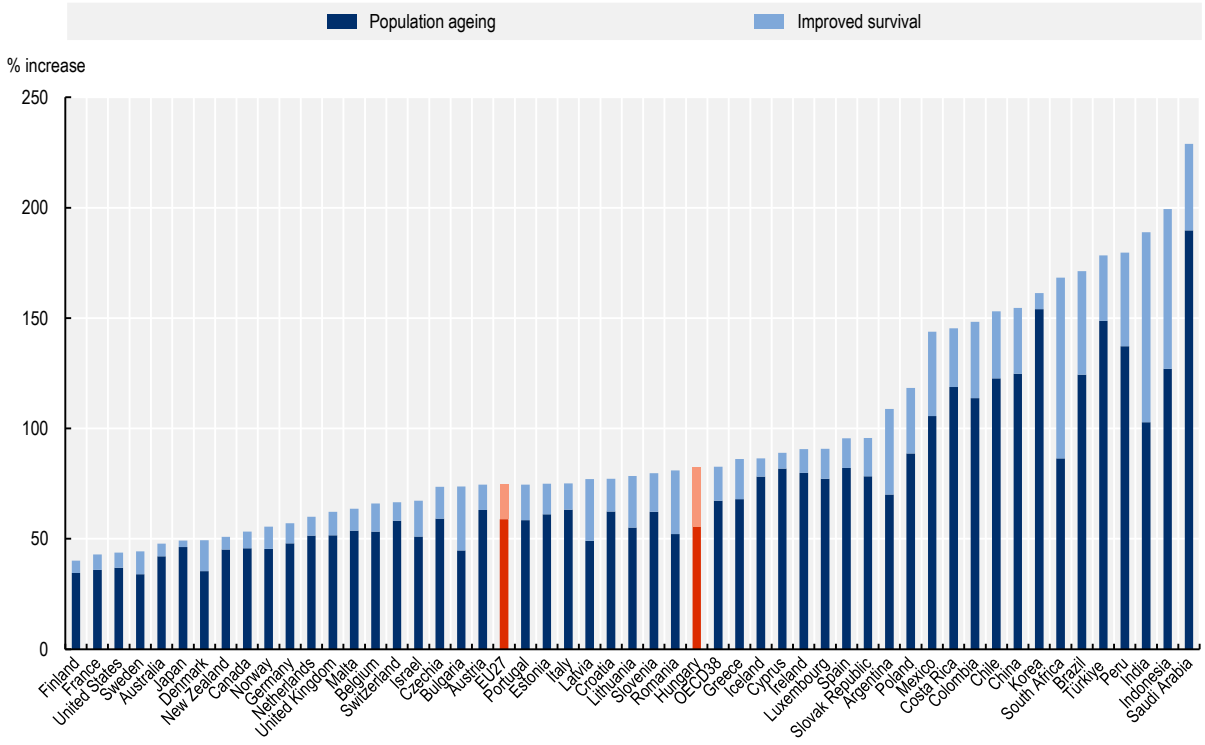
This increase in health expenditure comes on top of the expected rise due purely to population ageing. As shown in Chapter 3, between 2023 and 2050 per capita health expenditure on cancer in the OECD is estimated to increase by 67% due to population ageing (59% in the EU). Improved survival rates could add another 15% to this (16% in the EU). In addition, there may be increased per-case cancer cost needed to achieve the higher survival rates, higher treatment and drug prices, as well as increased cost to deliver physical, psychological, and supportive care to a growing number of cancer survivors (Box 4.7).

Figure 4.12. Population ageing and improved cancer survival will increase health expenditure on cancer considerably over the next three decades

The percentage increase in per capita cancer health expenditure due to population ageing and improved cancer survival rates, in 2050 vs. 2023



Source: OECD SPHeP NCDs model, 2024.

StatLink https://stat.link/4cykpo

Box 4.7. Models of care for cancer survivors

As the number of people that have survived cancer increases, due to better treatment as well as population ageing, health systems need to adjust to meet the needs of these survivors. Traditionally, follow-up care has been provided by oncology specialists, with a focus on detecting cancer recurrence (Jefford et al., 2022[50]). However, the needs of cancer survivors are much broader. Care is needed to address the medical and psychosocial consequences of cancer and its treatment, including for example fatigue, sexual changes, anxiety and depression (Lisy et al., 2019[51]). In addition, specialists may become overloaded with the rising burden of treating current and former cancer patients.

Alternative models for follow-up care after cancer include (Jefford et al., 2022[50]):

- **Follow-up led by general practitioners (GPs)**: GPs are well placed to provide ongoing follow-up care for survivors of cancer, as they often have a pre-existing relationship with the patient and already provide them with care for a wide range of issues. Moreover, current evidence suggests that primary-care-led follow-up can be a cost-effective alternative.
- **Shared care between oncology providers and primary-care providers**: This option may be more acceptable to specialists, who would remain involved in the aftercare of their patients; for GPs, who will have specialist support; and for patients, who benefit from both types of care. However, this model requires strong communication between providers, and clarity of the roles and responsibilities of all members of the care team.
- **Oncology nurse-led survivorship care**: Aftercare can be provided by specialist cancer nurses, trained to identify and manage issues, support self-management, provide health promotional advice, and refer to appropriate services. Nurse-led models appear to be less costly than traditional models of care, with no difference in outcomes.
- **Long-term follow-up clinics**: Long-term follow-up clinics generally provide care for cancer survivors with more complex needs or who are at substantial risk of late effects (for example adult survivors of childhood and adolescent cancer, or survivors of complex treatments, such as allogeneic bone marrow transplantation). They bring together multiple medical specialties, allied health professionals, and expert nurses, according to the clinical needs of the survivors. While these services can address more complex challenges, they could be expensive to run.

Source: Jefford, M. et al. (2022[50]), "Improved models of care for cancer survivors", https://doi.org/10.1016/s0140-6736(22)00306-3.

As the trajectory of cancer treatment costs continues to rise, it becomes increasingly evident that the most effective approach lies in prioritising prevention strategies. While advancements in cancer treatment have undoubtedly improved patient outcomes, the financial burden associated with managing the disease places significant strain on healthcare systems worldwide. By shifting our focus towards preventive measures, such as promoting healthier lifestyles and increasing vaccination, we not only have the potential to curb escalating costs but also to significantly alleviate the physical, emotional, and financial toll experienced by individuals and society.

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5 The health and societal benefits of scaling up policy action on cancer risk factors

This chapter shows how stronger action on key cancer risk factors would benefit individuals, health systems, the environment and safety. The chapter presents results from OECD Strategic Public Health Planning (SPHeP) for Non-Communicable Diseases (NCDs) model, which was used to quantify the impact of achieving international policy targets for tobacco use, harmful alcohol use, diet, physical activity, overweight and air pollution. It also highlights the societal co-benefits of achieving targets on diet and harmful alcohol use, for the environment and safety, respectively.

In Brief

Stronger action on key cancer risk factors would benefit health, health systems, the environment and safety

- Around 40% of all cancer cases can be prevented by adopting healthier lifestyles and protection from harmful exposures, prevention should be a corner stone of the battle against cancer.
- Most of the key cancer risk factors remain prevalent in the OECD and EU: 16% of adults smokes daily; the average per capita consumption of alcohol is 8.6 litres of pure alcohol per year; only 15% of adults in the OECD eats at least five portions of fruit and vegetables daily; in most OECD countries over half of the population is either overweight or obese; only 40% of adults meets the WHO physical activity recommendations; and almost all OECD countries have air pollution levels above the WHO guideline of $5_{\mu g}/m^3$.
- Analysis using the OECD SPHeP NCDs model estimates that meeting international policy targets on major cancer risk factors would prevent around 8% of all cancer cases, avert 12% of premature deaths due to cancer, and reduce the burden of cancer on health expenditure by 9%.
- Tobacco accounts for 40-60% of the total impact of action on risk factors across the different outcomes. This shows that, despite progress made, action on tobacco smoking remains a fundamental element of any cancer prevention strategy.
- However, it is essential that policy makers go beyond tobacco control, and develop cancer prevention strategies that effectively target a wider set of risk factors. This includes more ambitious targets, as well as stronger policy action to achieve these targets. The current targets on obesity and physical activity are less ambitious than those for tobacco. Similarly, the timeline to achieve the air pollution target is much longer than for other targets, which means that the health benefits are delayed. Moreover, it appears that few countries will actually achieve these targets.
- Action to improve diets would also benefit the environment. The food system accounts for about one-third of all human-caused greenhouse gas (GHG) emissions. Adhering to a healthier diet with less meat and more fruit, vegetables and whole grains is estimated to reduce GHG emissions by 304 Mt of CO2-equivalent. This is the amount of GHG associated with more than 72 million gasoline-powered passenger vehicles, or the number of cars in Germany and Spain combined.
- Harmful alcohol use has a direct impact on societal safety, as it can lead to road traffic accidents and violence due to its effects on cognitive function, co-ordination, and behaviour. It is estimated that achieving the policy target on reducing harmful alcohol use could prevent 10% of premature deaths due to road traffic accidents and homicides.
- A wide range of effective policies exist to address the major risk factors of cancer, varying in degree of intrusiveness. The least intrusive policies increase the choices available to people or decrease the cost of certain choices. For example, improving cycling and walking infrastructure can increase physical activity and reduce air pollution. Policies can also modify preferences through persuasion or provision of information; or by increasing the price of certain choices. Finally, there is the option to regulate, up to forbidding, certain options. This can be selective or partial, such as forbidding to smoke or the sale of alcohol to underage people.

Prevention should be a corner stone of the battle against cancer

As technological advances made cancer treatable, the discovery of carcinogens (substances capable of causing cancer) also made it preventable. For example, the human papilloma virus (HPV) was discovered in 1907, and its link to cervical cancer was first reported in 1974 (Lippman and Hawk, 2009[1]). The relation between tobacco smoking and lung cancer – though long suspected – was unequivocally established by the United States Surgeon General report in 1964 (Lippman and Hawk, 2009[1]). Since its inception in 1965, the International Agency for Research on Cancer (IARC) has identified 127 substances that are carcinogenic to humans, with another 95 that are probably carcinogenic (Box 5.1) (IARC, 2023[2]).

Box 5.1. Defining carcinogenicity

The International Agency for Research on Cancer (IARC) is a global authority on evaluating preventable causes of cancer in humans. IARC undertakes comprehensive reviews with subject experts and classifies risk factors based on the levels of evidence. The different classes are:

- Group 1: Carcinogenic to humans. There is sufficient evidence of carcinogenicity in humans.
- Group 2A: Probably carcinogenic to humans. There is limited evidence of carcinogenicity in humans and sufficient evidence of carcinogenicity in experimental animals.
- Group 2B: Possibly carcinogenic to humans. There is limited evidence of carcinogenicity in humans and less than sufficient evidence of carcinogenicity in experimental animals.
- Group 3: Not classifiable as carcinogenic to humans. Inadequate evidence of carcinogenicity and inadequate or limited evidence of carcinogenicity in experimental animals.

Importantly, this grouping is based only on the level of evidence, not the effect size. Exposure to a group 1 carcinogen does not necessarily result in a greater cancer risk than a group 2A one. Similarly, carcinogens in group 1 all result in different levels of increased cancer risk – what they have in common is that there is convincing evidence that they *do* increase the cancer risk.

Source : Minozzi, S. et al. (2015[3]), "European Code against Cancer 4th Edition: Process of reviewing the scientific evidence and revising the recommendations", https://doi.org/10.1016/j.canep.2015.08.014; IARC (2019[4]), *IARC Monographs on the Identification of Carcinogenic Hazards to Humans Questions and Answers*, https://monographs.iarc.who.int/wp-content/uploads/2018/07/IARCMonographs-QA.pdf.

Around 40% of cancers can be prevented (European Commission, 2021[5]). In the OECD, 46% of cancer deaths are attributable to risk factors, and 47% of cancer deaths in the EU (IHME, 2019[6]). Therefore, addressing cancer risk factors to prevent cancer should be a corner stone of the battle against cancer. By investing in prevention, individuals are saved the physical, emotional, and financial tolls associated with cancer, leading to healthier, happier lives. Additionally, preventing cancer will alleviate the strain on healthcare systems by reducing the demand for medical services. Furthermore, healthier societies are more productive, and benefit the economy. Overall, prioritising prevention aligns with principles of sustainability, efficiency, and social responsibility, ultimately contributing to stronger, more resilient societies.

This chapter focuses on six major behavioural risk factors that should be considered in any cancer prevention strategy: tobacco use, harmful alcohol use, diet, air pollution (referring to ambient air PM2.5 pollution), overweight and obesity, and low physical activity (HPV is discussed separately in the next chapter, and other cancer risk factors are discussed in Box 1.2 in Chapter 2). Progress on addressing these risk factors over the past decade has been mixed. Tobacco smoking is the leading cause of cancer, and between 2011 and 2021, almost all countries saw a decrease in smoking prevalence (OECD, 2023[7]).

However, tobacco use remains common in the OECD, with 16% of adults smoking daily in 2021. Contrary to tobacco smoking, alcohol consumption has changed little over the past decade. The average per capita consumption in the OECD has gone from 8.9 litres of pure alcohol in 2011 to 8.6 in 2021; and in around 40% of countries the consumption of alcohol increased (OECD, 2023[7]).

Other cancer risk factors also remain prevalent in the OECD (Table 5.1). On average, only 15% of adults in the OECD eats at least five portions of fruit and vegetables daily, ranging from 2% to 33%. Overweight and obesity have been increasing, and in most OECD countries, over half of the population is now either overweight or obese. Only 40% of adults in the OECD meets the WHO recommended 150 minutes of physical activity per week, ranging across countries from 5% to 76%. Despite some progress, in 2020 all OECD countries except Finland had air pollution levels above the WHO guideline of $5_{\mu g}/m^3$, with five-fold variation across countries (OECD, 2024[8]).

Table 5.1. Major cancer risk factors

Daily tobacco smoking rates among population aged 15 and over, 2021 (or nearest year); Alcohol consumption in litres per capita among population aged 15 and over, 2021 (or nearest year); Self-reported overweight and obese adults (BMI>25), 2021 (or nearest year); Proportion of adults reporting spending at least 150 min per week on physical activity, 2021 or most recent (2019 for EU countries); Daily consumption of five or more portions of fruit and vegetables among adults, 2019 (or nearest year); Mean annual population exposure to fine particulates (PM2.5), 2020

	Tobacco	Change 2011-21	Alcohol consumption	Change 2011-21	Air pollution	Change 2000-20	Overweight and obesity	Physical activity	Fruit and vegetable consumption
Argentina	24.0	▼ -4.3	8.0	▲ 0.3	14.3	▼ -2.5			
Australia	11.2	▼ -4.1	9.5		8.1	▲ 1.0	47.6	71.3	
Austria	20.6	▼ -2.6	11.1	▼ -0.8	10.9	▼ -8.2	51.1	43.8	5.6
Belgium	15.4	▼ -5.1	9.2	▼ -0.9	11.1	▼ -8.2	49.3	29.3	15.3
Brazil	9.1	▼ -4.3	9.8	▲ 0.6	11.6	▼ -2.9	57.3	30.1	
Bulgaria	28.7		11.2	▲ 1.3	17.2	▼ -7.9		11.3	5.0
Canada	8.7	▼ -7.0	8.3	▲ 0.1	6.3	▼ -3.1	55.4	49.0	22.2
Chile	17.6		7.1	▶ 0.0	23.2	▼ -5.0	67.7		
China	25.3	▼ -0.9	4.5	▼ -0.9	34.5	▼ -13.5			
Colombia			4.1	▼ -0.2	13.9	▼ -10.9			
Costa Rica	7.8	▼ -5.9	3.1	▼ -0.2	14.1	▼ -6.9			
Croatia	22.1		9.6	▼ -1.4	15.8	▼ -6.4	63.8	19.9	9.8
Czechia	17.6	▼ -12.3	11.6	▲ 0.1	14.1	▼ -6.3	58.4	25.1	7.6
Denmark	13.9	▼ -7.0	10.4	▼ -0.6	8.9	▼ -6.4	52.6	55.4	23.1
Estonia	17.9	▼ -8.3	11.1	▼ -0.9	6.1	▼ -5.4	52.7	25.8	13.2
Finland	12.0	▼ -5.8	8.1	▼ -1.7	4.9	▼ -3.2	60.0		13.5
France	25.3	▼ -4.4	10.5	▼ -1.9	9.5	▼ -6.3	45.3	27.4	19.8
Germany	14.6	▼ -7.3	10.6	▼ -0.7	10.3	▼ -7.8	52.7	49.0	10.8
Greece	24.9	▼ -7.0	6.3	▼ -1.2	14.2	▼ -9.8	57.2	19.6	12.3
Hungary	24.9	▼ -1.6	10.4	▼ -1.0	14.0	▼ -6.6	58.2	32.3	8.3
Iceland	7.2	▼ -7.1	7.4	▲ 0.6	5.5	▼ -2.6	58.6	55.9	8.8
India	8.1	▼ -6.6	3.1	▲ 0.1	47.4	▼ -12.5			
Indonesia	32.6	▲ 1.2	0.1	▶ 0.0	17.5	▼ -7.6			
Ireland	16.0	▼ -8.0	9.5	▼ -2.2	8.0	▼ -4.3	56.0	37.3	33.1
Israel	16.4	▼ -2.1	3.1	▲ 0.3	18.6	▼ -6.2	54.7		
Italy	19.1	▼ -3.4	7.7	▲ 0.7	14.3	▼ -11.2	46.2	19.7	10.7
Japan	16.7	▼ -3.4	6.6	▼ -0.7	12.6	▼ -0.1		53.6	
Korea	15.4	▼ -7.8	7.7	▼ -1.2	25.3	▲ 0.7	30.6	45.6	31.8
Latvia	22.6	▼ -5.5	12.2	▲ 2.1	11.8	▼ -11.1		20.2	7.2
Lithuania	18.9		12.1	▼ -2.6	9.2	▼ -8.7	55.0	20.9	16.2
Luxembourg	19.2	▲ 2.3	11.0	▼ -0.8	8.7	▼ -5.6	48.4	44.9	13.7
Mexico	8.6	▼ -1.7	5.1	▲ 1.1	14.4	▼ -15.2			
Netherlands	14.7	▼ -6.1	8.1	▼ -0.9	10.8	▼ -8.2	48.5	62.0	30.1
New Zealand	9.4	▼ -7.0	8.8	▼ -0.7	6.3	▼ -0.2		51.9	
Norway	8.0	▼ -9.0	7.4	▲ 1.0	6.1	▼ -4.5	52.0	67.6	8.6
Peru	8.2	▼ -8.3	5.7	▲ 0.5	26.0	▼ -40.6			
Poland	17.1	▼ -6.7	11.0	▲ 0.7	17.8	▼ -7.7	56.6	20.3	8.6
Portugal	14.2	▼ -4.4	10.4	▼ -0.5	8.3	▼ -5.3	53.5	16.9	14.7
Romania	18.7	▼ -1.8	11.0	▲ 1.4	13.8	▼ -6.4	66.9	8.0	2.4
Slovak Republic	21.0	▲ 1.5	9.6	▼ -0.6	15.3	▼ -6.0	57.7	30.5	8.5
Slovenia	17.4	▼ -1.5	10.6	▶ 0.0	14.0	▼ -6.4	56.5	32.6	5.3
South Africa	20.2	▼ -0.8	7.2	▶ 0.0	22.9	▼ -0.6			
Spain	19.8	▼ -4.1	10.5	▲ 0.9	9.7	▼ -6.4	50.2	35.4	11.2
Sweden	9.7	▼ -3.4	7.6	▲ 0.3	5.6	▼ -4.1	51.3	56.4	7.6
Switzerland	19.1		8.5	▼ -1.0	9.0	▼ -7.2	41.9	76.0	
Türkiye	28.0	▲ 2.6	1.4	▼ -0.1	22.1	▼ -0.9	56.1	5.4	2.8
United Kingdom	12.7	▼ -7.1	10.0	▲ 0.1	9.7	▼ -6.1	63.7	61.4	23.7
United States	8.8	▼ -6.0	9.5	▲ 0.8	7.7	▼ -4.9	67.5	47.9	

Note: For each risk factor, the best performance is coloured green, the worst in red, and points in between are coloured proportionally. Grey indicates missing data.

Source: OECD (2023[7]), *Health at a Glance 2023: OECD Indicators*, https://www.doi.org10.1787/7a7afb35-en/; OECD (2024[8]), *OECD Data Explorer: Exposure to air pollution* ; OECD (2024[9]), *Beating Cancer Inequalities in the EU: Spotlight on Cancer Prevention and Early Detection* https://www.doi.org/10.1787/14fdc89a-en.

Action on cancer risk factors is needed to improve health and reduce pressure on health systems

Scaling up action to tackle tobacco and harmful alcohol use, unhealthy diets, low physical activity, overweight and air pollution can make a crucial contribution in curbing the growing burden of cancer on individuals and health systems. Various international policy targets have been set to encourage countries to take action on these risk factors. Such targets were used in the OECD SPHeP NCDs model to evaluate the potential impact of scaling up action on risk factors on cancer (Table 5.2). The policy targets are based on Europe's Beating Cancer Plan (European Commission, 2021[10]; European Commission, 2021[11]; European Commission, 2021[12]), the European Code Against Cancer (IARC, 2016[13]), the WHO Global Action Plan on NCDs (WHO-GAP) (WHO, 2021[14]) (WHO, 2013[15]) (WHO, 2022[16]), other WHO action plans (WHO, 2018[17]; WHO, 2024[18]), and national dietary guidelines (Annex Box 5.A.1), among others.

