This chapter provides an overview of the burden of obesity on population health and the economy. Based on the results of the OECD Strategic Public Health Planning for non-communicable diseases (SPHeP-NCDs) model, it presents the impact of obesity on life expectancy, morbidity and mortality, and on health expenditure in 52 countries – including OECD, EU28 and Group of 20 (G20) member countries. It also explores the impact of obesity on the labour market and the wider economy. Linking to the OECD long-term economic model, the impact of obesity on gross domestic product (GDP) and tax rate is assessed.
Key findings

Overweight will have a significant impact on population health in the next 30 years

- Nearly 60% of all new diabetes cases will be due to overweight, as well as 18%, 11% and 8% of all cases of cardiovascular disease, dementia and cancers, respectively.
- In the 52 countries in this analysis, there will be about 3 million premature deaths (between the age of 30 and 70) per year due to overweight.
- This is reflected in life expectancy: overweight and its related conditions will reduce life expectancy by 2.7 years on average in OECD countries. Obesity has the greatest impact in Mexico and Poland, where it reduces life expectancy by 4.2 years and 3.9 years, respectively.

This impact of overweight on population health translates into an increase in health expenditure

- OECD countries will spend on average USD PPP 209 per capita annually on treating high body mass index (BMI) and its related conditions. The United States, Germany and the Netherlands will spend the most on obesity, at USD PPP 645, USD PPP 411 and USD PPP 352 per capita, respectively.
- About USD PPP 311 billion will be spent every year by OECD countries to treat diseases caused by overweight. In total, overweight will cost the 52 countries USD PPP 425 billion per year.
- For OECD countries, this equates to 8.4% of total health spending – although this is highly variable across countries. While the United States will spend nearly 14% of its health budget on obesity and overweight, Estonia will spend less than 5%.
- This cost burden is mainly driven by treatment costs for diabetes, cardiovascular diseases (CVDs), dementia and cancer, with 70% of all health expenditure on diabetes being due to overweight.

Overweight will also affect the labour market

- Obesity reduces the employment rate, and increases early retirement, absenteeism and presenteeism. As a result, the workforce in the 52 countries will be reduced by the equivalent of 54 million full-time workers.
- When these effects are converted into lost labour market output using average wages, OECD countries will lose USD PPP 863 per capita per year on average. The cost of presenteeism makes up nearly half of this amount, with absenteeism and employment rates accounting for around a quarter each. The impact of early retirement is minimal.

Overweight decreases GDP and increases the overall tax rate

- Through the combined effects of overweight on life expectancy, health expenditure and the labour market, GDP will be 3.3% lower on average in OECD countries. Across all the 46 countries included in the analysis, this equates to a total of USD PPP 5.3 trillion over 2020-50, similar to the average annual GDP of Germany or Japan.
- Overweight will also increase the overall tax rate needed to stabilise the public debt ratio by 0.62 percentage points on average in OECD countries, which is similar to the average in 23 EU countries.
- The increase in the tax rate can be translated into an equivalent increase in taxes per person. On average in the OECD, every person would be subject to an additional USD PPP 359 per year in taxes due to overweight.
3.1. To make the economic case for investing in obesity prevention and treatment, its impact needs to be quantified

Health systems in all OECD countries are facing a number of challenges. Societies are rapidly aging, lifestyles are changing, chronic diseases are on the rise, and the threat of infectious diseases is constantly evolving. On the other hand, fiscal constraints in many countries mean that the financial resources to address these challenges are limited. Policies that target underlying risk factors such as obesity can help prevent chronic diseases, while reducing health care cost in the long-term (Sassi and Hurst, 2008[1]).

However, the upfront costs of preventive care and the intangibility of outcomes mean that, in many countries, it does not receive the attention it deserves. Currently, less than 3% of health spending in OECD countries is allocated to public health and prevention activities (Gmeinder, Morgan and Mueller, 2017[2]). Quantifying the burden of obesity on health and the economy helps make the economic case for investing in prevention.

The burden of overweight on population health is well established. Obesity is one of the leading risk factors contributing to the burden of non-communicable diseases (NCDs), increasing the risk of developing type 2 diabetes, cardiovascular diseases, musculoskeletal disorders, several types of cancer, and depression. Moreover, an estimated 2.8 million people die each year due to being overweight (WHO, 2017[3]).