Table 5.2. Risk factor policy targets

Risk factor	Policy target modelled	Source
Tobacco	30% reduction in tobacco use by 2025 relative to 2010 levels; less than 5% of the population uses tobacco by 2040	*WHO Global Action Plan (WHO-GAP) on Non-communicable diseases (NCDs) and Europe Beating Cancer Plan* (WHO, 2013[15]) (European Commission, 2021[5])
Alcohol	20% reduction in the harmful use of alcohol by 2030 relative to 2010 levels (modelled as a 20% reduction in the total use of alcohol, plus at least a 20% reduction in binge drinking prevalence over 2010-30)	*WHO Global Alcohol Action Plan 2022-30* (WHO, 2024[18])
Air pollution	Annual average PM2.5 level capped at 10 µg/m3 by 2030; 5 µg/m3 by 2050	*Proposal on new EU air quality standards and WHO Global Air Quality Guideline* (Council of the EU, 2024[19]) (WHO, 2021[20])
Obesity	Halt the rise in obesity by 2025 relative to 2010 (i.e. revert back to 2010 levels of obesity)	*WHO-GAP* (WHO, 2013[15])
Physical activity	A 15% increase in physical activity levels for everyone by 2030, relative to 2016 levels	*Based on WHO Global Action Plan on Physical Activity* (WHO, 2018[17]), *adjusted to increase coverage*
Diet	By 2025, everyone consumes less than 18g of processed meat and 52g of red meat per day; and more than 80g of whole grains; 250g of fruit; 250g of vegetables per day; plus a 30% reduction in mean intake of salt/sodium relative to 2010	*National dietary guidelines (see* Annex 5.A*); WHO-GAP on NCDs for sodium* (WHO, 2013[15])

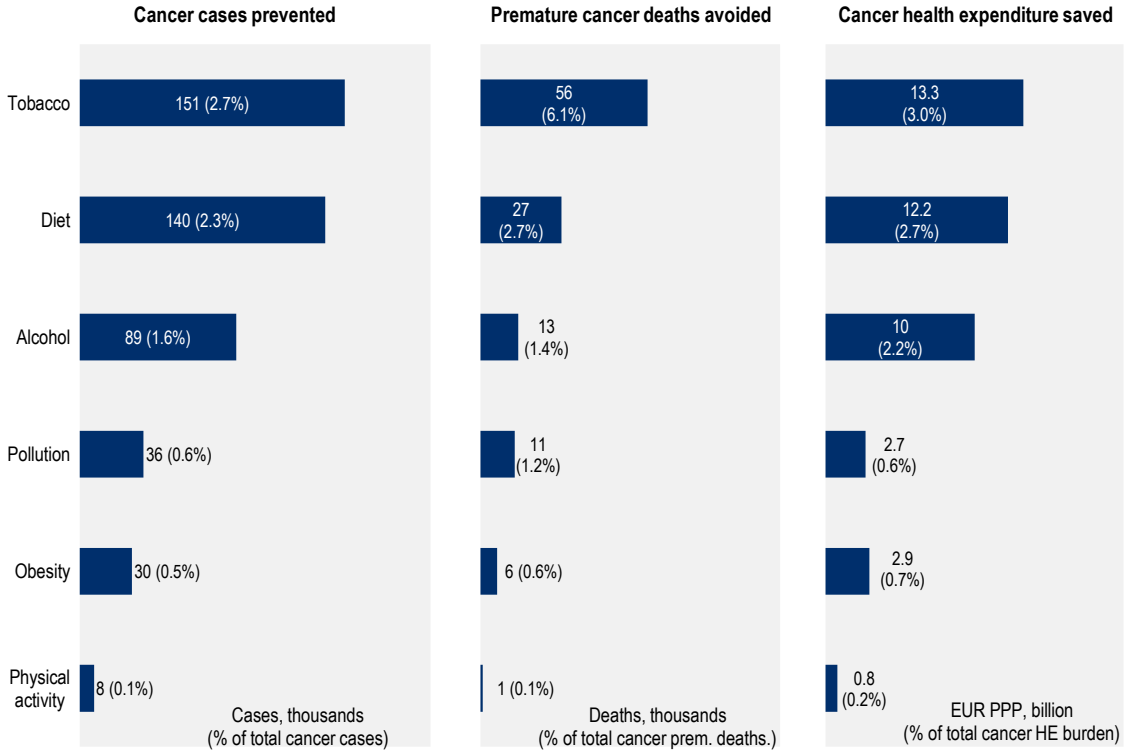
Note: For more details on these policy targets, please see Annex 5.A.
Source: OECD analysis of sources listed in table.

Tobacco remains a fundamental element of cancer prevention…

It is estimated that meeting the policy targets on all risk factors would prevent around 8% of all cancer cases, avert 12% of premature deaths due to cancer, and lower the burden of cancer on health expenditure by 9%. Tobacco accounts for 40-60% of the total impact of action on risk factors across the different outcomes, which shows that, despite progress made, action on tobacco remains a fundamental element of any cancer prevention strategy (Figure 5.1).

Figure 5.1. Tobacco remains the most important policy area for cancer prevention in the OECD

Cancer cases prevented (thousands and as a percentage of total), premature cancer deaths avoided (thousands and as a percentage of total), and cancer health expenditure saved (EUR PPP billions and as a percentage of total burden of cancer on health expenditure) if policy targets on key cancer risk factors were achieved, total for OECD countries, per year, average over 2023-50



Note: For country-level results, please see Annex 5.A.
Source: OECD SPHeP NCDs model, 2024.

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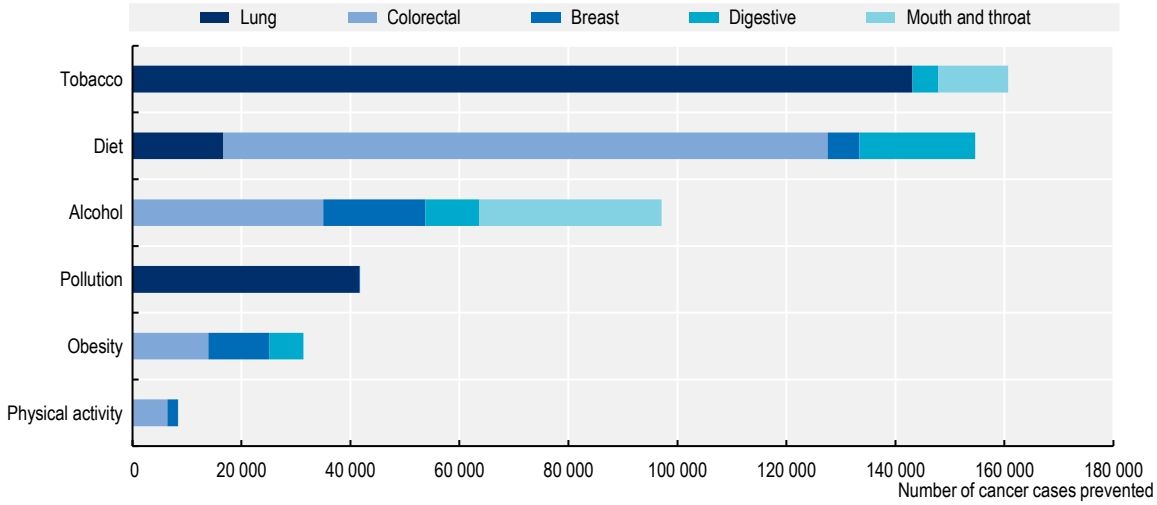
If the policy targets on tobacco were achieved, it would prevent 151 000 cases of cancer per year in the OECD, corresponding to 2.7% of all the cancer cases in the same region (67 000 and 3.4% in the EU). Tobacco primarily affects lung cancer cases (Figure 5.2). As lung cancer has a high case fatality rate, the impact of tobacco on cancer cases translates to a greater impact on premature mortality than other risk factors. Achieving the policy target on tobacco would prevent 56 000 premature deaths per year– 6.1% of total premature mortality due to cancer (Figure 5.1) (28 000 and 7.8% in the EU). It would also save health systems EUR PPP 13.3 billion each year in cancer health expenditure – 3.0% of total burden of cancer on health expenditure – more than the total annual health budget of Hungary.

Figure 5.2. Action on tobacco primarily prevents lung cancer, while diet mostly impacts colorectal cancer

Cancer cases prevented by cancer type if policy targets on key cancer risk factors were achieved, total for OECD countries, per year, average over 2023-50



Note: Graph only shows the number of cancer cases prevented, and not the small increase in other types of cancers as people live longer and are more likely to get other cancers. The total number shown here is therefore higher than the absolute impact on cancer cases presented above. Digestive includes liver, oesophageal, pancreatic, and stomach cancer; head and neck includes lip and oral cavity, larynx, other pharynx, and nasopharynx cancer; and other includes prostate, cervical cancer and malignant skin melanoma.
Source: OECD SPHeP NCDs model, 2024.

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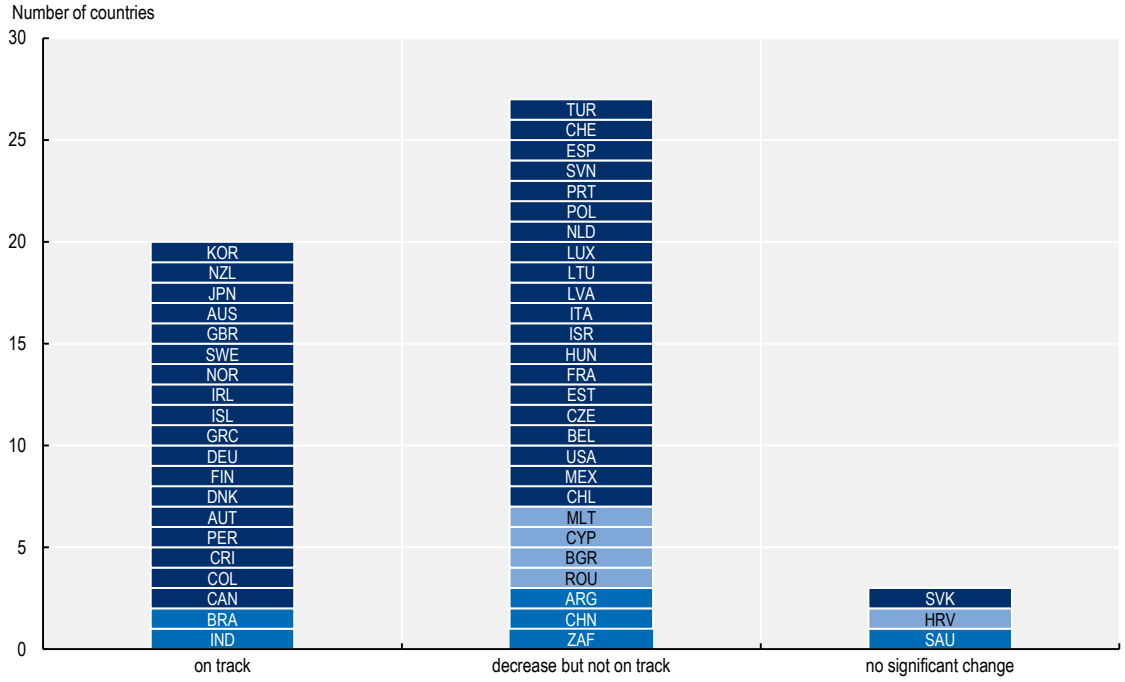
Countries globally are getting closer to reaching the target of a 30% relative reduction in current tobacco use by 2025, with the projected relative reduction being at 24.9% in 2022 (WHO, 2024[21]). However, progress is uneven across countries and regions of the world. Across the 51 countries included in this report, 20 were deemed on track to achieve a 30% relative reduction, 27 were likely to achieve a decrease in prevalence but less than 30%, and 3 were unlikely to experience a significant change in prevalence (Figure 5.3).

Figure 5.3. Around 40% of countries are on track to achieve a 30% reduction in tobacco use by 2030

Assessment of country progress towards the 30% tobacco reduction target over 2010-25



Source: WHO (2024[21]) Global report on trends in prevalence of tobacco use 2000-30.

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…but it is crucial that tobacco control policies are complemented with action on a wider set of risk factors

However, it is essential that policy makers go beyond tobacco control, and develop cancer prevention strategies that effectively target a wider set of risk factors. This includes more ambitious targets on physical activity and obesity. The results presented here are based on the policy target set for each risk factor, and the relatively small impact from addressing obesity and physical activity is in part a reflection of the ambition of the target. While reaching the target on tobacco (*a 30% relative reduction in tobacco use by 2025 versus 2010, and that less than 5% of the population using tobacco by 2040*) would see a considerable impact on tobacco smoking rates, the target on obesity (*to reduce current levels of obesity down to those observed in 2010*) would do little to tackle high obesity levels.

The air pollution target would have seen greater impact if its timeline was shorter. For most other risk factors, the scenarios reach their target value by 2025 or 2030. For air pollution, the current policy targets aims to achieve a level of 10 µg/m³ by 2030 and the WHO Global Air Quality Guideline of 5 µg/m³ by 2050 (European Parliament, 2024[22]), which is reflected in the analyses as a linear decrease over time to reach the two targets. Moreover, under the current EU proposal, the 2030 deadline to achieve the intermediary target of 10 µg/m³ can be postponed by ten years under certain circumstances, which would further delay the health benefits.

Stronger action is also needed to achieve these targets. It is estimated that, of OECD, G20 and EU countries, only Estonia and Latvia have a 20% or greater chance of reaching the obesity target for women under a business-as-usual situation. No country in the OECD, G20 or EU has a greater than 5%

chance of reaching the target for men in absence of stronger policy action (World Obesity Federation, 2020[23]). The WHO Global Status Report on Physical Activity 2022 found that, if current physical activity trends continue, the global target of a 15% relative reduction in physical inactivity by 2030 will not be met (WHO, 2022[24]). And while the average PM2.5 exposure level fell from 17.5 to 11.6 µg/m³ between 2000 and 2020 in OECD countries, this is still well above the final target of 5 µg/m³ by 2050, or the 10 µg/m³ by 2030 (or 2040 under certain circumstances) target for EU Member States (OECD, 2024[8]).

In addition to reducing the cancer burden, action on risk factors also benefits other NCDs. All of these risk factors are linked to many other NCDs, including cardiovascular disease, diabetes, COPD, dementia and depression. Stepping up efforts to tackle risk factors would therefore have an additional impact on health, healthcare cost and the economy through other NCDs. Moreover, action on harmful alcohol use and diet would provide societal benefits to safety and the environment (see sections below).

Tackling major cancer risk factors would also produce societal co-benefits for the environment and safety

In addition to reducing the burden of cancer and other NCDs, action on risk factors such as harmful alcohol use and diet can produce wider societal benefits. Policies on diet affect the environment through a change in the greenhouse gas (GHG) emissions associated with the food system, and alcohol policies can improve safety by reducing road traffic accidents and violence. These societal co-benefits make an even stronger case for action.

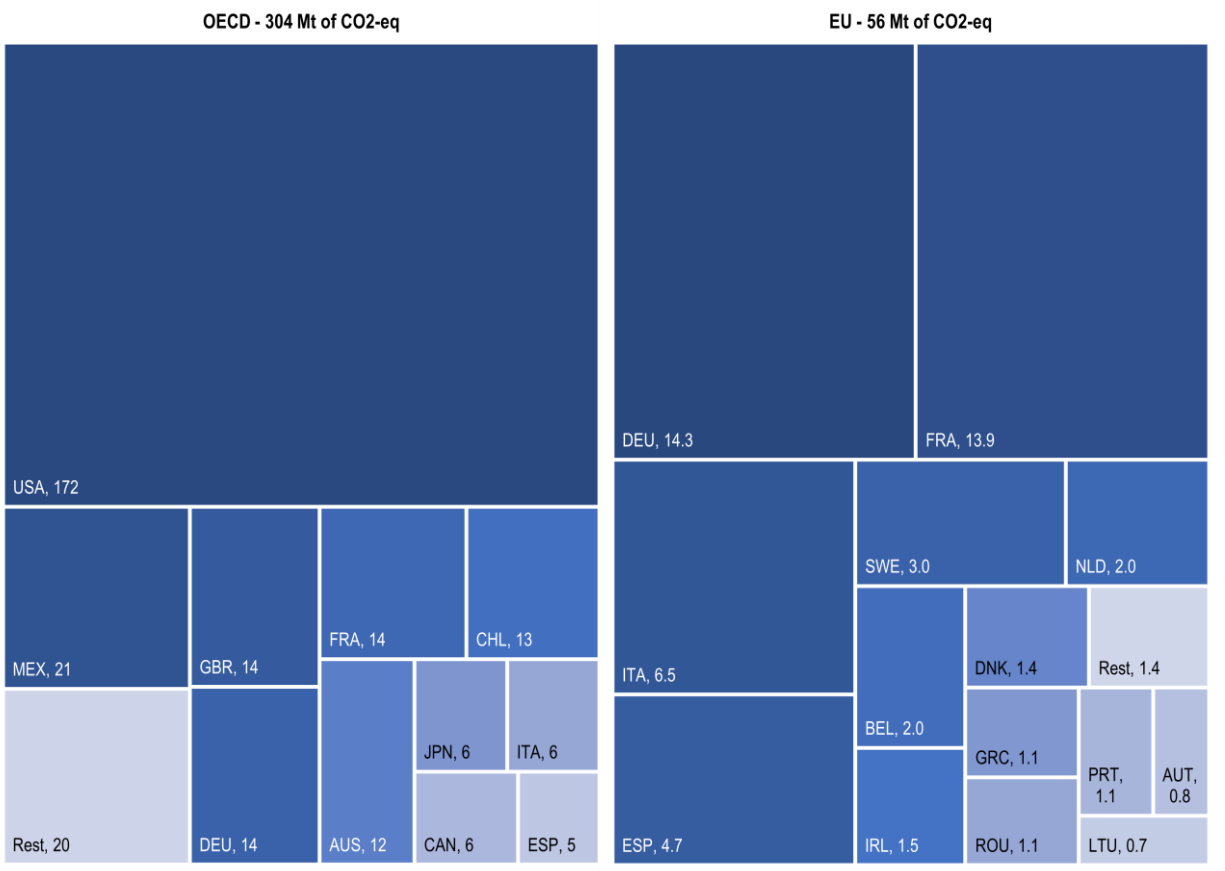
Healthier diets would reduce greenhouse gas emissions by the equivalent of 72 million cars in the OECD

There are strong links between dietary patterns and the environment. About one-third of all anthropogenic (human-caused) GHG) emissions are linked to food systems (Crippa et al., 2021[25]). This includes land-use, production (farming and harvesting), processing, transporting and distribution, packaging, cooking and disposing of waste. To reflect the relationship between diet and the environment, the OECD SPHeP NCDs model links the dietary factors to GHG emissions, using data from the WHO Diet Impact Assessment model (WHO, 2023[26]) (see Annex 5.C for more details on the methodology).

If everyone in the OECD were to adhere to the policy targets for the selected dietary risk factors, this is estimated to reduce GHG emissions by 304 Mt of carbon dioxide (CO2) equivalent per year (56 in the EU) (Figure 5.4). This is the amount of GHG associated with more than 72 million gasoline-powered passenger vehicles (13 million in the EU) (EPA, 2024[27]), or the number of cars in Germany and Spain combined.

Figure 5.4. Achieving the diet targets would reduce GHG emissions by 304 Mt of CO2 equivalent per year in the OECD, and 56 Mt in the EU

Change in total GHG emissions, Mt of CO2-eq per year, average over 2023-50



Source: OECD SPHeP NCDs model, 2024, and WHO (2023[26]), *The Diet Impact Assessment model: a tool for analyzing the health, environmental and affordability implications of dietary change*, https://iris.who.int/handle/10665/373835.

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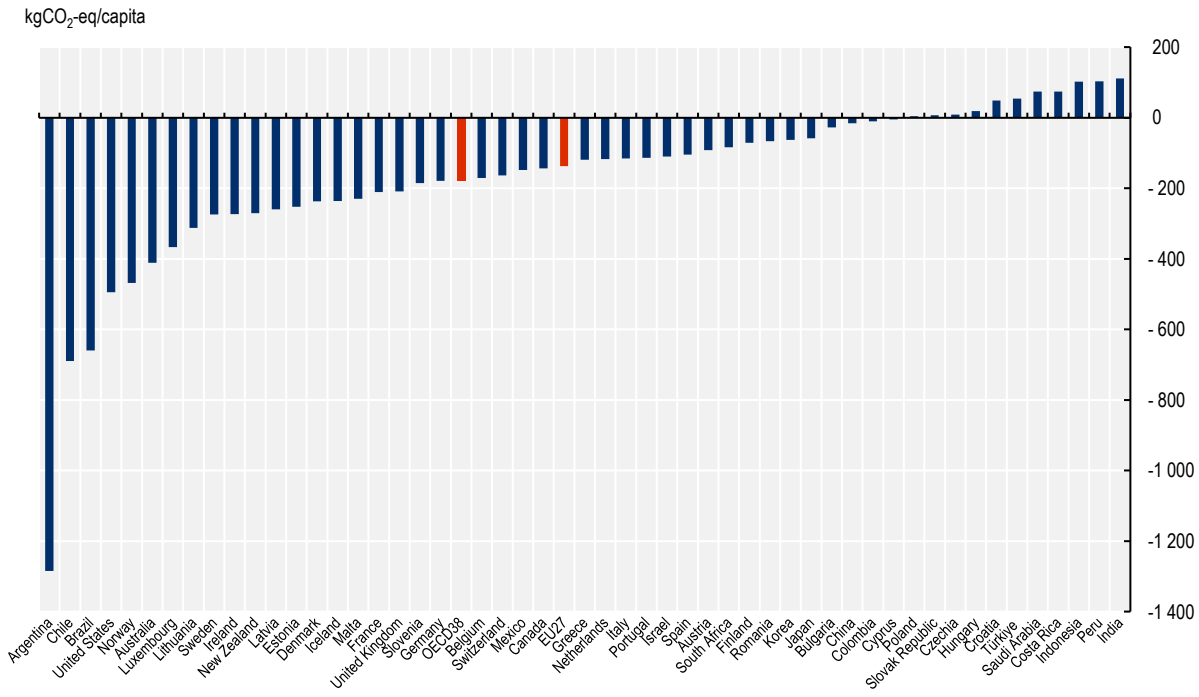
As meat has one of the largest footprints when it comes to GHG emissions, countries with a higher baseline consumption of meat generally see a greater impact on per capita GHG emissions from meeting the diet policy targets (Figure 5.5). However, other factors also influence the relative impact: Argentina's baseline consumption of meat is average, but a high proportion of meat consumption is beef – for which GHG emissions are five times higher per kilogram than for pork (WHO, 2023[26]). In addition, Argentina has relatively high emissions per kilo of beef due to local production inputs and methods. As a result, the per capita impact in Argentina is much higher than for other countries. On the other hand, many Central and Eastern EU member states predominantly eat pork rather than beef, and the impact of reducing meat consumption is therefore small.

Figure 5.5. Impact of achieving the diet targets on GHG emissions

Change in per capita GHG emissions, kgCO2-eq per year, average over 2023-50



Note: Differences between countries are influenced by baseline consumption of target food groups, mix of animal products consumed, and the country-specific emission intensity of the food groups.
Source: OECD SPHeP NCDs model, 2024, and WHO (2023[26]), *The Diet Impact Assessment model: a tool for analysing the health, environmental and affordability implications of dietary change*, https://iris.who.int/handle/10665/373835.

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In countries where meat, and in particular beef, consumption is low, the additional GHG emissions from increased fruit, vegetables and whole grain consumption can outweigh the reduction related to meat. In this case, GHG emissions can increase under the diet policy target. However, it is important to note that the scenario assumes no substitution, where any increase in consumption is on top of current dietary intake. For whole grain, an increase in consumption is likely to come from substituting processed grain, rather than additional grain consumption to meet the whole grain target. In that case, the amount of raw products needed will not be substantially affected, and the impact on GHG emissions would in fact be minimal.

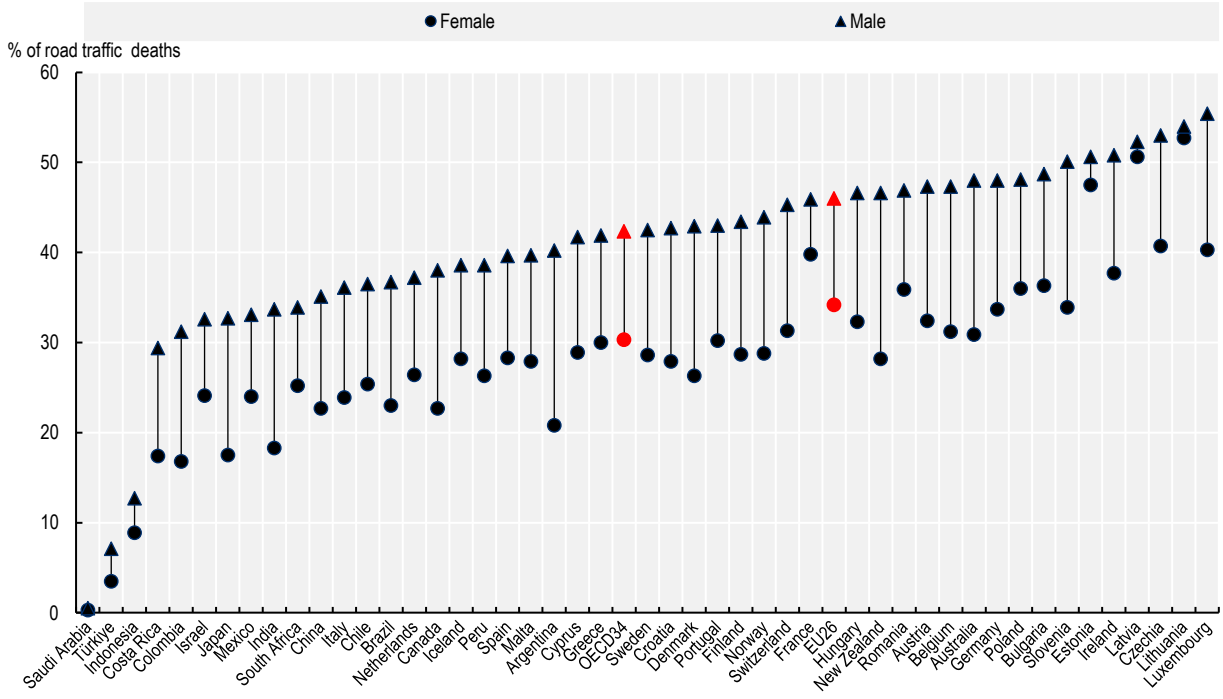
Action on harmful alcohol consumption would prevent 10% of premature deaths due to road traffic accidents and homicides

Harmful alcohol use has a direct impact on societal safety, as it can lead to road traffic accidents and violence due to its effects on cognitive function, co-ordination, and behaviour. When individuals consume alcohol, it impairs their ability to make rational decisions, slows reaction times, and impairs motor skills, all of which are critical for safe driving. Similarly, alcohol can lower inhibitions and increase impulsivity, making individuals more prone to engage in confrontations and escalate conflicts. In some cases, alcohol-induced aggression can lead to physical altercations, assaults, and even homicides.

Alcohol plays a significant role in fatal road traffic accidents. On average in the OECD, around one in three deaths from road traffic accidents can be attributed to alcohol use (Figure 5.6). This ranges from less than 1% in Saudi Arabia to 55% among male fatalities in Luxembourg in 2016. The proportion of road traffic crash deaths involving alcohol was higher in males than in females all countries.

Figure 5.6. More than a third of all deaths from road traffic crashes is attributable to alcohol

Proportion of road traffic crash deaths attributable to alcohol among men and women aged 15+ in 2016



Source: WHO (2016[28]) Alcohol-attributable fractions (15+), road traffic crash deaths (%) 2016, www.who.int/data/gho/data/indicators/indicator-details/GHO/alcohol-related-road-traffic-crashes-per-100-000-population.

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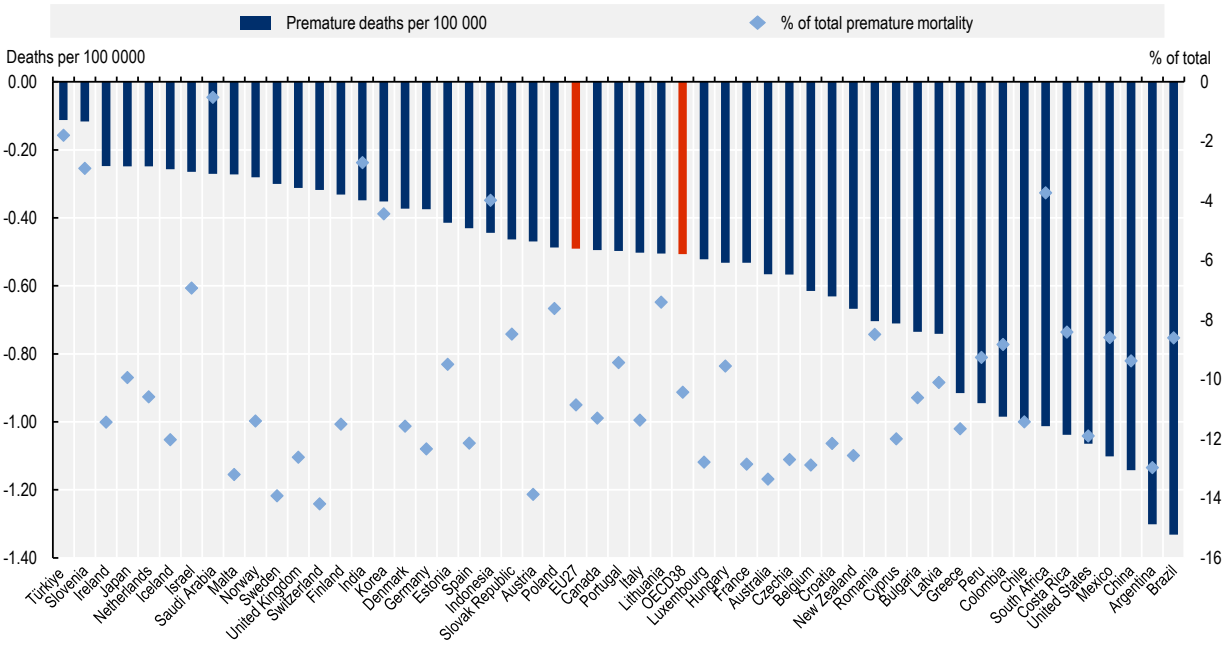
Achieving the policy target of reducing harmful alcohol consumption with 20% by 2030 versus 2010 is estimated to prevent 9 246 premature deaths due to road traffic accidents per year in the OECD (2065 in the EU). This is 10.4% of the total premature mortality from road traffic accidents (10.9% in the EU) (Figure 5.7). Countries with higher baseline rates of road traffic accidents see greater absolute reductions in premature mortality rate.

Figure 5.7. Achieving the policy target on harmful alcohol use would reduce premature mortality from road traffic accidents by around 10%

Impact of achieving the harmful alcohol use policy target on premature mortality from road traffic accidents, in deaths per 100 000 population and as a percentage of total premature mortality from road traffic accidents, per year, average over 2023-50



Source: OECD SPHeP NCDs model, 2024.

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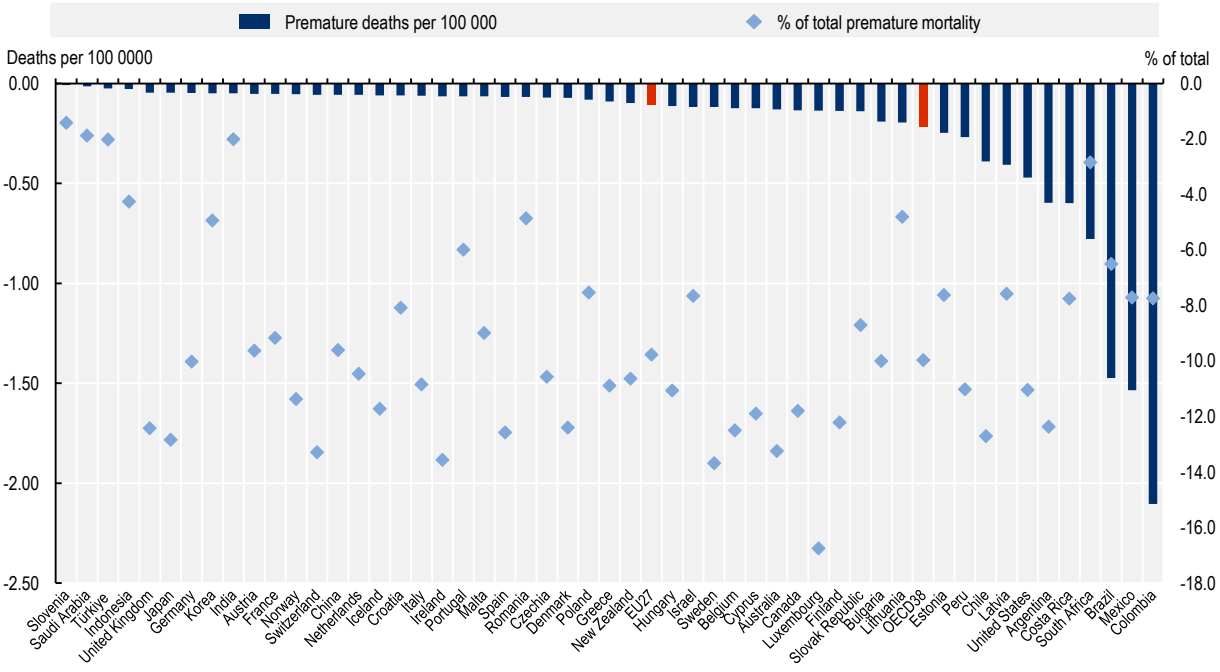
Alcohol also plays a detrimental role in many non-traffic related injuries and violent behaviour. In a systematic review of alcohol consumption and causes of fatal injuries in Canada Mexico and the United States, alcohol played a role in almost one in three homicides, a quarter of firearm injuries, a third of fire injuries, one in three drownings and more than a third of fall injuries among other injuries (Alpert et al., 2022[29]).

Achieving the policy target on harmful alcohol use is estimated to prevent 5 645 premature deaths due to interpersonal violence each year in the OECD, 10.0% of the total premature mortality from this cause (309 and 9.8% in the EU) (Figure 5.8). There is strong variation across countries, driven by baseline differences in homicide rates, with the number of homicide deaths prevented per 100 000 population ranging from less than 0.01 in Slovenia to 2.1 in Colombia.

Figure 5.8. Achieving the policy target on harmful alcohol use would also reduce premature mortality from interpersonal violence by around 10%

Impact of achieving the harmful alcohol use policy target on premature mortality from interpersonal violence, in deaths per 100 000 population and as a percentage of total premature mortality from interpersonal violence, per year, average over 2023-50



Source: OECD SPHeP NCDs model, 2024.

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A wide range of policies exist to address the major risk factors of cancer, varying in degree of intrusiveness

A wide range of effective policies exist to address the major risk factors of cancer (Table 5.3). The least intrusive policy options increase the choices available to people or decrease the cost of certain choices. Positive changes to the environment such as improving cycling and walking infrastructure can help increase physical activity, reduce air pollution and decrease overweight and obesity levels. Other examples of increasing choice include non-alcoholic alternatives at social venues (Box 5.2), or subsidising healthy food options such as fruit and vegetables. Interventions to improve the choices available can also be used to address existing structural (often overlapping) inequities, such as poverty and gender (Ginsburg et al., 2023[30]).

Table 5.3. Policies of varying degree of intrusiveness are available to address cancer risk factors

Risk Factor	Improving choice options available	Modifying preferences based on choice characteristics	Increasing price of selected choice options	Banning selected choice options
Tobacco		Regulating packaging*; health warning labelling*; ban tobacco advertising, promotion, and sponsorship*; mass media campaigns*	Increase tobacco taxation*	Ban sales to minors; control illicit tobacco trade; regulate contents of tobacco products
Air pollution	Increase urban green areas; improve cycling and walking infrastructure; subsidise low emissions vehicles	Information and communication campaigns on ways to improve air quality	Higher taxes on higher polluting vehicles; congestion charges; increase fuel prices	Ban highest polluting vehicles
Alcohol	Increase availability of non-alcoholic alternatives at social venues	Advertising restrictions*; nutrition and health warning labels; promote "dry" months; information campaigns	Increase taxation*; introduce minimum unit pricing	Restrictions on hours and days of alcohol sales*; minimum legal purchasing age; penalties for drink driving
Physical activity	Create active spaces and recreational areas; improve cycling and walking infrastructure; invest in sports infrastructure	Provide information on available activities and resources/facilities; physical education in schools; campaigns on the importance of physical activity	Implement congestion charges; increase fuel prices	
Diet	Subsidies for healthy foods; increase availability of health choices in schools, workplaces and supermarkets through public food procurement policies*; community gardens	Front-of-pack food labelling*; improve food and health literacy; enhance food and nutrition skills (e.g. cooking classes); restrictions on food advertising to children*; mass media campaigns*	Impose tax on products high in sugar, saturated fats, and salt	Ban trans-fats from food supply*
Obesity	*The policy actions for overweight and obesity mirror those examples used for diet and physical activity*			

Note: This table aims to provide examples of different policies across risk factors, and is not exhaustive. Policies with an * are part of the WHO NCD Best Buys to tackle NCDs. However, this does not imply that the other policies are not cost-effective and/or feasible.

Source: Sassi, F. and J. Hurst (2008[31]), "The Prevention of Lifestyle-Related Chronic Diseases: an Economic Framework", https://doi.org/10.1787/243180781313; WHO (2003[32]), *WHO Framework Convention on Tobacco Control (WHO FCTC)*, https://iris.who.int/handle/10665/42811; European Commission (2021[33]), European Commission (2021), *Pathway to a Healthy Planet for All – EU Action Plan:'Towards Zero Pollution for Air, Water and Soil' communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions*, https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=COM%3A2021%3A400%3AFIN; OECD (2021[34]), *Preventing Harmful Alcohol Use*, https://doi.org/10.1787/6e4b4ffb-en; WHO (2018[17]), *Global action plan on physical activity 2018-30*, https://iris.who.int/handle/10665/272722; OECD (2019[35]), *The Heavy Burden of Obesity: The Economics of Prevention*, https://doi.org/10.1787/67450d67-en; WHO (2015[36]), *Fiscal policies for diet and prevention of noncommunicable diseases: technical meeting report*, https://iris.who.int/handle/10665/250131; Gelius, P. et al. (2020[37]), "What are effective policies for promoting physical activity? A systematic review of reviews", https://doi.org/10.1016/j.pmedr.2020.101095; OECD/WHO (2023[38]). Step Up! Tackling the Burden of Insufficient Physical Activity in Europe, https://doi.org/10.1787/500a9601-en; WHO (2023[39]), More ways, to save more lives, for less money: World Health Assembly adopts more Best Buys to tackle noncommunicable diseases, https://www.who.int/news/item/26-05-2023-more-ways--to-save-more-lives--for-less-money----world-health-assembly-adopts-more-best-buys--to-tackle-noncommunicable-diseases.

Box 5.2. Improving options available: Policies to increase non-alcoholic options at social venues

In France, article L. 3323-1 of the public health code requires that bars hosting happy hour drink deals also include zero-alcohol drink options in the deal. The deals should be equivalent, such that if during a happy hour there are two alcoholic drinks for the price of one, there should also be two non-alcoholic drinks for the price of one. Additionally, non-alcoholic drinks should be on display and easily seen in the bar, with the display of at least ten bottles or containers of non-alcoholic drinks (Republique Francaise, 2009[40]).

In Australia all licenced premises must provide cold drinking water on request, though there are regional variations in terms of exact rules, with five of six States stipulating it must be offered free rather than at a reasonable cost. Western Australia also states that the water needs to be easily accessible in areas away from the queues for alcoholic drinks (Tasmanian Government, 2019[41]; Queensland Government, 2024[42]; Government of Southern Australia Customer and Business Services, 2023[43]; Government of New South Wales, 2024[44]; Government of Victoria, 2023[45]; Government of Western Australia, 2024[46]).

The next policy lever involves actions that modify preferences based on characteristics of choice options other than price, such as through persuasion, provision of information. Labelling and health warnings on tobacco, alcohol and food products can inform and persuade people to make healthier choices (Box 5.3). Providing education, for example through physical education and classes on food preparation, or through public health campaigns, can also help modify choice towards healthy behaviours. Regulation of advertising, for alcohol, tobacco or food, can reduce the exposure to persuasive messages promoting less healthy choices. It is important to note that, when developing policies that affect industries, countries need to ensure the transparency and integrity of lobbying and other influence practices (Box 5.4).

Box 5.3. Modifying preferences: The Nutriscore food labelling system

Nutri-score is a front-of-pack (FOP) label consisting of five colours, ranging from green to red, to help consumers make more informed choices about what they eat (Figure 5.9). In addition to informing consumers, FOP labels can also incentivise food companies to reformulate their products (OECD, 2022[47]; Kloss et al., 2015[48]).

Figure 5.9. Nutri-score logo

Source: Santé Publique France (2024[49]), Nutri-score, www.santepubliquefrance.fr/determinants-de-sante/nutrition-et-activite-physique/articles/nutri-score.

Nutri-score was introduced initially in France in 2017, where a randomised control trial showed that it increased purchases of the highest nutrition categories (Dubois et al., 2021[50]). It is implemented by companies on a voluntary basis, and between 2018 and 2023 the market share of food companies that adhere to the Nutri-score increased from 24% to 62% (in sales volume) (Ministère du travail, 2021[51]; OECD, 2022[47]). Since its introduction in France, the logo has also been adopted by Belgium, Switzerland, Germany, Spain, the Netherlands and Luxembourg (Santé Publique France, 2024[49]).

OECD analysis of the Nutri-score scheme estimates that it could prevent nearly 2 million cases of NCDs between 2023 and 2050 across EU countries, as well as lower annual healthcare spending by 0.05% (Devaux et al., 2024[52]).

Box 5.4. Transparency and Integrity in Lobbying and Influence

Lobbying groups and influencers represent valid interests and provide policy makers with important insights and data on various issues, leading to more informed and better policies. However, policy making is not always inclusive. Sometimes, financially and politically powerful groups dominate, sidelining those with fewer resources. Additionally, policies can be skewed by biased or deceitful information and manipulated public opinion, resulting in policies that only benefit special interest groups and not society as a whole.

The *OECD Recommendation of the Council on Transparency and Integrity in Lobbying and Influence* provides a set of recommendations to strengthen transparency and openness of lobbying and influence activities in public decision-making processes, with the aim to avoid making policy choices in the interests of the more financially and politically powerful.

Source: OECD (2024), Recommendation of the Council on Transparency and Integrity in Lobbying and Influence; https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0379.

Increasing the price of selected options, typically through increased taxation, is more intrusive but can help move individuals away from less healthy options. Examples include taxation on tobacco, alcohol, food and drinks high in sugar, saturated fats and salt, and highly polluting vehicles. There are also non-taxation fiscal measures, such as minimum unit pricing for alcohol, and higher congestion charges or parking fees for polluting vehicles (Box 5.5).

Box 5.5. Increasing price of selected options: Fiscal policies to decrease the use of high polluting vehicles

There are various financial policies to discourage the purchase of polluting vehicles, and steer buyers towards less polluting options (Samos, Mellios and Tsalikidis, 2019[53]). In the Netherlands, CO2-efficient cars have been encouraged by (partial) exemptions from registration tax and annual circulation tax, while diesel cars are taxed at a higher rate than petrol cars, for registration tax as well as in the annual circulation taxes. In France, buyers of efficient vehicles are rewarded with an up-front bonus subsidy, while buyers of high-emitting vehicles have to pay a malus.

Financial incentives can also be used to discourage the use of polluting vehicles. London has implemented an Ultra Low Emission Zone (ULEZ) which covers all London boroughs. Vehicles that do not meet the ULEZ emissions standards need to pay a GBP 12.50 (EUR 15) daily charge to drive within the zone (Transport for London, n.d.[54]). In Paris, a new policy was implemented in 2024 where heavier and higher polluting cars have to pay much higher parking charges within the city (Ville de Paris, 2024[55]).

The final policy lever involves banning selected options. Bans can be employed as selective or partial, such as restricting the times or days alcohol can be sold, or imposing a minimum age at which tobacco products can be legally sold (Box 5.6). Bans can also be complete, such as banning outright the use of trans-fats in the food supply chain or banning highly polluting vehicles from the roads. Although these regulatory measures are typically less expensive than other policy types, enforcement costs can be substantial and bans also run the risk of incentivising illicit activities (Sassi and Hurst, 2008[31]).

Box 5.6. Banning selected options: Tobacco-free generation

The idea of a tobacco-free generation first took hold in 2010, when researchers at the National Cancer Centre in Singapore suggested that minimum age legislation for tobacco sales could be re-written so that sales are denied to: “a person below the age of 18 years or a citizen born on or after 1 January 2000”, effectively phasing out tobacco use in the next generations (Khoo, 2010[56]).

In December 2022, New Zealand became the first country in the world to introduce legislation on a tobacco-free generation, as part of a larger strategy on smoking (Hefler, 2023[57]). The policy would see the legal age to purchase tobacco increase yearly, so that it will never be legal to sell combustible tobacco products to people born after 2008. However, in November 2023, the new Coalition Government announced that they intended to repeal the legislation, referring to the illicit tobacco market and tax revenue shortages.

In the United Kingdom, a bill is under way to ensure that children turning 15 in 2024 or younger will never be legally sold tobacco, by increasing the legal age of sale by one year, every year (UK Government, 2024[58]). Other countries have also started talking about raising smoke-free generations, including Australia, France, Mexico and Portugal. (World Economic Forum, 2023[59]) (Hefler, 2023[57])

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Annex 5.A. Policy targets on cancer risk factors

Annex Table 5.A.1. Risk factor policy targets

		Policy target	Notes
Tobacco		30% reduction in tobacco use by 2025 relative to 2010 levels; less than 5% of the population uses tobacco by 2040	This scenario combines the target on tobacco from the WHO-GAP, which aims for a 30% reduction in tobacco use by 2030, and that of the Europe Beating Cancer Plan, which an additional target in which less than 5% of the population uses tobacco by 2040 (WHO, 2013[15]) (European Commission, 2021[5])
Alcohol		20% reduction in the harmful use of alcohol by 2030 relative to 2010 levels (modelled as a 20% reduction in the total use of alcohol, plus at least a 20% reduction in binge drinking prevalence over 2010-30)	This target is higher than the original in the WHO-GAP, reflecting the 20% reduction target set in the *WHO Global Alcohol Action Plan 2022-30* (WHO, 2024[18]). The target focuses on "harmful use" – therefore the additional target of reducing binge drinking prevalence was added.
Air pollution		Annual average PM2.5 level capped at 10 µg/m3 by 2030; 5 µg/m3 by 2050	This reflects the February 2024 provisional political agreement on a proposal on new EU air quality standards, which states that by 2030 the annual average PM2.5 exposure should be no more than 10 µg/m³, and that by 2050 air quality is no longer harmful to health, by meeting the WHO Global Air Quality Guideline of 5 µg/m³ (Council of the EU, 2024[19])
BMI		Halt the rise in obesity by 2025, versus 2010	This reflects the WHO-GAP target, and effectively reduces current levels of obesity to those of 2010 (WHO, 2013[15])
Physical activity (PA)		15% increase in physical activity levels for everyone by 2030, relative to 2016 levels	The target on physical activity in the WHO Global Action Plan on Physical Activity (WHO, 2018[17]), later also adopted in the WHO-GAP, is a 15% reduction in physical inactivity between 2016 and 2030. If inactivity is defined as not meeting the WHO target of at least 150 minutes of moderate-intensity physical activity per week, this target is expected to result in a very small effect. Instead, a 15% increase in physical activity for everyone was modelled.
Diet	Processed meat	Everyone consumes less than 18g of processed meat per day by 2025	The diet targets are modelled as a single scenario. Most dietary policy targets are based on national dietary guidelines (Annex Box 5.A.1). The target year for these dietary components was set at 2025, matching the target year of the WHO-GAP targets. The target for sodium matches the WHO-GAP target.
	Red meat	Everyone consumes less than 52g of red meat per day (70g– 18g of processed meats) by 2025	
	Whole grains	Everyone consumes more than 80g of whole grains per day by 2025	
	Fruit	Everyone consumes at least 250g of fruit per day by 2025	
	Vegetables	Everyone consumes at least 250g of vegetables per day by 2025	
	Sodium	30% reduction in mean population intake of salt/sodium by 2025, relative to 2010 levels	

Note: All scenarios assume a linear change starting 2023, going from current level to the target level in the target year, after which they remain at target level.
Source: OECD analysis of European Commission (2021[12]), *Europe's Beating Cancer Plan*, https://ec.europa.eu/commission/presscorner/detail/en/ip_21_342; WHO (2013[15]), *Global action plan for the prevention and control of noncommunicable diseases 2013-20*, https://iris.who.int/handle/10665/94384; WHO (2018[17]), Global action plan on physical activity 2018-30, https://iris.who.int/handle/10665/272722; WHO (2022[16]), Seventy-fifth World Health Assembly – Resolutions and decisions annexes, https://apps.who.int/gb/ebwha/pdf_files/WHA75-REC1/A75_REC1_Interactive_en.pdf#page=1, WHO (2021[60]), Global alcohol action plan: Second draft, unedited, www.who.int/publications/m/item/global-alcohol-action-plan-second-draft-unedited; EAT-Lancet Commission (2019[61]), *Food Planet Health: Healthy Diets From Sustainable Food Systems – Summary Report*, https://eatforum.org/content/uploads/2019/07/EAT-Lancet_Commission_Summary_Report.pdf; WHO (2021[20]), *WHO global air quality guidelines: particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide*, https://apps.who.int/iris/handle/10665/345329; WHO (2022[62]), WHO manual on sugar-sweetened beverage taxation policies to promote healthy diets, https://iris.who.int/handle/10665/365285; WHO (2022[63]), Follow-up to the political declaration of the third high-level meeting of the General Assembly on the prevention and control of non-communicable diseases, https://doi.org/10.1016/S0140-6736(20)31761-X; (European Parliament (2023[64]), *Texts adopted – Ambient air quality and cleaner air for Europe*, www.europarl.europa.eu/doceo/document/TA-9-2023-0318_EN.html.