However, the impact of obesity is not limited to population health - it also has important consequences for the economy. Firstly, treatment of obesity and related chronic conditions increases health expenditure (see Box 3.1). Secondly, as obesity and its consequences affect an individual’s productivity and workforce participation, it has an impact on the labour market. At a macroeconomic level, this affects the GDP of a country and increases fiscal pressure.

Several studies have estimated these two economic costs of obesity, but differences in methodology mean that results are difficult to compare, and the geographical scope of these studies is limited to a few countries.

**Box 3.1. The multiplicative impact of obesity on the cost of health care**

Obesity is associated with increased health care costs. The additional cost increases with BMI, so people with severe obesity face the highest health care costs (Effertz et al., 2016[4]).

This is driven in part by care utilisation. People with obesity are more likely to develop conditions such as heart disease, diabetes and cancer – all of which are associated with health care costs for their management and treatment. As a result, people with obesity have a higher utilisation of health care services: they have more primary care and outpatient specialty care visits and inpatient stays, undergo more surgeries, and use more diagnostic and home health care services (Cecchini, 2018[5]; Bertakis and Azari, 2005[6]; Andreyeva, Sturm and Ringel, 2004[7]). People with obesity also receive 2.4 times more prescriptions than people with a healthy weight (Cecchini, 2018[5]).

In addition to a greater utilisation of health care services, people with obesity may also face a higher cost per visit. A study in the United States found that emergency room treatment and hospitalisation charges were higher for people with obesity – potentially because they require more complicated and costlier care (Bertakis and Azari, 2005[6]). Another study showed that the impact of obesity and its comorbidities on the cost of a single inpatient or outpatient visit were additive – and in some cases more than additive (Padula, Allen and Nair, 2014[8]). For example, while the average visit for someone with obesity cost USD 1 908, and for someone with congestive heart failure USD 1 642, the average cost per visit for someone with both conditions was USD 5 276.
3.1.1. Previous studies estimate the health care cost of overweight to be between 2% and 8% of total health expenditure

Previous estimates of the impact of obesity on health expenditure range from just under 2% of total health expenditure in Brazil, to 7.9% in Germany (see Figure 3.1). However, there is wide variation in the obesity-related conditions and health care settings that are included to calculate health care costs, the data sources underlying each study and the methods used to estimate excess cost due to overweight.

A US-based study estimated the obesity-related medical cost at USD 147 billion per year, using data from the Medical Expenditure Panel Surveys (Finkelstein et al., 2009[12]). A study for Germany obtained costs for various types of expenditures of inpatient and outpatient treatment, such as rehabilitation, health protection, ambulance, administration, research and education from a range of sources (Lehnert et al., 2015[13]). They estimated the health care cost of obesity and overweight at EUR 8 647 million (USD PPP 11 116), or 3.27% of total health expenditure. Another study in Germany, looking only at obesity and not overweight, was based on data from the German statutory health insurance system. This study put the annual health care cost of obesity at EUR 29 billion (USD PPP 38 billion), approximately 7.9% of total health expenditure (Effertz et al., 2016[4]).

Besides using different data sources and health care settings, studies also include different diseases in their analysis. While studies for Switzerland (Schneider and Venetz, 2014[14]), Brazil (de Oliveira, Santos and da Silva, 2015[15]) and Canada (Anis et al., 2010[16]) all include colorectal cancer, the studies for Brazil and Canada also look at breast, endometrial, oesophageal, kidney, ovarian and pancreatic cancer, amongst others. However, only the study for Switzerland includes the cost for depression and road traffic accidents due to sleep apnoea.

The methods used to estimate the cost attributable to obesity affect the results. The largest estimate of health expenditure associated with obesity – 7.9% of total health expenditure – was found by Effertz et al. (2016[4]). They used a bottom-up approach that relies on individual-level health and cost data to understand the excess cost of obesity, which is then extrapolated to the whole population. Studies that used a top-down approach, which estimates the share of disease-specific costs within a population attributable to obesity (by means of so-called population attributable fractions) resulted in relatively low estimates for Brazil, Australia, the Czech Republic and the Netherlands (de Oliveira, Santos and da Silva, 2015[15]; Access Economics, 2008[17]; Lette et al., 2016[18]). Top-down approaches may underestimate cost as they do not account for the health care cost of minor health impairments associated with obesity (e.g. heartburn), and often fail to account for the effect of comorbidities (see Box 3.1) (Effertz et al., 2016[4]; Lette et al., 2016[18]).
3.1.2. Existing studies suggest that the impact of obesity on the wider economy is between 0.5% and 1.6% of GDP

A number of studies go beyond health expenditure, and try to estimate the impact of overweight on the wider economy. Estimates of the impact of overweight on GDP range from 0.45% to 1.62% of GDP (see Figure 3.2). As with health expenditure, the concepts, data and methods vary widely – making comparisons between countries difficult.