Annex Box 5.A.1. Diet policy targets are based on national dietary guidelines

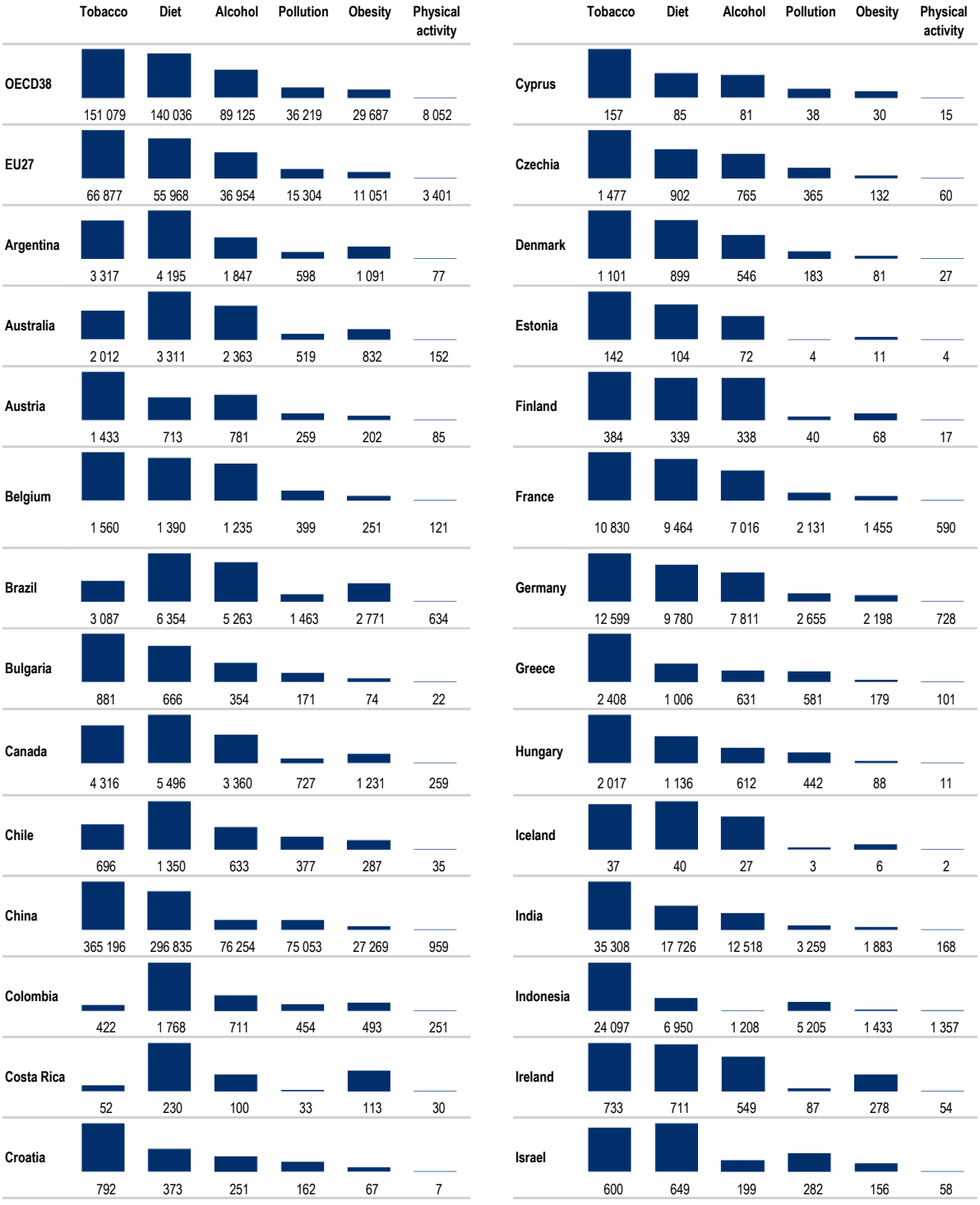
For diet, there are few international policy targets. Instead, national dietary guidelines were reviewed from European countries, the United States, Canada, Australia, New Zealand, Japan and Korea.

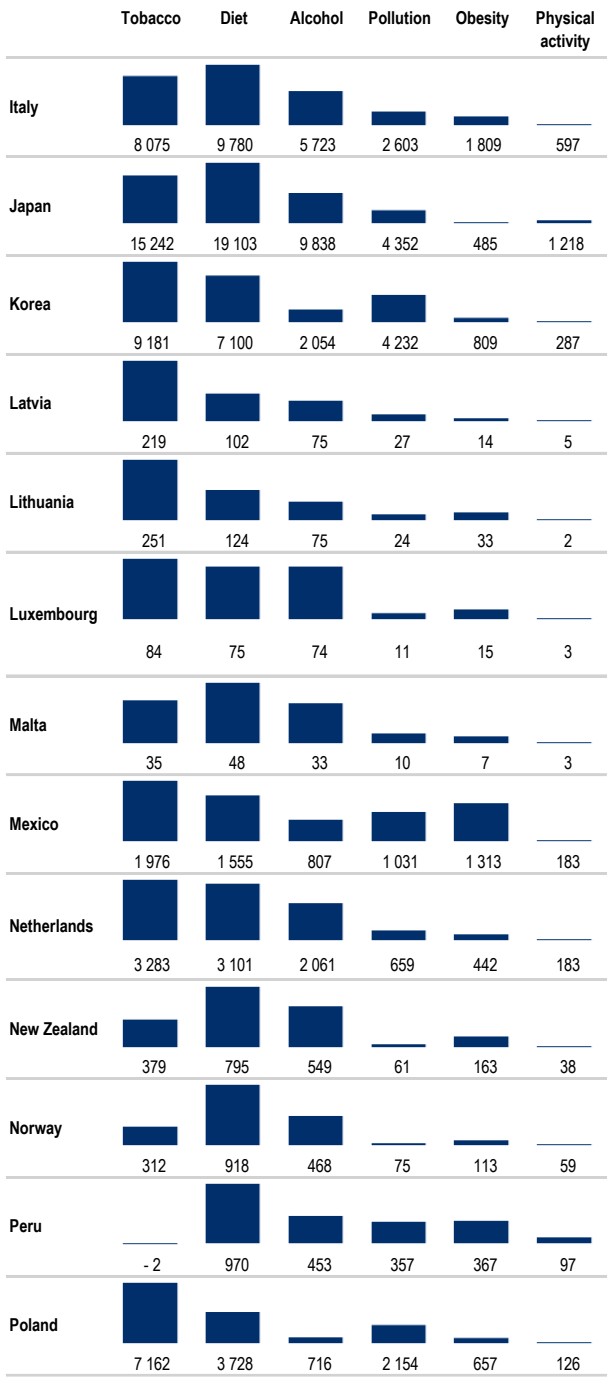
- **Fruit and vegetables:** Where guidelines provide specific, quantitative targets, the most common recommendation is to consume 250 grammes per day of both fruit and vegetables (i.e. 500 grammes per day in total). While this adds up to more than the WHO recommendation of eating 400 grammes per day of fruit and vegetables, many countries have recommendations even higher than 250 grammes per day.
- **Whole grains:** Few countries have quantitative targets on whole grains, but those that do are closely aligned: Denmark, Sweden, Norway and the United States all recommend between 75 and 85 grammes per day.
- **Red meat and processed meat:** The countries that include specific recommendations on red meat intake generally recommend limiting intake to 500 grammes per week (about 70 grammes per day). Often the recommendation covers both red and processed meat. France and Switzerland have separate recommendations on processed meat, limiting intake to 150 grammes and 100-120 grammes per week respectively (around 18 grammes per day on average). Therefore, for the policy targets the 70 grammes of red meats per day was split into 18 grammes of processed meat, and the remaining 52 grammes for other red meats.

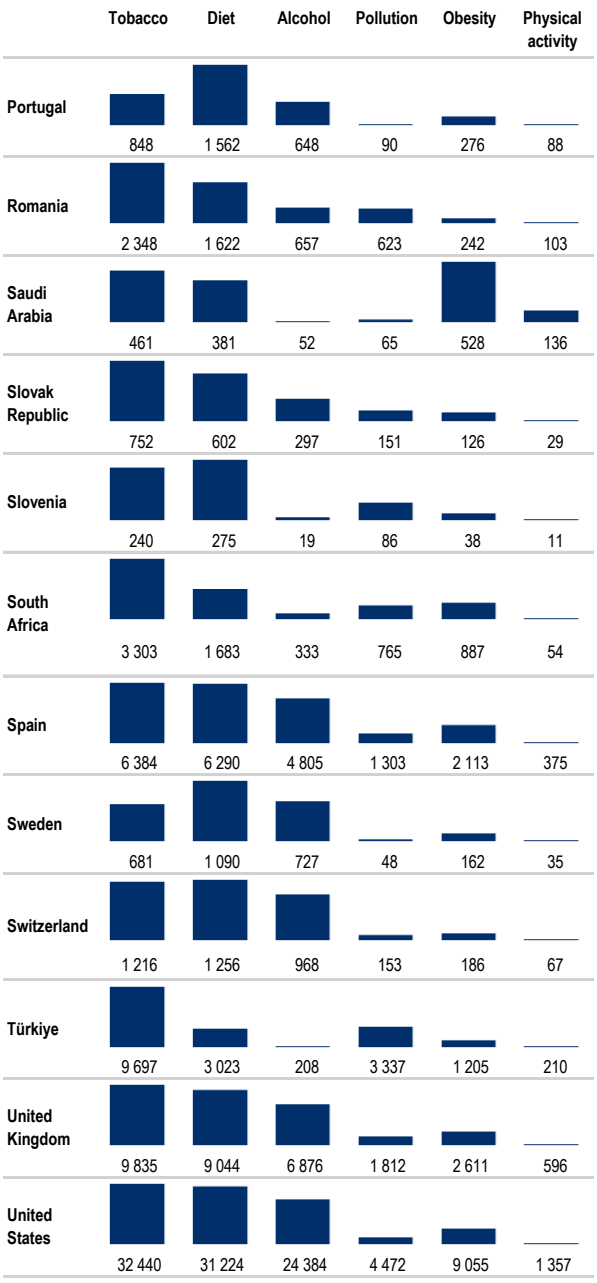
Source: OECD analysis of European Commission (2023[65]), *Food-Based Dietary Guidelines in Europe*, https://knowledge4policy.ec.europa.eu/health-promotion-knowledge-gateway/topic/food-based-dietary-guidelines-europe_en; National Health and Medical Research Council (2013[66]), *Australian Dietary Guidelines*, www.health.gov.au/sites/default/files/australian-dietary-guidelines.pdf; U.S. Department of Agriculture and U.S. Department of Health and Human Service (2020[67]) *Dietary Guidelines for Americans, 2020-25*, www.dietaryguidelines.gov/sites/default/files/2020-12/Dietary_Guidelines_for_Americans_2020-2025.pdf; Health Canada (2019[68]), *Canada's Dietary Guidelines*, https://food-guide.canada.ca/sites/default/files/artifact-pdf/CDG-EN-2018.pdf; Ministry of Health (2020[69]), *Eating and Activity Guidelines for New Zealand Adults*, www.health.govt.nz; Ministry of Agriculture (2016[70]), *Dietary guidelines for Japanese*, www.maff.go.jp/j/syokuiku/attach/pdf/shishinn-10.pdf; FAO (2016[71]), *Food-based dietary guidelines - Republic of Korea*, www.fao.org/nutrition/education/food-dietary-guidelines/regions/countries/republic-of-korea/en/.

Annex 5.B. Country-level results

Annex Figure 5.B.1. Impact of achieving risk factor policy targets on number of cancer cases per year (average 2023-50)



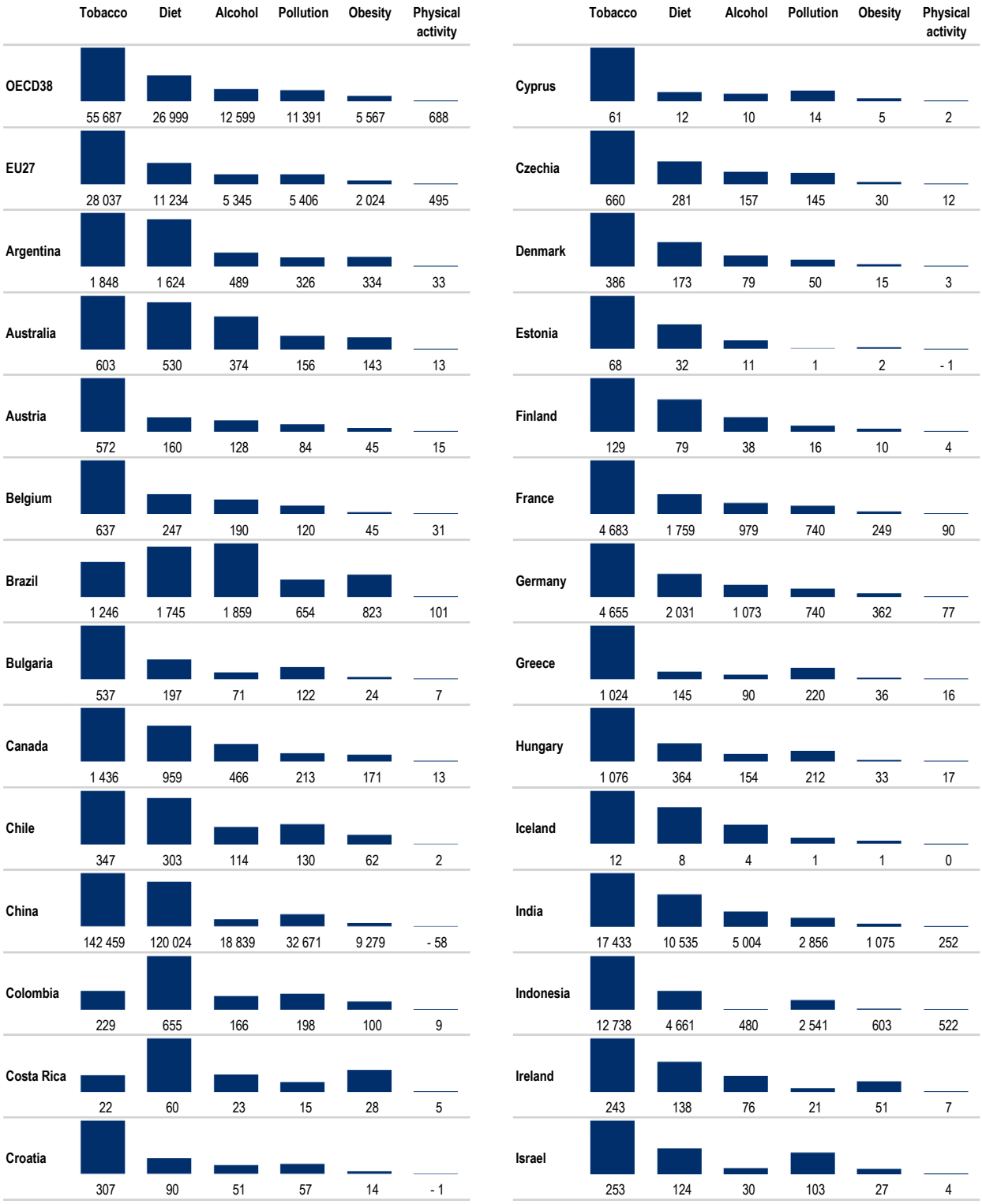


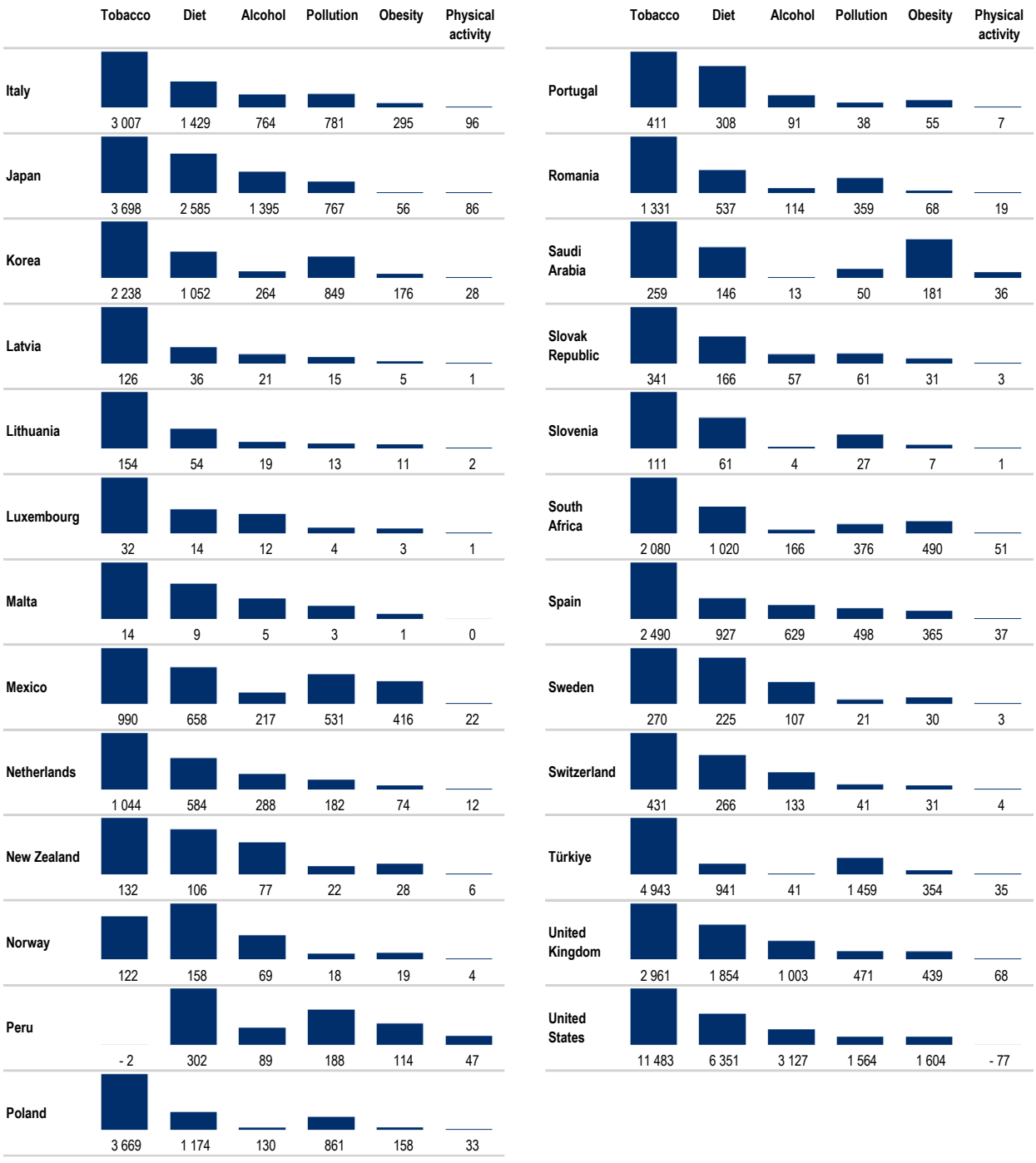


Source: OECD SPHeP NCDs model, 2024.

StatLink https://stat.link/ph9dig

Annex Figure 5.B.2. Impact of achieving risk factor policy targets on number of premature deaths due to cancer per year (average 2023-50)

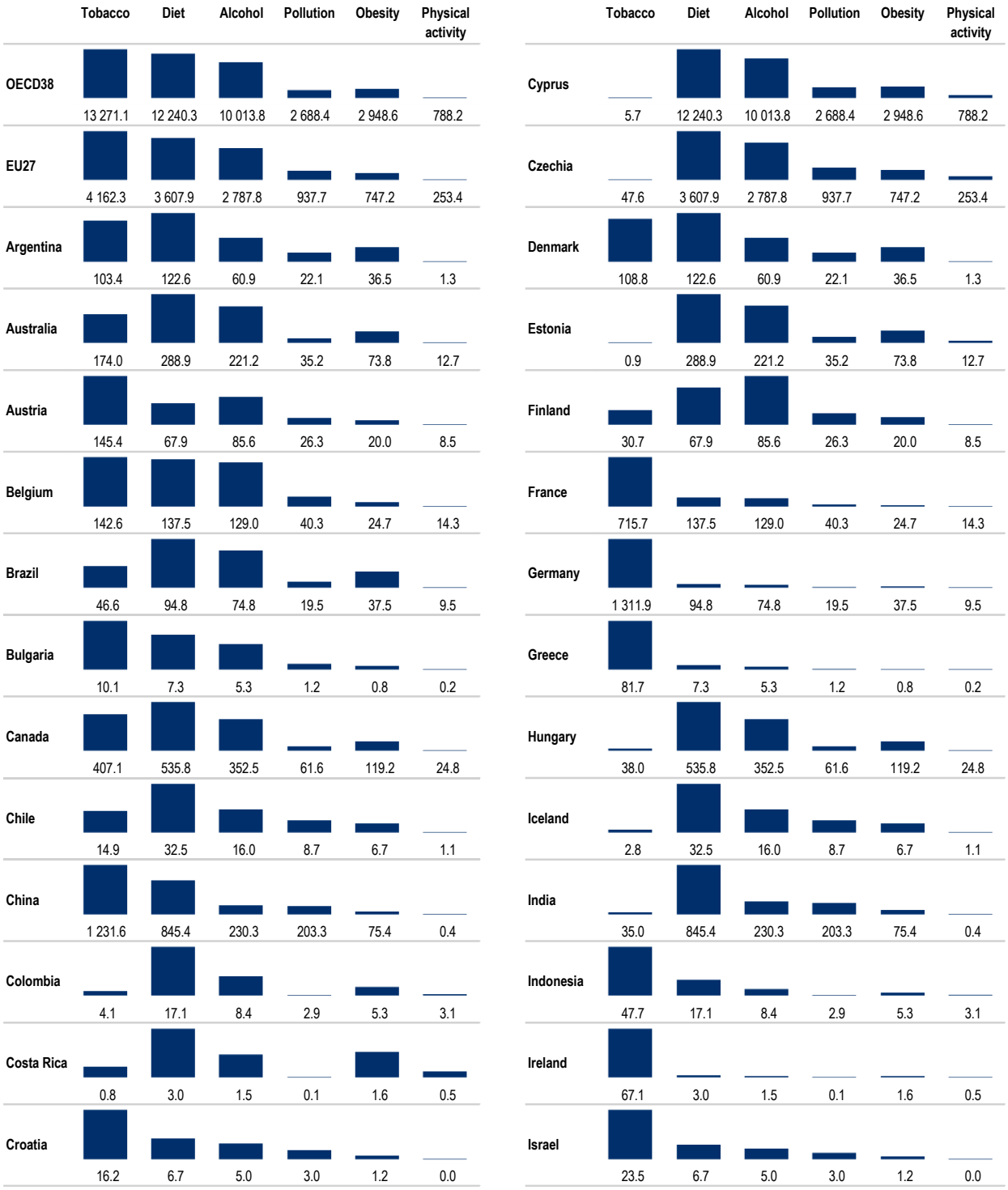


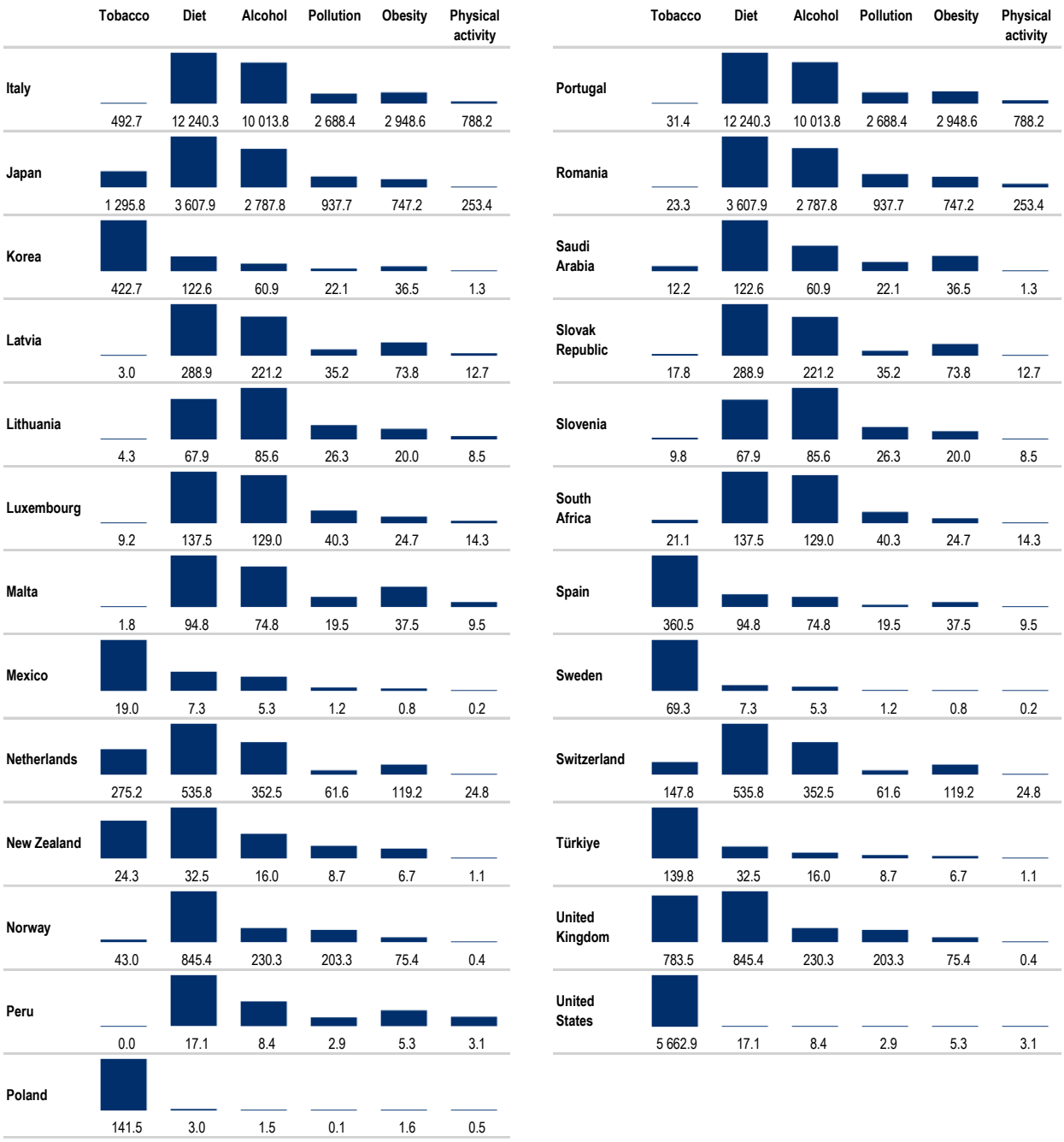


Source: OECD SPHeP NCDs model, 2024.

StatLink https://stat.link/vbitw9

Annex Figure 5.B.3. Impact of achieving risk factor policy targets on health expenditure on cancer per year in EUR PPP millions (average 2023-50)





Source: OECD SPHeP NCDs model, 2024.

StatLink https://stat.link/kr1ijq

Annex 5.C. Methodology to model environmental impacts of diet in the OECD SPHeP NCDs model

The OECD SPHeP NCDs model contains six dietary risk factors that are linked to cancer: fruit, vegetables, whole grains, sodium, red meat and processed meat (GBD 2019 Risk Factors Collaborators, 2020[72]). Changes in five of these (excluding sodium) were linked to changes in greenhouse gas (GHG) emissions. The environmental footprint for each food group was derived from the WHO Diet Impact Assessment model, which is a tool for analysing environmental implications of dietary changes (WHO, 2023[26]).

As environmental impacts of specific food products are highly variable across producers (Poore and Nemecek, 2018[73]), the environmental impacts of specific food products differ across countries. The impacts shown in this report therefore reflect both the difference between the baseline and target consumption in a country, as well as the relative environmental footprint of food consumed in that county. Moreover, the environmental impact combines all food groups covered in the OECD SPHeP NCDs model (red meat, processed meat, fruit, vegetables, whole grains), and assumed that there is no change in other dietary groups, e.g. there was no replacement or substitution.

To compare and aggregate emissions of different GHGs, a carbon dioxide equivalent (CO_2-eq) is used. This measure converts the amount of other GHGs to the equivalent amount of carbon dioxide with the same global warming potential. The lifecycle assessment approach was used to calculate the GHG emissions of food products across all stages of a food item's life cycle – including farming, processing, packaging and transport.

While the dietary risk factors in the OECD SPHeP NCDs model include "red meat" or "processed meat" as a group, different animal products are associated with different emission intensities. For example, a kilogram of beef results in ten times more GHG emissions than a kilogram of pork. Analysis of the European Food Safety Agency (EFSA) Comprehensive European Food Consumption Database (EFSA, 2021[74]) shows that the relative proportion of meat intake from various animals varies significantly across countries, and across the fresh and processed meat categories. Therefore, the two meat intake variables are combined into one overall meat consumption quantity, which is split into red meat categories based on country-specific supply data from the FAO Food Balance Sheets (FAO, 2022[75]) for bovine meat (beef), pig meat (pork) and mutton and goat meat (including lamb).

Note that this necessitates the assumption that all processed meat also falls into these red meat categories. While processed meat is defined only by its processing method and not by type of animal ("meat preserved by smoking, curing, salting, or addition of chemical preservatives"), analysis across 22 countries included in the EFSA Database shows that approximately 90% of processed meat consumed was indeed red meat (beef or pork).

It is important to note that the changes in total emissions are based on the change in per capita emissions, applied to the baseline population. This means that the results are not affected by the slight increase in population size associated with a lower cancer mortality.

6 The impact on cervical cancer of scaling up HPV vaccination

This chapter shows the potential impact of scaling up vaccination for human papilloma virus (HPV). It shows how vaccination for HPV offers a unique opportunity to protect future generations from cervical cancer and discusses the current status of national vaccination campaigns. The chapter presents results from OECD Strategic Public Health Planning (SPHeP) for Non-Communicable Diseases (NCDs) model, which was used to quantify the potential impact of optimising HPV vaccination, and discusses approaches to increase the coverage rates.

In Brief

HPV vaccination offers a unique opportunity to protect future generations from cervical cancer

- Infection with the human papillomavirus (HPV) can lead to various forms of cancer, with cervical cancer accounting for 91% of all HPV-related cancers.
- Vaccines protecting against HPV infection are highly effective and safe, and they have been added to the national immunisation programmes of nearly all OECD and EU countries. However, the population coverage remains low.
  - Only four OECD countries (Spain, Portugal, Chile and Norway) achieved the target of vaccinating at least 90% of girls in 2022.
  - The average coverage in the OECD was 69% in 2022 (EU 56%), but this varied immensely across countries: from 8% in Japan to 96% in Norway.
- Optimally implemented vaccination schemes could prevent between 84% and 92% of all cervical cancer cases, and 89% of all premature mortality due to cervical cancer.
- It would also reduce the total burden of cancer on health expenditure by 1.3% in the OECD (1.6% in the EU) and add the equivalent of 120 000 full-time workers to the OECD workforce, and 40 000 to the EU. In monetary terms, this equates to a workforce output of EUR PPP 5.7 billion per year in the OECD (EUR PPP 1.6 billion in the EU).
- To benefit fully from the impact of HPV vaccination on population health, healthcare expenditure and workforce productivity, countries should increase uptake and coverage by:
  - Evaluating the benefits and challenges of adopting a single-dose schemes and considering its implementation based on the national circumstances: while initially a two-dose schedule was advised, a single-dose schedule has recently been found to provide sufficient protection for the primary target of young girls (excluding immunocompromised or HIV-infected people). Moving to a single-dose schedule could provide various benefits, including cost-savings, simplified logistics and increased acceptability by the public.
  - Considering catch-up vaccination if and where needed: Catch-up vaccination targets individuals who have not received doses of the vaccine for which they are eligible. This can increase coverage, while improving the resilience of the programme against interruptions.
  - Addressing misinformation: Misinformation is a powerful threat to vaccination campaigns, including for HPV. To address this, comprehensive multimedia campaigns are needed, which address the specific concerns of parents; monitor and engage with social media; and benefit from wide and authoritative support.

HPV vaccination as a cancer prevention strategy

Cancer prevention predominantly involves efforts to encourage behavioural changes such as quitting smoking, adopting a healthy diet and protecting oneself from harmful environmental exposures. While these behavioural changes are crucial, they can be challenging to implement and do not fully eliminate the risk of cancer. Beyond behavioural change, there are few healthcare interventions that prevent cancer. One notable exception is vaccination for human papillomavirus (HPV). With its high efficacy and safety, it offers a unique opportunity to protect future generations from cancer.

What is HPV and how does it cause cancer?

HPV is the most common viral infection of the reproductive tract, and it can be transmitted through sexual intercourse, including oral sex (WHO, 2022[1]). It is very prevalent: almost all sexually active people will be infected with HPV at some point in their lives, usually without symptoms (WHO, 2024[2]). It is more common among people living with HIV and in men who have sex with men (WHO, 2022[1]). While 70% to 90% of HPV infections exhibit no symptoms and resolve on their own within one to two years, persistent HPV infection can lead to the development of precancerous lesions that have the potential to advance into cancer in both men and women. This process can take 15-20 years or longer.

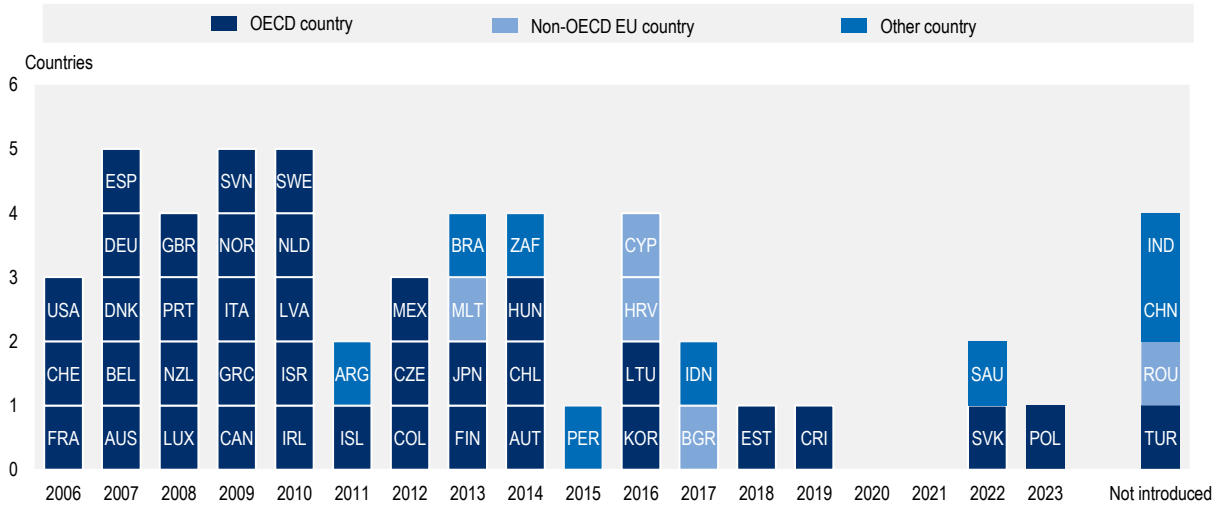
The primary cancer associated with HPV is cervical cancer, accounting for 91% of all HPV-related cancers (WHO, 2022[1]). Cervical cancer is the fourth most common cancer in females and persistent, untreated HPV infection of the cervix (the lower part of the uterus or womb) causes 95% of all cervical cancers (WHO, 2024[3]). The remaining 9% of HPV-related cancers are cancer types that are generally less common, but still have a high relative burden due to HPV: HPV causes 90% of anal cancers, 70% of oropharyngeal (throat) cancers, 63% of penile cancers, 75% of vaginal cancers and 69% of vulvar cancers (National Cancer Institute, 2023[4]).

Vaccination against HPV

The first vaccine against HPV was licensed in 2006, and there are now six different vaccines available (WHO, 2022[1]). The HPV vaccines are deemed to be highly effective and safe. Consequently, almost all OECD and EU countries have included HPV vaccination in their national immunisation programmes (37 out of 38 and 26 out of 27 countries, respectively) (Figure 6.1). In addition, 19 EU MS also have HPV screening programmes (Box 6.1).

Figure 6.1. Almost all OECD and EU countries have introduced HPV vaccination

Number of countries that introduced HPV vaccination in their national immunisation programme, by year of introduction



Note: Date refers to the year when vaccine is included into the national immunisation schedule and accessible at no cost to primary target population cohorts in the country.
Source: WHO (2024[5]), WHO Immunization Data.

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Box 6.1. HPV screening

International efforts to eliminate cervical cancer rely on both vaccination and screening (WHO, 2020[6]) (European Commission, 2021[7]). In the EU, 19 countries have population-based cervical cancer screening in place, organised at the national or regional level. The design of these programmes varies, including the age groups they target (generally women over the age of 20, 25 or 30), and the frequency of testing (generally everyone, three or five years).

These programmes also differ in the type of test they use: cytology, HPV testing, or both. For cytology-based screening, 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. 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. Most of the 29 EU+2 countries offer either high-risk HPV-based testing or a combination of cytology and HPV.

In the new EU Council Recommendation on cancer prevention through early detection, the possibility of self-sampling is suggested, where tests are sent to eligible women and performed at home (European Union, 2022[8]). This is of interest as it could reach non-responders and increase uptake. Mailing the eligible population self-sampling devices has been shown to increase uptake for both cervical and colorectal cancer screening (Camilloni et al., 2013[9]). 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).

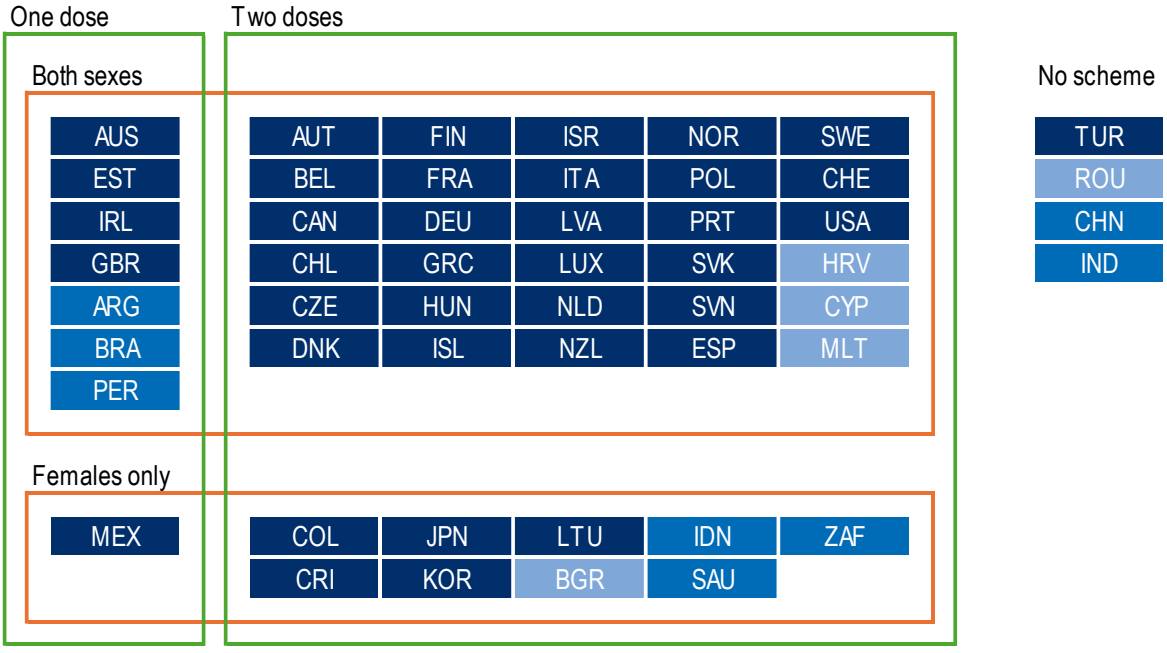
In Estonia, an HPV self-sampling feasibility and pilot study was conducted in 2020 and 2021, followed by an implementation project (2022-24). Since August 2022, women who did not participate in cervical cancer screening in the first half of the year will be able to choose between being provided with 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.

Source: OECD (2024[10]) Beating Cancer Inequalities in the EU: Spotlight on Cancer Prevention and Early Detection

Most national HPV vaccination programmes target both girls and boys, but six OECD countries only target girls (Figure 6.2) (Box 6.2). Around 90% of all countries aim to provide two doses of the vaccine, with the rest providing one dose. All aim to vaccinate teenagers before they become sexually activity, typically targeting people aged between 9 and 14 years old (WHO, 2024[5]).

Figure 6.2. Most countries provide two doses of the HPV vaccine to both girls and boys

Countries with HPV vaccination schemes targeting females only or both sexes, and using one dose or two doses



Source: WHO (2024[5]), WHO Immunization Data.

Box 6.2. Considerations around gender in HPV vaccination policies

HPV vaccination is highly effective against HPV related cancers and other diseases when given to children before they become sexually active (aged 9 to 14 years) (WHO, 2022[1]), though policy on whether to vaccinate girls alone or girls and boys differs across countries. The World Health Assembly in 2020 adopted the Global Strategy for cervical cancer elimination, which included a goal to fully vaccinate 90% of girls with the HPV vaccine by age 15 (WHO, 2020[11]). Vaccination of boys is considered a secondary target population, to be covered if it is "feasible and affordable, and does not divert resources from vaccination of the primary target population or effective cervical cancer screening programmes" (WHO, 2022[1]). Europe's Beating Cancer Plan also sets a 90% coverage target for girls, while recommending to "significantly increase the vaccination of boys" (European Commission, 2021[12]).

There are several ways in which vaccinating boys for HPV can help reduce the cancer burden:

- While boys are partially protected from HPV infection if there is a high vaccination rate among girls, if coverage is low they remain at risk (Qendri, Bogaards and Berkhof, 2018[13]). HPV infection in boys can cause various types of cancers. In England there has been increasing numbers of anal cancers in men, 80% of which are caused by HPV (Powell, Hibbitts and Evans, 2018[14]). Globally, the incidence of HPV-related anal cancer and oropharyngeal cancer has increased among men between 1962 and 2015 (Varga et al., 2019[15]). While the number of tobacco and alcohol-related head and neck cancers has been declining, cases related to HPV infection are on the rise and now make up 70-90% of all new cases (Sabatini and Chiocca, 2019[16]) (Young et al., 2015[17]).
- There is also a high burden of HPV among men who have sex with men (MSM), who do not benefit from herd immunity from female-only vaccination (Woestenberg et al., 2020[18]) (Díez-Domingo et al., 2021[19])
- In addition to directly protecting boys, vaccinating boys can help provide additional protection for girls. Particularly when coverage rates among girls are low (e.g. below 60%), it is estimated that at least half of the gains from vaccinating boys are from preventing cervical cancer in girls (Qendri, Bogaards and Berkhof, 2018[13]).

There are also ethical considerations to vaccinating both boys and girls. First, only vaccinating girls may reinforce the impression that sexual health is primarily a female responsibility (Powell, Hibbitts and Evans, 2018[14]). Second, targeting MSM specifically requires discussions around sexual orientation with boys at a young age. This could produce highly unreliable results, because orientation is not yet firmly established, taboo or parental objection (Stanley, 2012[20]).

While on average gender-neutral vaccination is less cost-effective than vaccination of girls only (WHO, 2022[1]), there are situations and settings where it is cost-effective. Gender-neutral vaccination was evaluated to be cost-effective for Belgium (Simoens et al., 2021[21]). For Spain, it was estimated to be cost-effective if protection against oropharyngeal or penile cancers was included (Linertová et al., 2022[22]). In the United Kingdom, the Joint Committee on Vaccination and Immunisation advised expanding vaccination from previously recommended females and MSM in 2015 to gender-neutral vaccination in 2018, based on the increasing incidence of HPV cancers in men and cost-effectiveness (Powell, Hibbitts and Evans, 2018[14]).

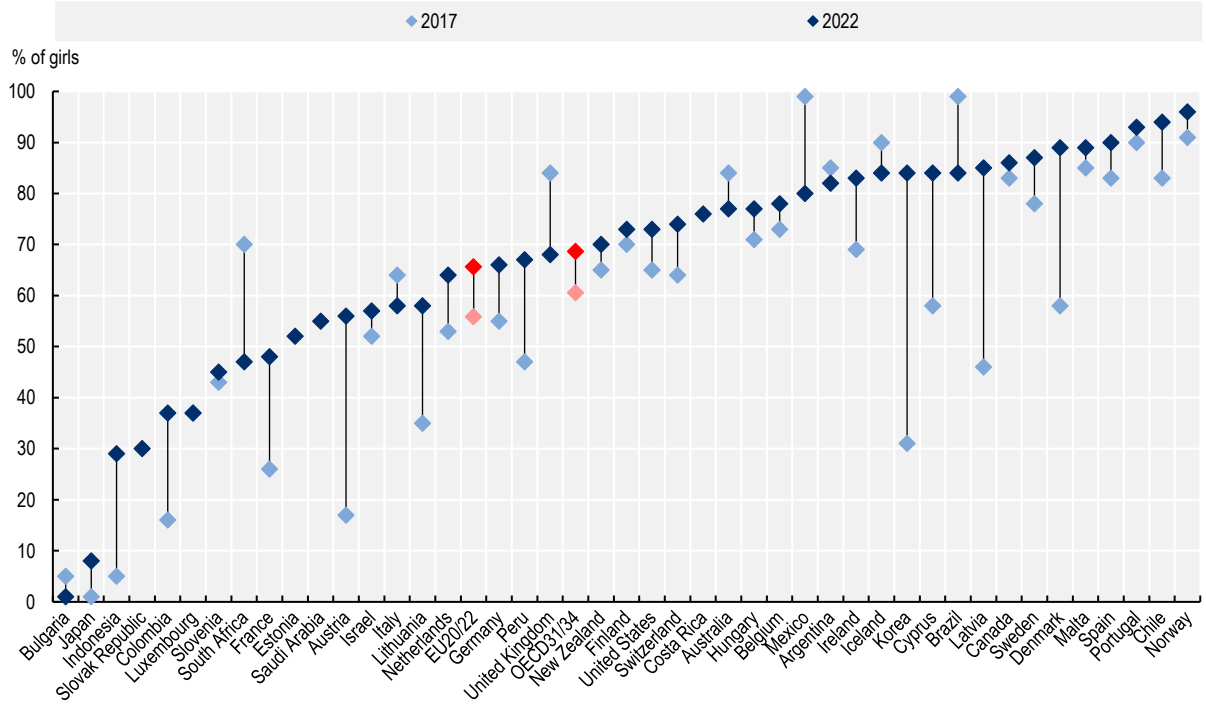
However, adequate vaccine supply remains a key issue in the debate. Demand for the HPV vaccine is expected to grow in the next ten years, and countries that have not yet implemented a vaccine programme, including countries with a high burden of disease, may have to wait until supply can meet demand (Logel et al., 2022[23]). To mitigate the vaccine shortage, the Strategic Advisory Group of

Experts on Immunization (SAGE) in 2019 advised the WHO that "countries should temporarily pause implementation of boy, older age group (>15 years) and multi-age cohort (MAC) HPV vaccination strategies until vaccine supply allows equitable access to HPV vaccine by all countries" (WHO, 2019[24]). Fortunately, a recent study estimates that the risk of HPV shortages has now significantly decreased, and global supply is, under normal circumstances, sufficient to meet global demand (Malvolti et al., 2023[25]).