A French study estimates the cost of obesity by looking at welfare payments, lost productivity and employment – but this is set off against revenue from nutrition taxes and the lower pension expenses due to obesity (Ministère de l’Économie et des Finances, 2016[19]). It estimates the total cost of obesity at EUR 20.4 billion (USD PPP 25 billion, approximately 0.8% of GDP). An Australian study also looks at carer cost and foregone taxes, and finds a total financial cost of AUD 8.3 billion (USD PPP 5.6 billion) for obesity (0.93% of GDP) (Access Economics, 2008[17]). In addition to the financial cost, the Australian study uses a value of statistical life approach to estimate the social cost of the burden of disease (not included in Figure 3.2). This approach puts a monetary value on disability and life-years lost due to obesity, usually based on willingness-to-pay (Biausque, 2012[21]).

Two German studies include similar concepts in their economic cost (mortality, early retirement, absenteeism), but the study by Effertz et al (2016[4]) also includes unemployment. This, in combination with a bottom-up approach rather than a top-down one, results in a larger estimate for the indirect cost of obesity.

Among the approaches to model the non-health care costs associated with obesity, the human capital approach was the most common one, a finding that echoes those of other systematic reviews (Tremmel et al., 2017[22]). The human capital approach measures lost productivity, morbidity or mortality in terms of lost earnings based on wages.
3.1.3. The OECD SPHeP-NCDs model estimates the health and economic burden of obesity

To quantify the impact of overweight on population health and the economy, the OECD developed the Strategic Public Health Planning for NCDs (SPHeP-NCDs) model. The model simulates the impact of major risk factors, such as obesity, on disease incidence, mortality, health expenditure and the labour market (see Box 3.2 for more details on the model). The OECD SPHeP-NCDs model can be used to understand the cost of doing nothing to prevent obesity, as well as the potential impact of interventions. As the model applies a standardised approach to all countries, it also allows cross-country comparisons. This chapter presents the outputs of the OECD SPHeP-NCDs model and its estimates of the health and economic burden of overweight between 2020 and 2050.

Box 3.2. The OECD SPHeP-NCDs model

The OECD Strategic Public Health Planning for NCDs (SPHeP-NCDs) 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 or a region up to 2050. The model consolidates previous OECD modelling work into a single platform to produce a comprehensive set of key behavioural and physiological risk factors (e.g. obesity, physical activity, blood pressure, etc) and their associated NCDs.

The model covers 52 countries. These countries include OECD countries, G20 countries, EU28 countries, and OECD accession and selected partner countries: Brazil (also a G20 country), China (also a G20 country), Colombia, Costa Rica, India (also a G20 country), Indonesia (also a G20 country), Peru and South Africa (also a G20 country).
For each of the 52 countries, the model uses demographic and risk factor characteristics by age and gender-specific population groups from international databases (see Figure 3.3). 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 (Global Burden of Disease Study 2015, 2016[23]).

For each year, a cross-sectional representation of the population can be obtained, to calculate health status indicators such as life expectancy, disease prevalence and disability-adjusted life years (DALYs) using disability weights. Health care 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. The labour market module uses relative risks to relate disease status to the risk of absenteeism, presenteeism (where even though they are physically present at work, employees are not fully productive), early retirement and employment. These changes in productivity and labour market participation are costed based on a human capital approach[3], using national average wages to calculate lost labour market outputs.

Figure 3.3. Schematic overview of the modules in the OECD SPHeP-NCDs 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)
3.2. Overweight and related diseases will reduce life expectancy in OECD countries by 2.7 years

Overweight has a considerable impact on population health. Comparing the no-overweight scenario to the business-as-usual scenario shows that, over the next 30 years, overweight will result in 462 million new cases of cardiovascular disease in the 52 countries, and 212 million cases of diabetes (Figure 3.4). This accounts for 18% and 58% of all new cases, respectively. Overweight will also result in 31 million cases of dementia and 17 million cancer incidences.