But while many countries have introduced HPV vaccination, the population coverage remains low. The WHO and EU both recommend that countries vaccinate 90% of girls to achieve the goal of cervical cancer elimination (WHO, 2020[6]) (European Commission, 2021[7]). However, only four OECD countries (Spain, Portugal, Chile and Norway) achieved this target in 2022 (Figure 6.3). The average coverage in the OECD was 69% in 2022 (EU 56%), but this varied immensely across countries: from 8% in Japan to 96% in Norway. Some countries saw a drop in coverage between 2017 and 2022, which can be the result of COVID-19 disruptions to routine care (UK Health Security Agency, 2024[26]) (NCIRS, 2024[27]) (Cruz-Valdez et al., 2023[28]).

Figure 6.3. However, coverage remains well under the 90% target in almost all countries

HPV vaccination programme coverage, first dose, females, in 2017 and 2022



Note: Averages for 2017 covers 20 EU countries and 31 OECD countries, while the 2022 average includes 22 EU and 34 OECD countries.
Source: WHO (2024[5]), WHO Immunization Data.

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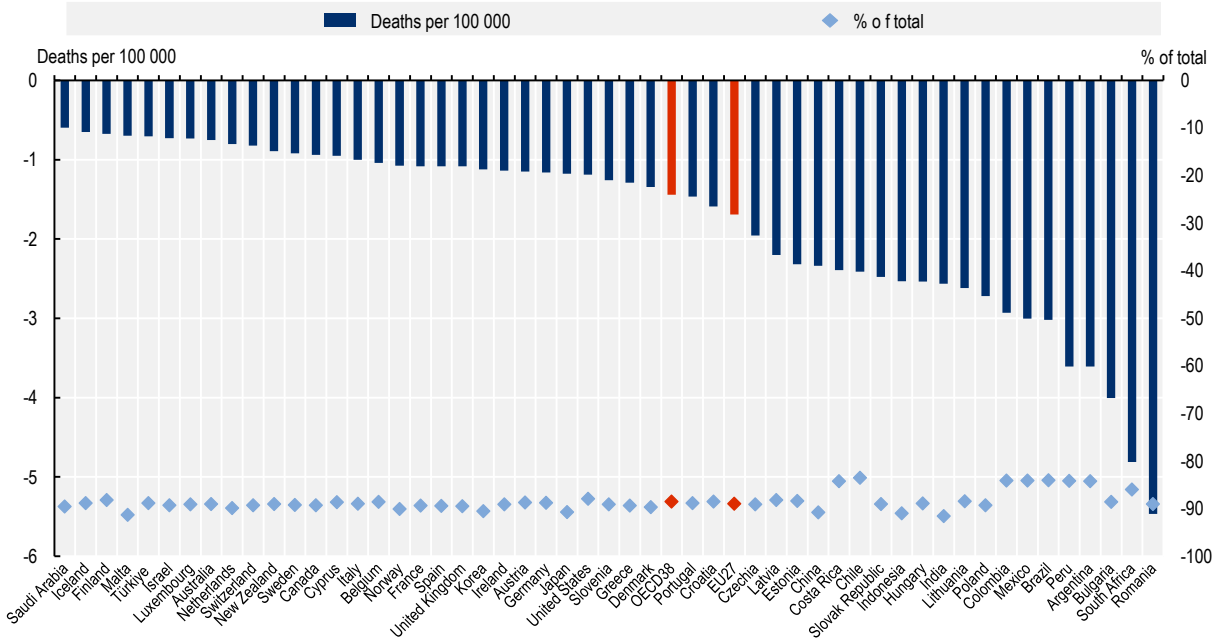
The potential impact of optimal HPV vaccination

Optimally implemented vaccination schemes, where a high coverage rate provides enough herd immunity to eliminate all infections by the targeted HPV types, could prevent between 84% and 92% of all cervical cancer cases from occurring (Bonjour et al., 2021[29]) (for more information on the methodology, which is based on the ATLAS model from the International Agency for Research on Cancer (IARC), see 0). While this is only one type of cancer, affecting only females, the high efficacy of this intervention means that the impacts[1] are substantial.

By preventing cervical cancer cases, HPV vaccination could prevent 113 000 premature deaths per year across the 51 countries, of which nearly 20 000 in OECD countries and over 6 000 in the EU. This is 89% of all premature mortality due to cervical cancer. Per 100 000 population, the impact on premature mortality would be greatest in Central and Eastern European and Latin American countries (Figure 6.4). These countries have a relatively high baseline incidence of cervical cancer, and the impact of vaccination would therefore be considerable.

Figure 6.4. Central and Eastern European and Latin American countries see the greatest impact of vaccination on premature mortality

Impact of HPV vaccination on premature mortality (deaths in people aged under 75) due to cervical cancer, per 100 000 population and as a percentage of total premature mortality due to cervical cancer, per year, average over 2023-50*



Note: *Estimates cover the period 2023-50, but they assume optimal coverage and protection from cervical cancer from the beginning. In other words, they reflect the maximum potential impact of HPV vaccination, and not a scenario where optimal vaccine uptake is achieved over time, and where the protective effect against cervical cancer is observed down the line. For more information on the methodology, see 0.
Source: OECD SPHeP NCDs model, 2024, using inputs from the ATLAS model by Bonjour, M. et al. (2021[29]), "Global estimates of expected and preventable cervical cancers among girls born between 2005 and 2014: a birth cohort analysis", https://doi.org/10.1016/S2468-2667(21)00046-3.

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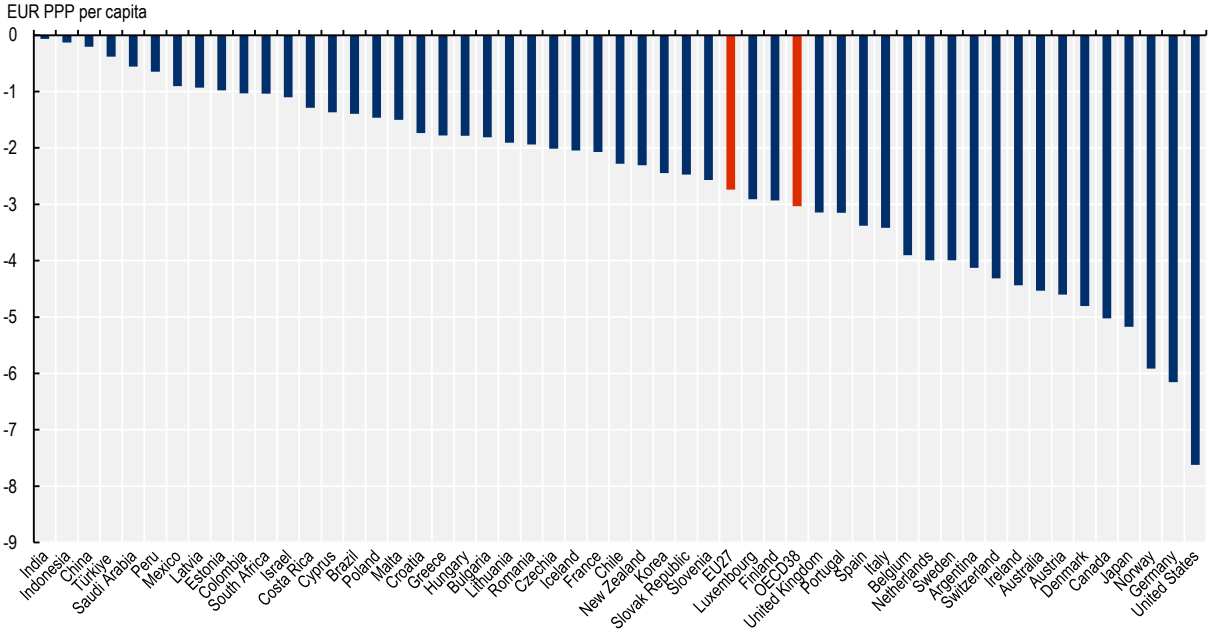
A total of EUR PPP 6.9 billion could be saved yearly in terms of cancer treatment cost if HPV vaccination was optimally implemented across the 51 countries, with EUR PPP 5.8 billion in OECD countries and EUR PPP 1.5 billion in the EU (not including cost associated with the vaccination programme). This equates to 1.3% of the total burden on cancer on health expenditure in the OECD (1.6% in the EU). Countries with higher health expenditure also see greater per capita savings from HPV vaccination (Figure 6.5).

Figure 6.5. HPV vaccination could decrease cancer healthcare expenditure by EUR PPP 3 per capita

The impact of HPV vaccination on cancer-specific health expenditure, in EUR PPP per capita, per year, average over 2023-50*



Note: *Estimates cover the period 2023-50, but they assume optimal coverage and protection from cervical cancer from the beginning. In other words, they reflect the maximum potential impact of HPV vaccination, and not a scenario where optimal vaccine uptake is achieved over time, and where the protective effect against cervical cancer is observed down the line. For more information on the methodology, see 0.
Source: OECD SPHeP NCDs model, 2024, using inputs from the ATLAS model by Bonjour, M. et al. (2021[29]), "Global estimates of expected and preventable cervical cancers among girls born between 2005 and 2014: a birth cohort analysis", https://doi.org/10.1016/S2468-2667(21)00046-3.

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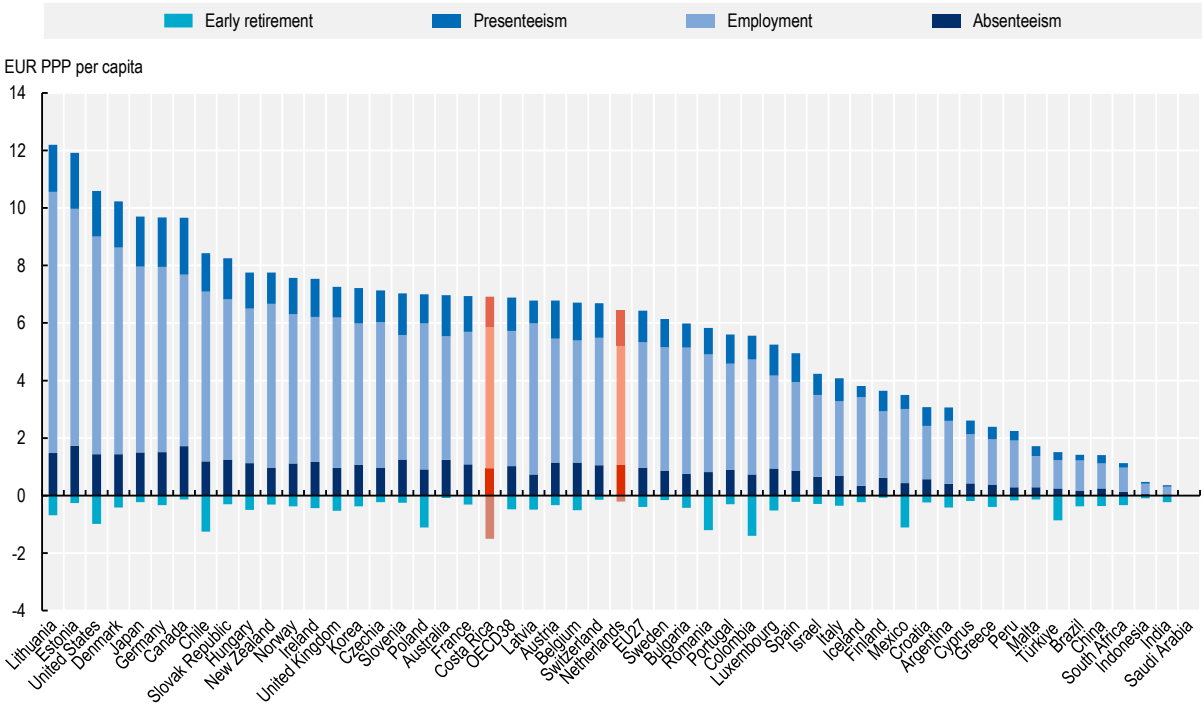
In Europe, North America and Oceania, approximately 70% of all cervical cancer cases will occur before 60 years of age (in the absence of vaccination) (Bonjour et al., 2021[29]). This constitutes a significant burden on the working age population, and thus on workforce productivity and participation. Optimal implementation of HPV vaccination could add the equivalent of 120 000 full-time workers to the OECD workforce, and 40 000 to the EU. In monetary terms, this equates to an output of EUR PPP 5.7 billion per year in the OECD, roughly equivalent to the monthly GDP of Latvia (EUR PPP 1.6 billion in the EU).

Workforce output increases by EUR PPP 6.4 per person of working age per year in the OECD on average (Figure 6.6). Countries with high average wages see greater impacts, as do countries with high baseline cervical cancer incidence. As cancer is more likely to affect older people, it reduces the number of people at early retirement age. Consequently, reducing cervical cancer actually increases the rate of early retirement.

Figure 6.6. HPV vaccination can increase the workforce output by EUR PPP 6 per person

The impact of HPV vaccination on the workforce through absenteeism, early retirement, employment (combining unemployment and part-time work) and presenteeism, in EUR PPP per capita (working age), per year, average over 2023-50*



Note: Reducing cervical cancer increases the rate of early retirement as more people are alive towards the end of their working life, at which point they may retire early. *Estimates cover the period 2023-50, but they assume optimal coverage and protection from cervical cancer from the beginning. In other words, they reflect the maximum potential impact of HPV vaccination, and not a scenario where optimal vaccine uptake is achieved over time, and where the protective effect against cervical cancer is observed down the line. For more information on the methodology, see 0.

Source: OECD SPHeP NCDs model, 2024, using inputs from the ATLAS model by Bonjour, M. et al. (2021[29]), "Global estimates of expected and preventable cervical cancers among girls born between 2005 and 2014: a birth cohort analysis", https://doi.org/10.1016/S2468-2667(21)00046-3.

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Policy options to increase HPV vaccination coverage

In many countries, there remains significant scope to improve the coverage rate of HPV vaccination and reap the full benefits in terms of population health, healthcare expenditure and workforce productivity. To increase uptake and coverage, countries can consider the implementation of a single-dose scheme based, after having evaluated benefits and challenges, consider catch-up vaccination campaigns if and where needed, and evaluate and address misinformation.

Evaluate the benefits and challenges of adopting a single-dose scheme and consider its implementation based on the national circumstances

When HPV vaccines were first introduced, they were licensed under a three-dose vaccination schedule (WHO, 2022[1]). Subsequently a two-dose schedule was approved based on positive effectiveness data. Currently, almost all OECD and EU countries have a two-dose schedule (WHO, 2024[5]).

A recent position paper by the WHO however found that a single dose of HPV vaccine is sufficient to elicit an immune response that provides similar protection as a multidose regimen against initial and persistent HPV infection (WHO, 2022[1]). WHO now advises that countries choose between a one- or two-dose schedule for girls aged 9-14 years (excluding immunocompromised or HIV-infected people).

A single-dose scheme can provide various benefits over two-dose schemes, which can help both the provision and uptake of HPV vaccination (IARC, 2023[30]):

- The HPV vaccine is one of the most expensive vaccines to be introduced in national immunisation programmes. Moving to a single-dose scheme would automatically cut the variable cost in half.
- A single-dose scheme would also simplify the logistics of the vaccination scheme, saving cost and facilitating expansion.
- A single dose may be more acceptable to the population, increasing uptake.
- With the three or two doses previously used on girls alone, boys and girls could be vaccinated, increasing the herd effect and improving programme resilience.

As with any immunisation programme, modifying the vaccination schedule may pose some practical challenges that need to be assessed and addressed before moving forward with the implementation of the new scheme. For example, healthcare providers may need to be trained in the new schedule to ensure that they administer the vaccines correctly and are able to address any concerns that patients may have. Additional public awareness and acceptance activities may also be needed to further reduce public confusion and hesitation.

Based on the change in WHO recommendation, Australia, Ireland, England and Scotland switched from a double to a single dose HPV vaccine schedule (Department of Health and Aged Care, 2023[31]) (Public Health Agency, 2023[32]) (UK Health Security Agency, 2023[33]). In Estonia, the move to a single dose in 2024 was combined with an expansion of the HPV vaccination scheme to boys and free catch-up vaccination (see next section), with the aim of significantly increasing the coverage of young people (Ministry of Social Affairs, 2023[34])

Consider catch-up vaccination if and where needed

Catch-up vaccination targets individuals who, for whatever reason, have not received doses of vaccines for which they are eligible. Due to larger direct protection and stronger herd effects, catch-up immunisation targeting people between 9 and 18 years can result in faster and larger population impact than vaccinating single age-cohorts (SAGE, 2017[35]). Catch-up vaccination also offers opportunities for economies of scale in delivery. Finally, it can make programmes more resilient to any interruptions in vaccination, as it provides a system to administer missed doses later (WHO, 2022[1]).

In many OECD countries catch-up vaccinations are already part of the standard vaccination programme. For example, in Australia anyone aged 12 to 25 who missed out on the main school-based HPV vaccination programme can receive a catch-up vaccination for free at the doctors, pharmacy or local immunisation clinic (Cancer Council, 2023[36]). Catch-up vaccinations can also be organised as a one-off campaign to compensate for interruptions. After an eight-year suspension of the HPV vaccination programme, in 2022 Japan started a three-year catch-up campaign to vaccinate females aged 17-25 who missed out due to the suspension (University of Tokyo Health Services Center, 2023[37]) (Sekine et al., 2022[38]).

Address misinformation with informed and authoritative multimedia campaigns

Misinformation is a powerful threat to vaccination campaigns, including for HPV. In Demark, social media, news reports and a documentary about adverse reactions to the HPV vaccine between 2013 and 2015 lead to a dramatic fall in vaccination rates (Bigaard and Franceschi, 2021[39]). These reports were later investigated by the European Medicines Agency which did not support a causal link between the suspected

adverse reactions and the HPV vaccination (Agergaard et al., 2023[40]). In Ireland, HPV vaccination rates decreased sharply following social media campaigns from lobby groups established by parents in 2015 about vaccine safety (Corcoran, Clarke and Barrett, 2018[41]). Other OECD countries such as France, Romania, Japan and Colombia have also experienced mistrust against the HPV vaccine (Bigaard and Franceschi, 2021[39]; Karafillakis et al., 2019[42]; Larson, 2020[43]; Simas et al., 2019[44]).

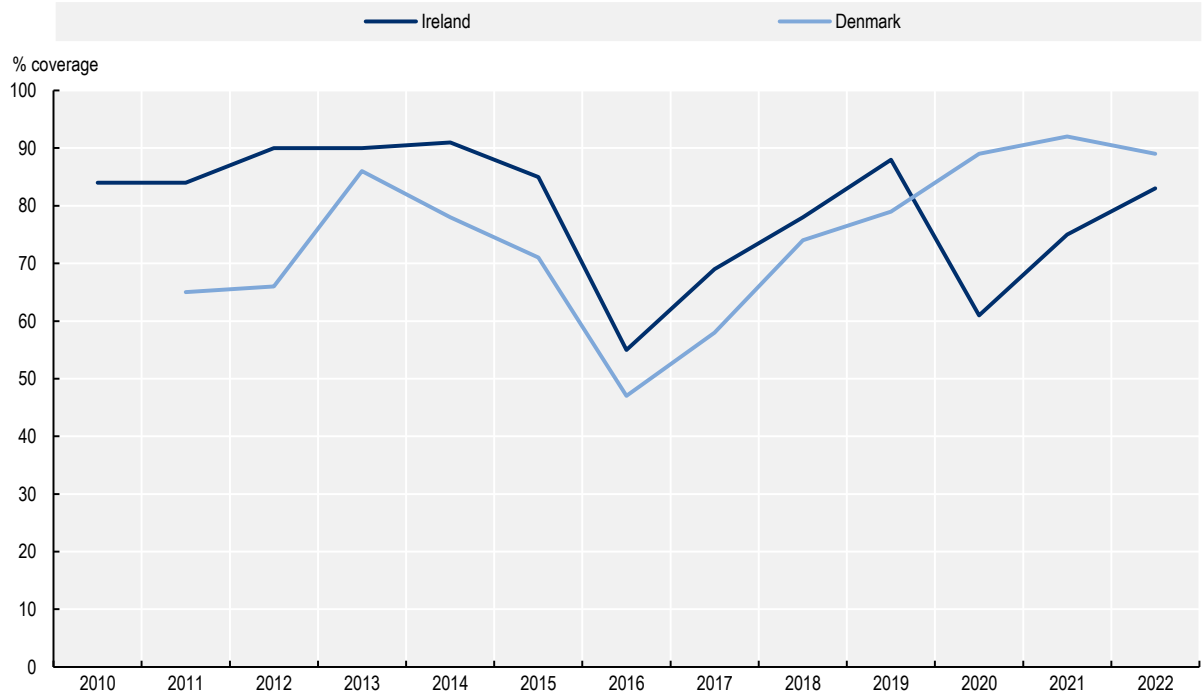
Both Ireland and Denmark implemented targeted multisectoral interventions to restore trust and increase uptake. These strategies had several elements in common:

- **Understanding parental attitudes and concerns**: In Denmark, analysis showed that mothers often decided about vaccination. Focus groups were therefore organised with mothers to gather insights into the barriers to HPV vaccination, which included a lack of clear information about the vaccine from health authorities and other trusted organisations (Bigaard and Franceschi, 2021[39]). Ireland also held focus groups on parental attitudes to HPV vaccination (Corcoran, Clarke and Barrett, 2018[41]).
- **Monitoring and use of social media:** Public health authorities need to monitor and be present on social media channels, to identify and respond to misinformation around vaccines (European Centre for Disease Prevention and Control, 2021[45]). Both the Danish and Irish approached included a strong presence on social media, informed by analysis (Corcoran, Clarke and Barrett, 2018[41]) (Bigaard and Franceschi, 2021[39]). In Denmark, specific social media channels were used to reach target audiences, with mothers more likely to use Facebook for information, while teenage girls interacted more on Instagram. However, substantial manpower was needed to answer questions and to prevent misinformation from dominating the digital channel. Students were employed for daily monitoring and prompt responses, supervised by experienced campaign staff (Bigaard and Franceschi, 2021[39]).
- **Wide and authoritative support of HPV vaccination**: In Denmark, multiple actors, including professional doctor and nurse organisations, sexual health organisations, and patient organisations were involved in backing up the campaign (Bigaard and Franceschi, 2021[39]). Ireland launched the HPV Vaccination Alliance, a group of over 35 different organisations working in the areas of health, women's rights, child welfare, and wider civil society committed to raising awareness of HPV vaccination, which supported the media campaign (Corcoran, Clarke and Barrett, 2018[41]).

The campaigns to address misinformation around HPV vaccination seem to have been successful. After both countries saw coverage reach a low in 2016, of 55% in Ireland and 47% in Denmark, uptake increased in the following years to reach 83% in Ireland and 89% in Denmark by 2022 (though Ireland saw a temporary drop in coverage in 2020, when its school-based HPV campaign was disrupted by COVID-19-related school closures and redeployment of school vaccination teams (Health Service Executive, 2021[46])) (Figure 6.7).

Figure 6.7. Interventions to address misinformation in Denmark and Ireland managed to restore HPV vaccination coverage

HPV vaccination programme coverage, first dose, females, over time in Ireland and Denmark



Note: Ireland saw a temporary drop in coverage in 2020, when its school-based HPV campaign was disrupted by COVID-19-related school closures and redeployment of school vaccination teams.
Source: WHO (2024[5]), WHO Immunization Data.

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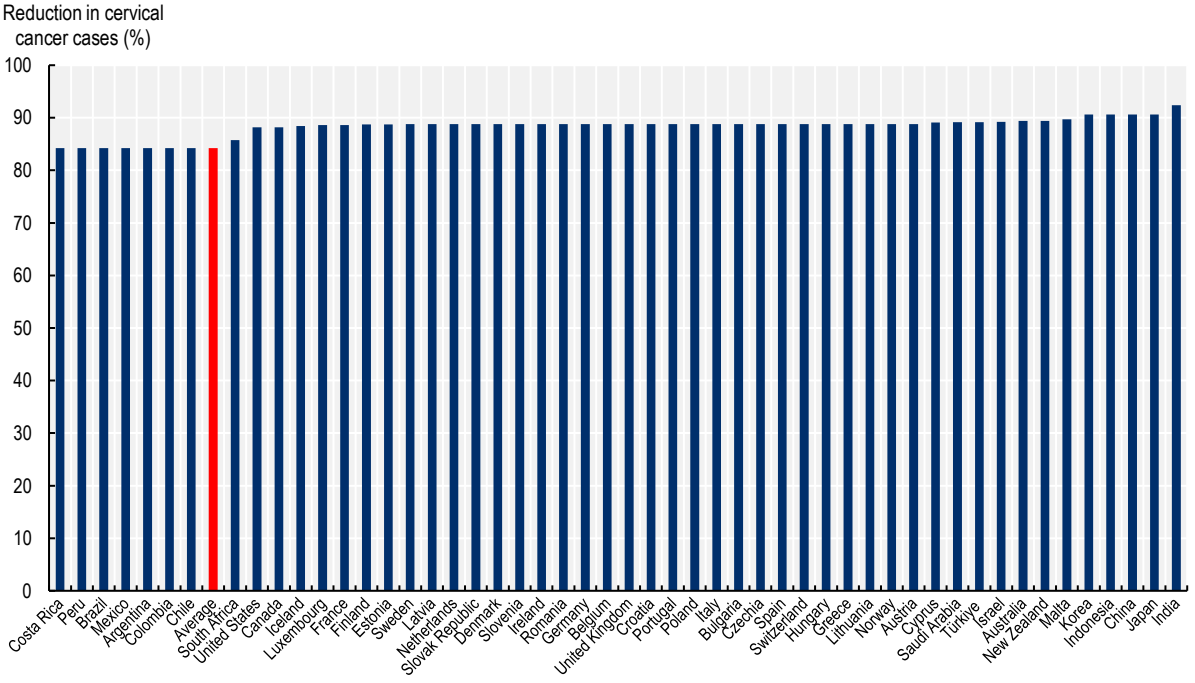
Annex 6.A. Methodology to model HPV vaccination

To model the impact of HPV vaccination on cervical cancer incidence, the ATLAS model from the International Agency for Research on Cancer (IARC) was used (Bonjour et al., 2021[29]). This model uses age-specific incidence rates from GLOBOCAN 2018 and cohort-specific mortality rates by age from UN demographic projections to establish a baseline of expected cervical cancer cases in the absence of vaccination. It estimates the number of vaccine-preventable cancers using the country-specific relative contribution of each HPV type to cervical cancer incidence, and an assumed effectiveness of the vaccination programme in reducing the prevalence of these HPV types. This latter variable combines various factors that affect the effectiveness of vaccination programmes, such as the immunisation schedule and coverage, the targeted sex and age groups, and population-specific sexual behaviour.

Data from the IARC model was used to model the burden of vaccine-preventable cervical cancer in the OECD SPHeP-NCDs model. The burden scenario is based on a vaccine that targets all possible HPV types (16, 18, 31, 33, 45, 52, and 58), and is 100% effective in eliminating them. In this scenario countries see on average an 88% decrease in cervical cancer cases (Annex Figure 6.A.1). This reduction in incidence was applied evenly across age bands, and instantaneously. This hypothetical scenario reflects the total potential impact, and does not consider the time it takes to see the impact of vaccinating young people on future cancer burden and mortality.

Annex Figure 6.A.1. Vaccine-preventable cervical cancer cases

Percentage of all cervical cancer cases prevented



Source: Bonjour, M. et al. (2021[29]), "Global estimates of expected and preventable cervical cancers among girls born between 2005 and 2014: a birth cohort analysis", https://doi.org/10.1016/S2468-2667(21)00046-3.

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Notes

[1] Note that these results are comparing a no-vaccine scenario to a scenario where vaccination has been fully successful in eliminating the targeted HPV types and its full impact has been reached. In reality, due to the lags between vaccination, sexual activity, infection and cancer development, the maximum impact of the intervention may take several decades to be reached.

7 Special focus: Aligning cancer prevention and care to the best in Europe

This special focus chapter shows the potential impact of aligning cancer prevention and care across the 27 European Union Member states, Iceland and Norway (EU27+2). The OECD Strategic Public Health Planning (SPHeP) for Non-Communicable Diseases (NCDs) model was used to model the impact of achieving the best risk factor prevalence rates, as well as the best cancer survival rates, observed across the EU27+2. It shows the impact on population health, healthcare expenditure and labour market output.

In Brief

Aligning cancer risk factors and survival rates to the best performer in the EU27+2 can each prevent one in five premature cancer deaths

- Aligning the risk factor prevalence of all 27 EU Member States (MS), plus Norway and Iceland (EU27+2), to that of the best performing country would prevent around 14% of all cancer cases, avert 19% of premature deaths due to cancer, and save 19% of healthcare expenditure on cancer.
- The impact of aligning dietary intake across the EU27+2 has the greatest impact on cancer cases and healthcare expenditure, while aligning tobacco smoking rates has the greatest impact on premature mortality.
- One in five premature cancer deaths could be prevented by aligning European survival rates to the best performer, increasing the average life expectancy by 5 months, and increase the workforce output by EUR PPP 2.1 billion in the EU27+2.
- However, even if there is no additional expenditure associated with the improved treatment outcomes, healthcare cost will go up as more people survive. Improved survival rates would increase per capita health expenditure by EUR PPP 29 per year on average in the EU27+2. This is a 1.0% increase in overall health expenditure or a total of EUR PPP 13 billion – equivalent to the total annual health budget of the Slovak Republic and Slovenia combined.

This Special Focus chapter explores the potential impact of aligning cancer risk factor prevalence rates and cancer survival rates to the best rates observed across the 27 European Union (EU) Member States (MS), plus Norway and Iceland (EU27+2), for each age and sex group. Rather than predetermined international policy targets, which may or may not be achievable, this approach shows what some countries have achieved and could therefore be a realistic goal for others.

Aligning risk factors to the best rates in the EU27+2 can avert 21% of premature deaths due to cancer

Achieving the best risk factor rates observed across age and sex groups in the EU27+2 (or across urban, commuting and rural areas for air pollution) has an impact on the average risk factor prevalence in all countries (Table 7.1). This is because no country has the best rates across all age and sex groups (or across urban/commuting/rural areas), leaving room for improvement in all countries. On average, achieving the best risk factor rates in the EU27+2 would reduce obesity prevalence by 4.6 percentage points, tobacco smoking by 12.2 percentage points, average alcohol consumption by 43%, reduce the prevalence of physical inactivity by 15.9 percentage points and PM2.5 air pollution levels by 45%.

Table 7.1. Impact of aligning risk factor rates to the best in the EU27+2

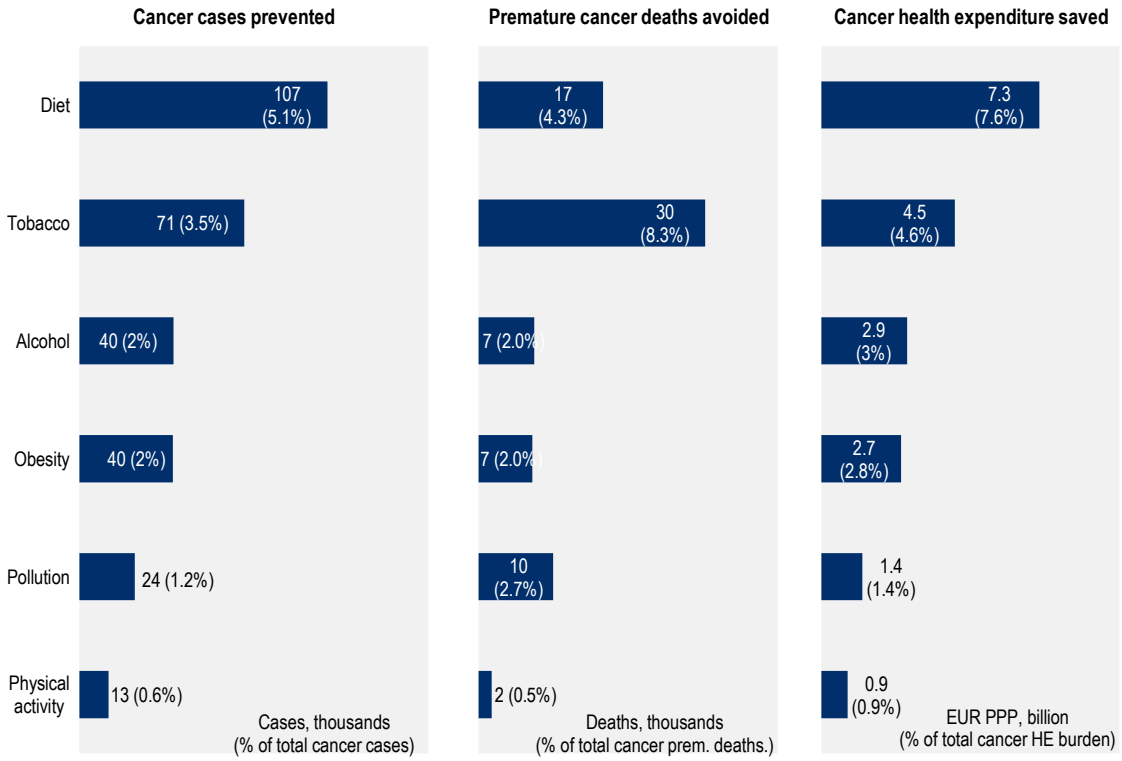
	Obesity	Tobacco smoking	Alcohol use	Physical inactivity	Air pollution
	Percentage point reduction in prevalence	Percentage point reduction in prevalence	Percentage reduction in daily consumption	Percentage point reduction in prevalence	Percentage reduction in PM2.5 levels
Austria	1.6	15.3	38%	16.2	53%
Belgium	4.2	8.1	33%	24.3	51%
Bulgaria	3.2	18.4	45%	5.2	67%
Cyprus	5.8	18.7	25%	30.1	61%
Czechia	6.4	11.5	41%	12.6	59%
Germany	4.4	11.1	40%	13.8	48%
Denmark	1.1	8.5	48%	12.2	42%
Spain	7.4	11.9	48%	22.2	44%
Estonia	3.2	10.3	53%	2.1	2%
Finland	3.5	5.3	50%	12.9	7%
France	4.1	16.2	34%	25.6	50%
Greece	5.7	20.8	44%	16.1	62%
Croatia	2.8	18.9	45%	8.7	59%
Hungary	4.5	14.4	48%	4.7	61%
Iceland	7.8	9.4	40%	27.4	0%
Ireland	7.8	9.4	40%	27.4	28%
Italy	4.9	9.9	11%	24.9	61%
Lithuania	7.8	13.5	61%	15.7	46%
Luxembourg	4.2	8.6	34%	15.0	29%
Latvia	5.3	18.8	47%	9.1	61%
Malta	9.8	9.4	25%	38.5	52%
Netherlands	1.1	8.0	25%	6.0	44%
Norway	6.2	14.2	57%	7.2	19%
Poland	6.2	14.2	57%	7.2	70%
Portugal	2.0	11.0	61%	27.7	24%
Romania	2.9	14.7	57%	17.9	61%
Slovak Republic	3.8	11.4	52%	8.5	62%
Slovenia	3.0	10.1	52%	3.0	61%
Sweden	2.1	2.5	35%	19.0	14%
EU27+2 average	4.6	12.2	43%	15.9	45%

Note: A 6 percentage point decrease in obesity prevalence is equivalent to 6% less of the population having obesity (e.g. going from 36% to 30% of the population having obesity). The numbers here reflect population averages – but the impact of these risk factors on cancer is also influenced by their distribution across the population, as well as other patterns or exposure (e.g. binge drinking, urban/rural). The impact of diet is not shown as it includes many different elements.

Aligning the risk factor prevalence in all EU27+2 countries to the best performing country would prevent around 14% of all cancer cases, avert around 19% of premature deaths due to cancer, and save around 19% of healthcare expenditure on cancer (Figure 7.1). While diet has most impact on cancer cases and healthcare expenditure, the strong link between tobacco and lung cancer (Figure 7.2), combined with the high case fatality rate of lung cancer, mean that tobacco has the greatest impact on premature mortality. Overall, aligning cancer risk factors to the best rates observed across the EU27+2 primarily prevents colorectal and lung cancer cases.

Figure 7.1. Impact of achieving the best risk factor prevalence in the EU27+2 on cancer cases, mortality and health spending

Cancer cases prevented (thousands and as a percentage of total), premature cancer deaths avoided (thousands and as a percentage of total), and cancer health expenditure saved (EUR PPP billions and as a percentage of total burden of cancer on health expenditure) if the best risk factor prevalence in the EU27+2 was achieved in all countries, total for the EU27+2 countries combined, per year, average over 2023-50



Source: OECD SPHeP NCDs model, 2024.

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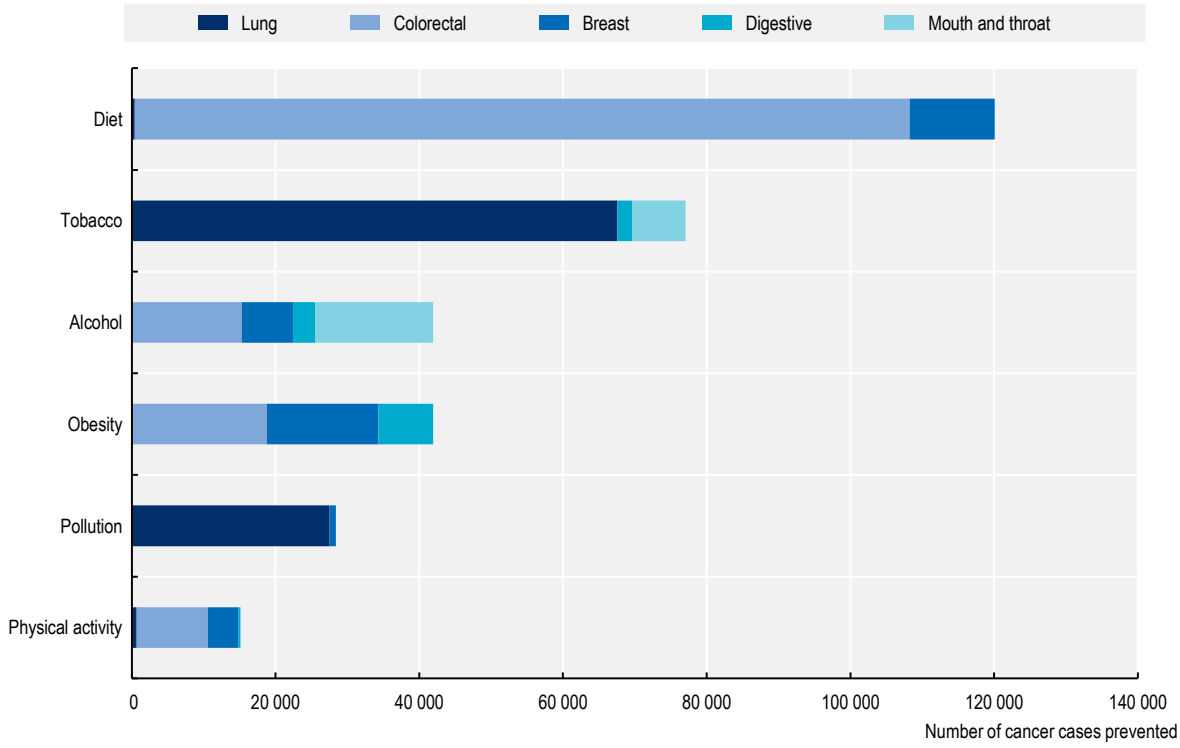
Figure 7.2. Aligning cancer risk factors to EU27+2 best practice primarily prevents colorectal and lung cancer cases

Cancer cases prevented by cancer type if policy targets on key cancer risk factors were achieved, total for the EU27+2 countries combined, per year, average over 2023-50



Note: Graph only shows the number of cancer cases prevented, and not the small increase in other types of cancers as people live longer and are more likely to get other cancers. The total number shown here is therefore higher than the absolute impact on cancer cases presented above. Digestive includes liver, oesophageal, pancreatic, and stomach cancer; head and neck includes lip and oral cavity, larynx, other pharynx, and nasopharynx cancer; and other includes prostate, cervical cancer and malignant skin melanoma.
Source: OECD SPHeP NCDs model, 2024.

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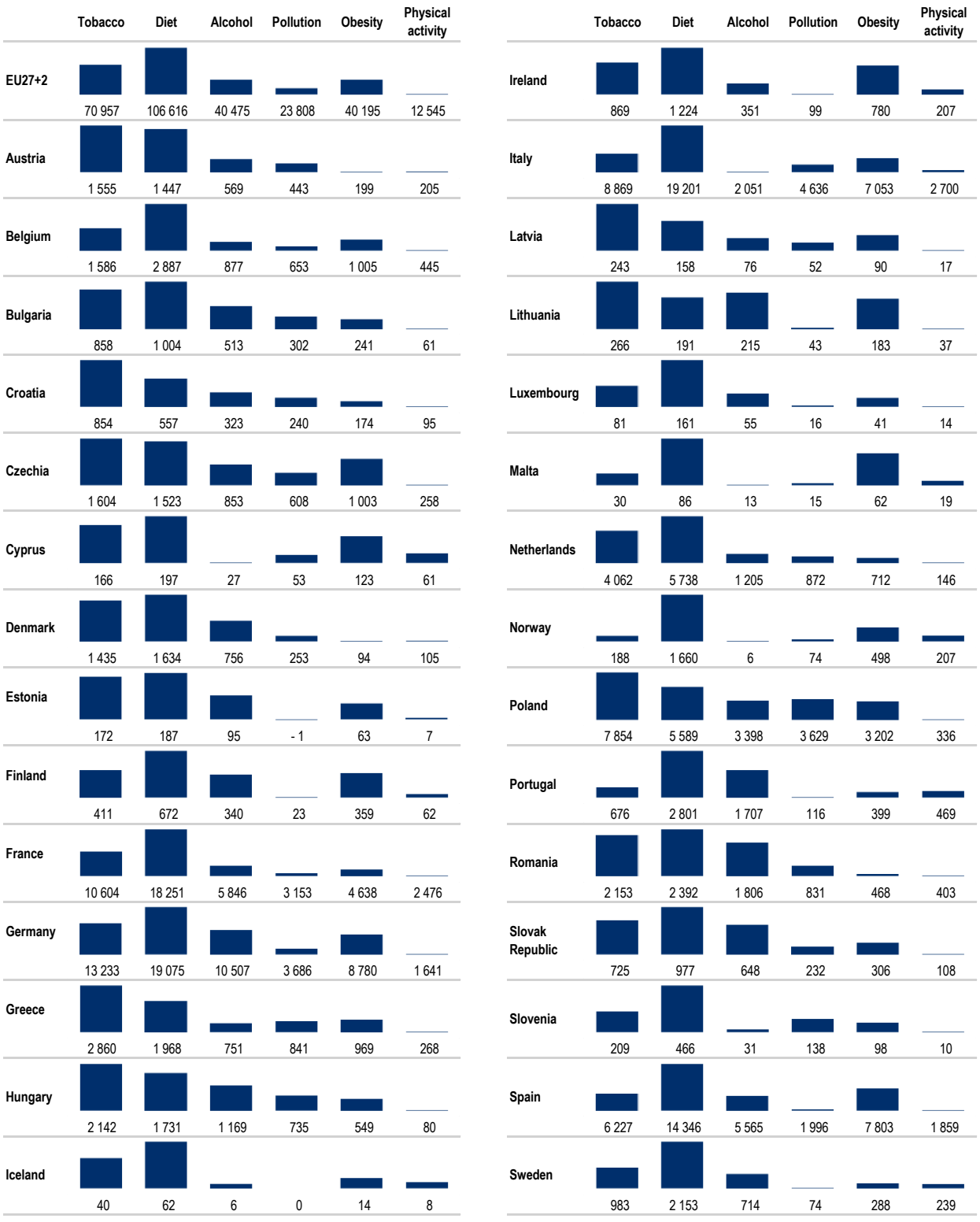
Looking at country-specific results, in most countries diet and tobacco are the two risk factors where most impact can be achieved. When it comes to preventing cancer cases (Figure 7.3) and reducing healthcare expenditure on cancer (Figure 7.5), countries with high smoking rates (e.g. Bulgaria, Croatia, Greece, Latvia) see the greatest impact from addressing tobacco, while in other countries diet has a greater impact. However, in almost all countries reducing tobacco smoking has the greatest impact on premature mortality (Figure 7.4).

Figure 7.3. Impact of achieving the best risk factor prevalence in the EU27+2 on the number of cancer cases per year (average 2023-50)



Source: OECD SPHeP NCDs model, 2024.

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Figure 7.4. Impact of achieving the best risk factor prevalence in the EU27+2 on number of premature deaths due to cancer per year (average 2023-50)

Source: OECD SPHeP NCDs model, 2024.