However, as overweight reduces life expectancy, it also reduces the amount of time available to develop a disease or condition. As a result, overweight decreases the total number of some conditions, such as cirrhosis, injuries and chronic obstructive pulmonary disease (COPD). This effect can also be seen when looking at disease incidence by age group, which shows a decrease in the total number of new cases for people aged over 80 (see Annex Figure 3.A.1).

Figure 3.4. The impact of overweight on disease incidence

Number of new cases due to overweight, and as percentage of all new cases, total 2020-50

Source: OECD analyses based on the OECD SPHeP-NCDs model, 2019.

StatLink  

https://doi.org/10.1787/888934007050

For more information on the OECD SPHeP-NCDs model, please see the SPHeP-NCDs Technical Documentation, available at: http://oecdpublichealthexplorer.org/ncd-doc.
As overweight affects people’s health and causes a range of conditions, it also leads to premature mortality. On average in the OECD, 61 people per 100,000 population will die prematurely each year due to overweight (defined as mortality of people aged 30 to under 70 (WHO, 2018[24])) (Figure 3.5). In EU28 countries, this average is higher at 73 per 100,000, driven by high premature mortality rates in Eastern European countries. Premature mortality is lower in countries where the overweight prevalence is low and life expectancy is high, such as Japan and Korea. In total, 3 million people will die prematurely every year in the 52 countries due to overweight in the next 30 years. This premature mortality carries considerable cost for society (see Box 3.3).

**Figure 3.5. The impact of overweight on premature mortality**

Annual number of premature deaths per 100,000 population, average 2020-50

![Graph showing the impact of overweight on premature mortality](https://doi.org/10.1787/888934007069)

The impact of overweight on mortality can also be measured in years of life lost. In the OECD, countries will lose on average 3,291 life years per 100,000 population every year due to overweight, over the period 2020-50. The impact on DALYs is even greater, at 3,908 DALYs per 100,000 population every year. This is nearly 12% of the overall rate of DALYs lost due to disease globally – and similar to the cumulative burden caused by stroke and ischemic heart diseases (GBD 2017 DALYs and HALE Collaborators, 2018[25]). Nearly half of all DALYs will be lost in 60-80 year-olds (For more details on life-years lost and disability-adjusted life-years lost, please refer to Annex 3.A).

The impact of overweight on premature mortality translates into a decrease in overall life expectancy. On average over the 2020-50 period, life expectancy in OECD countries will be 2.7 years lower due to overweight (Figure 3.7). Importantly, this decrease in life expectancy is the average across the total population – not just for people with overweight. The average for G20 countries is lower, at 2.5 years, while the EU28 average is higher at 2.9 years. Countries with low overweight prevalence will see a smaller impact on life expectancy, with Japan losing less than a year, compared to Mexico where overweight reduces life expectancy by more than four years. Healthy life expectancy – which uses disease disability weights to calculate the number of years lived in perfect health – will be reduced even further, by 3.2 years on average in OECD countries, 3.0 in G20 countries and 3.3 in EU28 countries.
Box 3.3. The social cost of premature mortality: a “Value of Statistical Life” approach

This report uses a “Cost of Illness” approach to estimate the economic burden of obesity, looking at health expenditure and labour market cost. However, it does not put an economic cost on premature mortality, to reflect the costs of pain and suffering. The Value of Statistical Life (VSL) approach tries to measure the social cost of obesity based on willingness to pay (WTP) data. Since these values do not reflect actual cost, they should not be directly compared to or combined with Cost of Illness estimates.

WTP methods estimate how much a person is willing to pay to reduce their risk of death, or how much premium they would require to accept additional risk. This determines the monetary value that a person assigns to their own life. This monetary value can then be multiplied by the number of premature deaths, resulting in the total statistical value of life lost due to obesity.

This report follows a methodology developed by the Environment Directorate of the OECD (OECD-ENV) (see (OECD, 2014[26]) and (Lindhjem, Analyse and Navrud, 2012[27])). It assumes a base value of USD 3 million per life in 2005, and an income elasticity of 0.8, being the mid-point of the 0.7-0.9 range established in OECD research. Figures are adjusted for purchasing power parity (PPP).

Using this approach, the social cost of overweight is estimated at USD PPP 2 554 per capita per year in OECD countries, USD PPP 2 189 in G20 countries and USD PPP 2 763 in EU28 countries (Figure 3.6).

Figure 3.6. The social cost of premature mortality due to overweight

USD PPP per capita per year, average 2020-50, using a VSL approach

Source: OECD analyses based on the OECD SPHeP-NCDs model, 2019.