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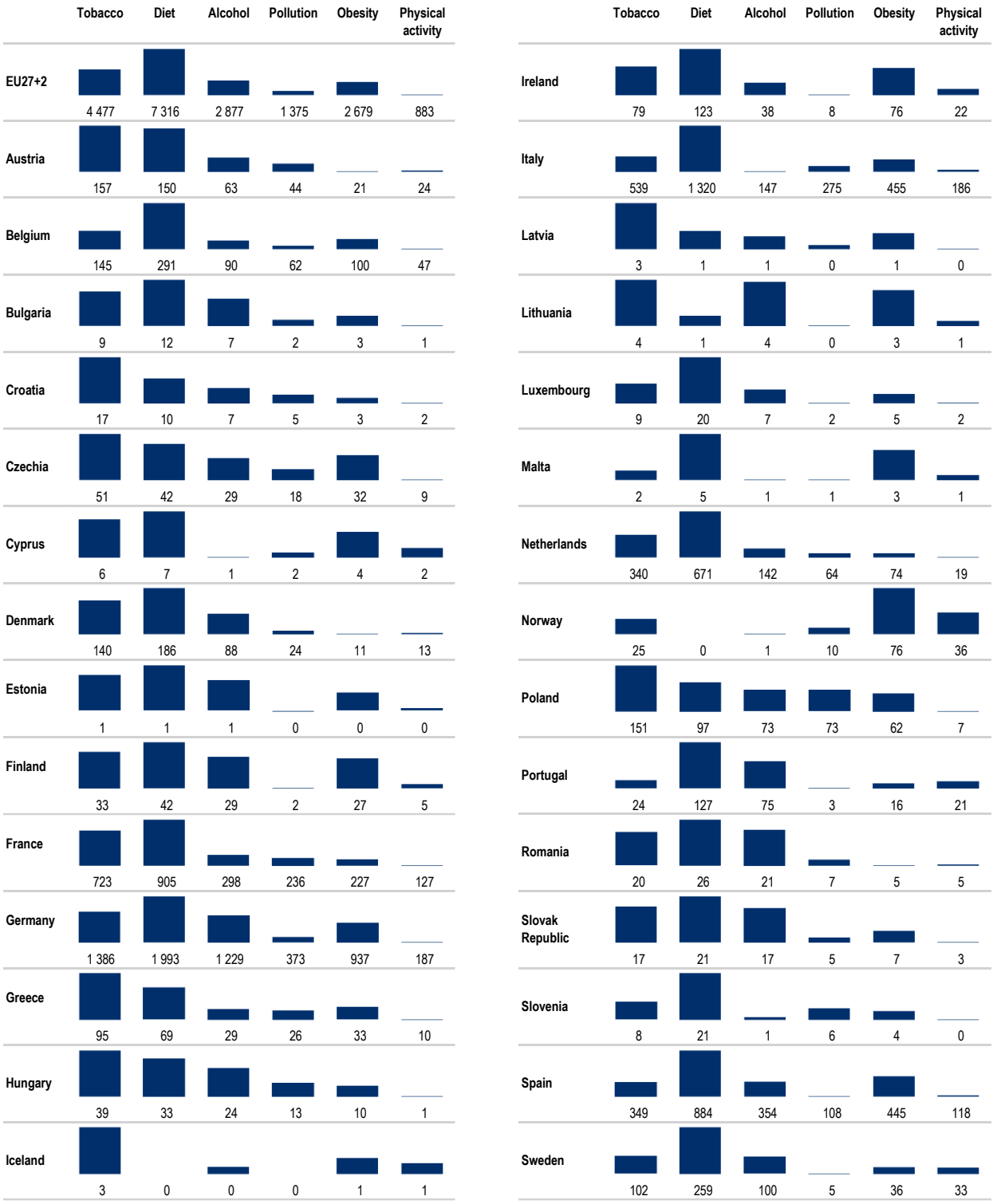
Figure 7.5. Impact of achieving the best risk factor prevalence in the EU27+2 on health expenditure on cancer per year in EUR PPP millions (average 2023-50)



Source: OECD SPHeP NCDs model, 2024.

StatLink https://stat.link/lrwbcg

Aligning cancer survival rates to the highest rates in the EU27+2 can prevent 21% of premature cancer deaths

To understand the potential impact of improving cancer screening, diagnosis, and treatment, it is useful to look at the cancer survival rates achieved by other countries. Similar to the scenario presented in Chapter 4, where cancer survival rates were aligned to the best performer across the OECD and EU, here cancer survival rates (by age, sex and cancer type) were aligned to the best performer in the EU27+2 alone. Note that this scenario does not assume any change in risk factors, and thus no change in cancer incidence other than through demographic changes.

All countries in the EU27+2 can make improvements to their cancer survival rates (Table 7.2). This is because no country has the best survival rates across all cancer types, sex and age groups. On average across the EU27+2, cancer survival rates would improve by 12.2 percentage points if all countries achieved the best rates seen in Europe. This means that an additional 12.2% of cancer patients would survive their diagnosis.

Table 7.2. Impact of aligning cancer survival rates to the best in the EU27+2

Percentage point improvement in cancer survival rate when aligning to the best in the EU27+2, weighted average across age bands for people aged 55 and older, average across

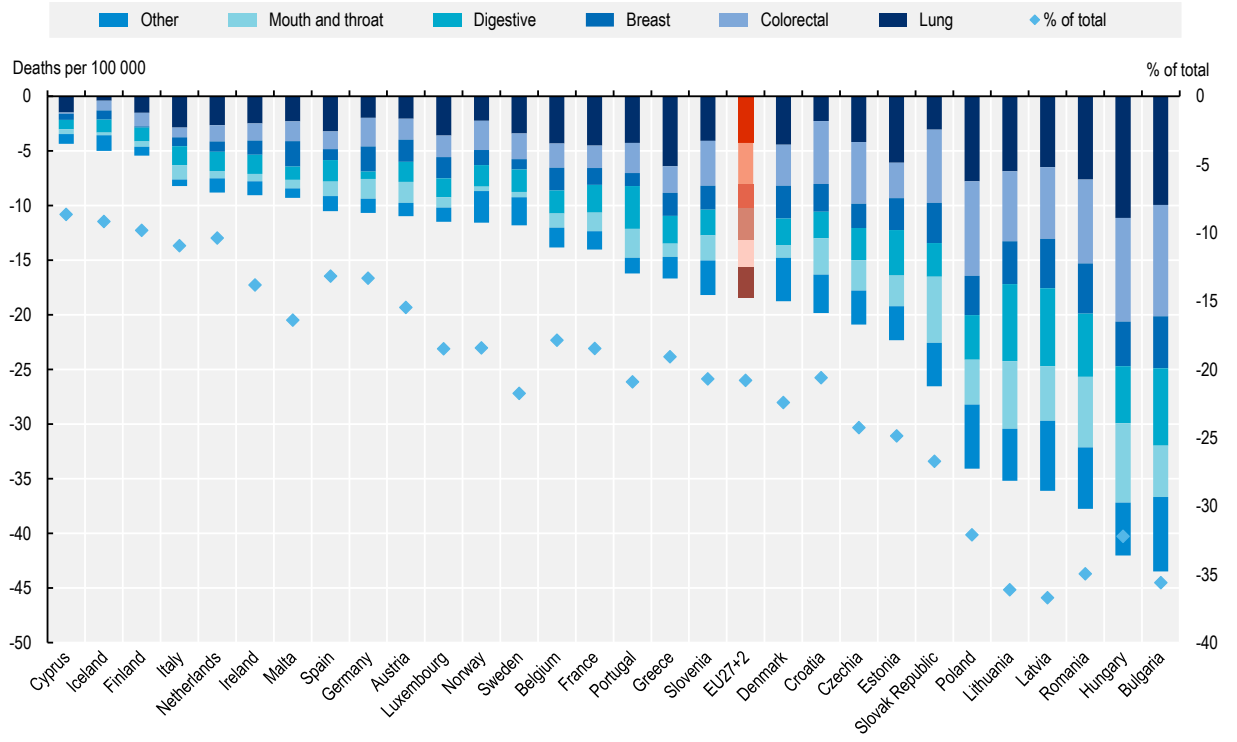
	Percentage point increase in survival rate
Austria	10.2
Belgium	10.5
Bulgaria	21.6
Croatia	11.9
Cyprus	9.2
Czechia	15.1
Denmark	16.3
Estonia	13.0
Finland	3.3
France	10.3
Germany	5.4
Greece	10.7
Hungary	19.5
Iceland	5.5
Ireland	7.9
Italy	5.5
Latvia	21.8
Lithuania	19.6
Luxembourg	11.7
Malta	9.7
Netherlands	6.1
Norway	11.9
Poland	19.2
Portugal	11.0
Romania	21.2
Slovak Republic	12.6
Slovenia	13.4
Spain	6.0
Sweden	14.6
EU27+2 average	12.2

Note: A 6 percentage point increase in survival rate is equivalent to an additional 6% of people surviving their cancer diagnosis (e.g. going from 30% to 36% of people surviving).

It is estimated that, if all countries improved their screening, diagnosis and treatment of cancer, to the point at which they achieved the best possible 5-year survival rates observed in the EU27+2, this would save a total of 70 000 premature deaths – one-fifth (21%) of all premature deaths due to cancer (Figure 7.6). Countries with a high baseline cancer premature mortality rate, including Central and Eastern EU MS, would see the greatest improvement in premature mortality rates as well as in the percentage of deaths prevented.

Figure 7.6. One in five premature cancer deaths could be prevented by aligning EU27+2 survival rates

The impact of achieving the highest cancer survival rates observed across the EU27+2 on premature mortality (deaths in people aged under 75) due to cancer per 100 000 population; and as a percentage of total premature mortality due to cancer; per year, average over 2023-50



Note: Digestive includes liver, oesophageal, pancreatic, and stomach cancer; head and neck includes lip and oral cavity, larynx, other pharynx, and nasopharynx cancer; and other includes prostate, cervical cancer and malignant skin melanoma.
Source: OECD SPHeP NCDs model, 2024.

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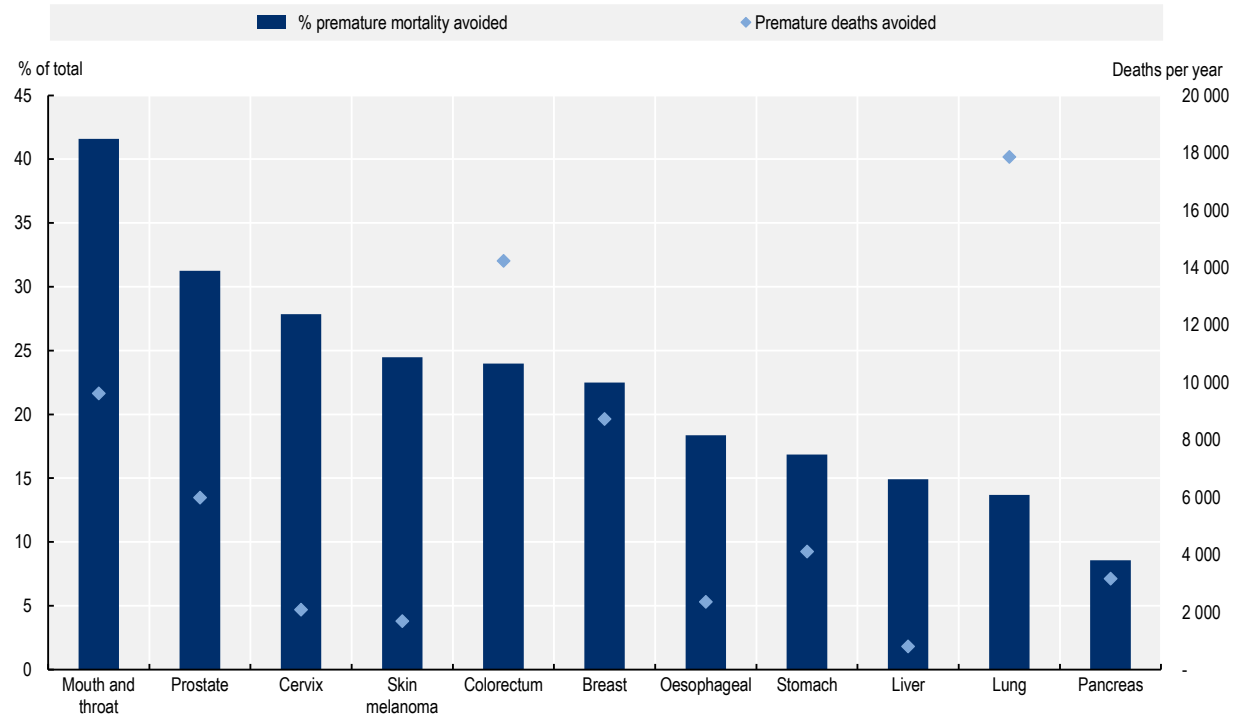
For mouth and throat cancer, around four in ten premature deaths (42%) could be avoided if the highest survival rates were to be attained across the EU27+2 countries (Figure 7.7). Improved survival rates would also prevent nearly one in three premature deaths due to prostate cancer (31%). In absolute terms the impact on lung cancer is the largest, with nearly 18 000 premature deaths avoided every year – 25% of the total impact – followed by more than 14 000 premature deaths due to colorectal cancer.

Figure 7.7. Improved survival rates have the greatest impact on mortality rates from mouth and throat cancer

The impact of improved cancer survival rates on premature mortality (deaths in people aged under 75), as percentage of total premature mortality and number of premature deaths per year, by cancer type, for all EU27+2 countries combined, average over 2023-50



Source: OECD SPHeP NCDs model, 2024.

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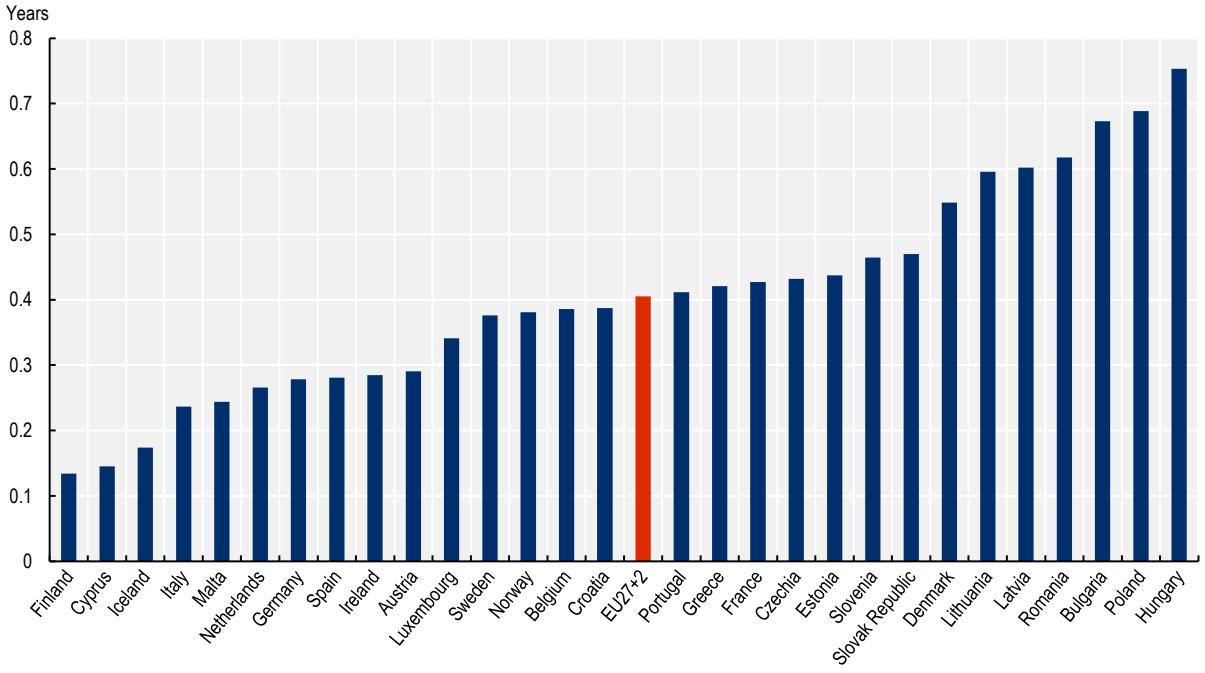
As premature mortality decreases, the average life expectancy is estimated to increase in all countries, and by 5 months in the EU27+2 on average (0.41 years) (Figure 7.8). Central and Eastern MS, who see the greatest improvement in premature mortality rates, also see the greatest impact on life expectancy.

Figure 7.8. The impact of achieving the best 5-year cancer survival rates in the EU27+2 on average population life expectancy

Average over 2023-50



Source: OECD SPHeP NCDs model, 2024.

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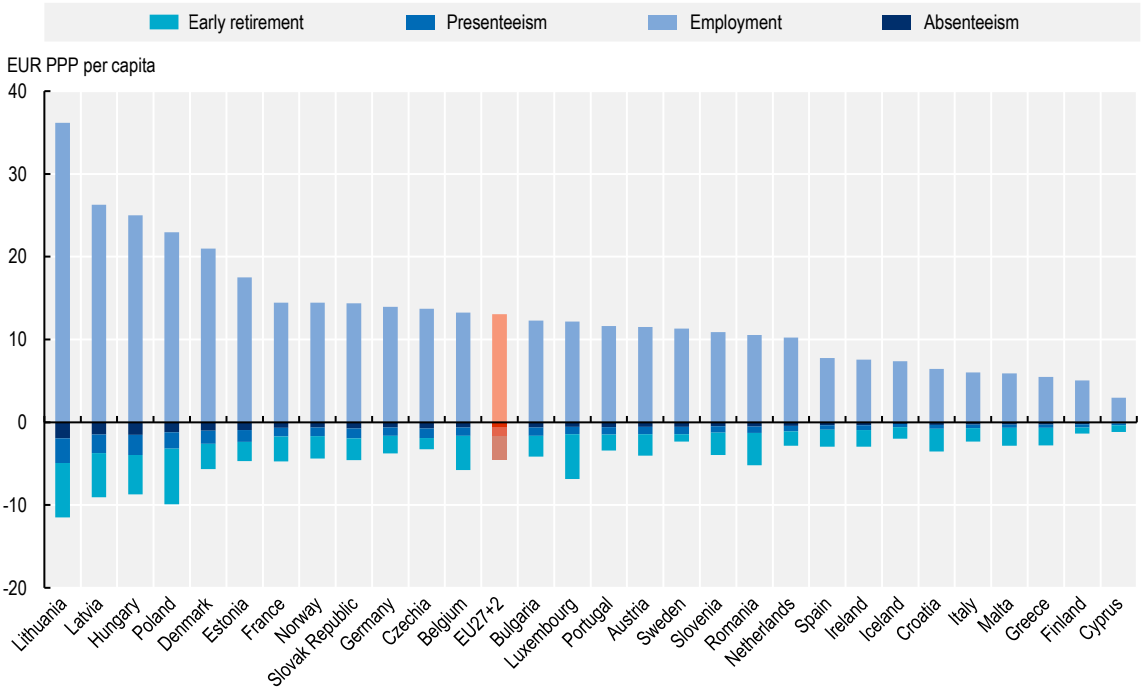
Improved cancer survival would increase the size and output of the workforce. In the EU27+2, it is estimated that the equivalent of 87 000 additional full-time workers would be available due to increased employment. However, improved cancer survival also means that the workforce would include more people living with cancer and older people who are more likely to have other non-communicable diseases (NCDs). As a result, there would be a reduction in workforce output due to increased absenteeism, presenteeism, and early retirement. However, these impacts do not outweigh the increased employment. Based on annual wages, per capita output would increase by EUR PPP 8.5 in the EU27+2 on average – including an increase of EUR PPP 13.0 due to employment (Figure 7.9). In total, improved cancer survival rates would increase the workforce output by EUR PPP 2.2 billion in the EU27+2.

Figure 7.9. The impact of achieving the best 5-year cancer survival rates in the EU27+2 on workforce output

The impact on the workforce through absenteeism, early retirement, employment (combining reductions in unemployment and part-time work) and presenteeism, expressed in EUR PPP per capita (working age) based on the average annual wage per country, average over 2023-50



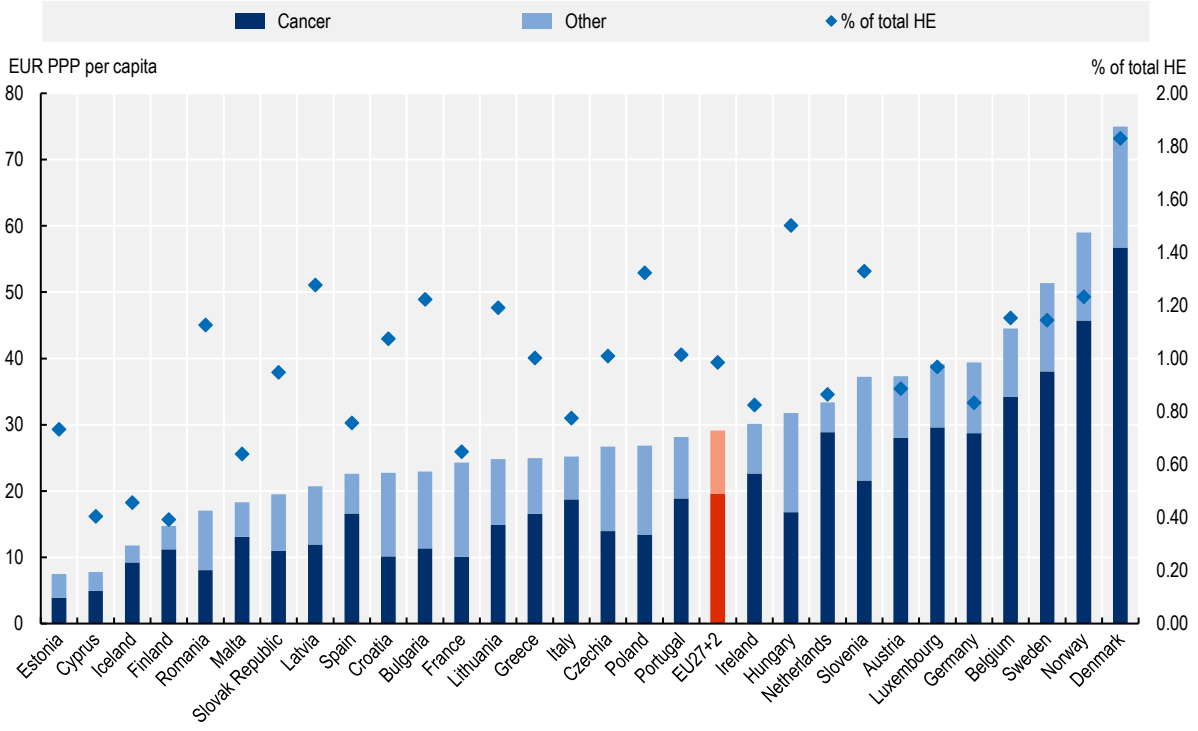
Source: OECD SPHeP NCDs model, 2024.

StatLink https://stat.link/agd5lj

As more people survive their cancer diagnosis, healthcare cost will go up: people will live for longer with cancer, they can get cancer again and they can incur cost for other diseases. If all countries improve cancer care to attain the best possible survival rates observed within the EU27+2, per capita health expenditure will increase by EUR PPP 29.1 per year on average in the EU27+2, even without additional per case costs (Figure 7.10). This includes EUR PPP 19.6 per capita in costs related to cancer treatment, as well as EUR PPP 9.5 for the treatment of other diseases. This is a 1.0% increase in overall health expenditure on average in the EU27+2, or a total of EUR PPP 13 billion – equivalent to the total annual health budget of the Slovak Republic and Slovenia combined.

Figure 7.10. The impact of achieving the best 5-year cancer survival rates in the EU27+2 on health expenditure

The impact of improved survival rates on cancer-specific and other health expenditure, in EUR PPP per capita and as a percentage of total health expenditure, per year, average over 2023-50



Source: OECD SPHeP NCDs model, 2024.

StatLink https://stat.link/eb2c84

OECD Health Policy Studies

Tackling the Impact of Cancer on Health, the Economy and Society

Cancer causes one in four premature deaths in OECD countries. It damages people's quality of life, their ability to work, and their incomes. Cancer increases health expenditure and harms the economy through reduced labour force participation and productivity. The economic and social costs of cancer will grow as populations age and cancer treatment costs increase. This report demonstrates the strong economic and societal case for investing in cancer policies. Microsimulation modelling for 51 countries (including OECD, European Union and G20 countries), shows that stronger action on cancer would yield broad benefits. If all countries did as well as the best performing country in cancer care, a quarter of premature cancer deaths would be prevented. Addressing key cancer risk factors – including tobacco, harmful alcohol use, unhealthy diet, air pollution, overweight and physical inactivity – would lower cancer rates and health expenditure, while also increasing workforce productivity. Co-benefits of such policies include improving road safety and reducing greenhouse gas emissions. Vaccination for human papillomavirus will protect future generations from cervical cancer.

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