StatLink  https://doi.org/10.1787/888934007088
Figure 3.7. The impact of overweight on life expectancy

The impact on life expectancy (LE) and healthy life expectancy (HALE) in years, average 2020-50

Source: OECD analyses based on the OECD SPHeP-NCDs model, 2019.

In addition to overweight prevalence and underlying population health, the effectiveness of national health care services at treating the medical consequences of high BMI also influences the health burden of overweight. Effective health care systems can reduce complications (e.g. diabetes) and prevent fatalities (e.g. from cancers or cardiovascular diseases). For example, Australia, Norway and the Netherlands have a smaller burden compared to other countries with similar overweight prevalence rates, such as Argentina and Bulgaria.

3.3. Overweight will account for over 8% of total health expenditure in OECD countries

Since overweight is a major risk factor for several NCDS, on average people with overweight require health care services more often and for more complicated issues. As a result, the per capita health expenditure in the business-as-usual scenario is higher than in the no-overweight scenario. Overweight will cost OECD countries on average USD PPP 209 annually per capita in health expenditure, between 2020 and 2050 (Figure 3.8). Again, this number is the average across the entire population, and not just for people with overweight.

In the EU28, the average annual per capita health expenditure on overweight is USD PPP 195 and it is USD PPP 171 for G20 countries. These differences are partly driven by cross-country differences in health care cost. High health care costs and high overweight prevalence means that the United States will spend the most per capita, at USD 645. Other countries with high health care costs, such as Norway, the Netherlands and Germany, also see a high per capita spending on overweight.

Countries with a lower overall health care budget but high overweight prevalence, such as Turkey and Saudi Arabia, will end up spending a high proportion of their health expenditure on overweight and related conditions. On average, OECD countries will spend 8.4% of their entire health budget on treating the
consequences of high body mass - but this is highly variable across countries. While the United States will spend nearly 14% of their health budget on overweight, Estonia will spend less than 5%.

In total, OECD countries will spend USD PPP 311 billion per year on treating overweight and related conditions. All 52 countries combined will spend USD PPP 425 billion per year over the period 2020-50 – equivalent to the GDP of Austria in 2018.

**Figure 3.8. Health expenditure associated with overweight**

Health expenditure due to overweight per year, in USD PPP per capita and as a percentage of total health expenditure, average 2020-50

Since overweight is a risk factor for cancers, CVDs, dementia and diabetes, it increases the overall health expenditure on these conditions (Figure 3.9). Across all 52 countries, overweight will be responsible for 70% of all diabetes-related health expenditure. It will also account for 23% of CVD-related health expenditure, 9% for cancers and 18% for dementia. However, as overweight reduces life expectancy, it also reduces the health expenditure on other medical conditions. This is because the lower life expectancy means that there is less time to develop other conditions, reducing the overall expenditure on these conditions. This applies particularly to conditions less strongly associated with high BMI.

Not all the cross-country variability in overweight-related health expenditure can be attributed to the burden of overweight. Organisational arrangements in the health care systems including, for example, the price of delivering health care services, the mix of health care services used and the share of the population with access to effective health care services, all play a role in modulating total health expenditure. For example, Denmark, the Netherlands and Norway show a smaller overweight-related health burden compared to other OECD countries but, at the same time, they rank among the top countries in terms of the impact of overweight on health expenditure. Conversely, Poland, Romania and the Russian Federation rank very high in terms of health burden of overweight but show a smaller impact on health care budgets.
Figure 3.9. The impact of overweight on disease-related health expenditure

Annual health expenditure (HE) due to overweight, in USD PPP billions and as a percentage of total HE for the disease, average 2020-50

Source: OECD analyses based on the OECD SPHeP-NCDs model, 2019.

3.4. Overweight has a negative impact on the labour market, through absenteeism, presenteeism, unemployment and early retirement

Overweight and related NCDs have a negative impact on the labour market and the economy (Feigl et al., 2019[28]). For this report, analyses on longitudinal datasets covering 27 European countries, Japan, the United Kingdom and Mexico were combined to understand these impacts. It was found that having at least a chronic disease is associated with a 8% decrease in the probability of being employed in the following year compared to individuals with the same age and level of education that do not report a chronic disease. The probability of not being in the labour force is particularly high in the case of stroke (up to -20% for men) and lowest for other cardiovascular diseases (-4%). Individuals with at least two chronic diseases are about 17% less likely to be in the workforce.

If employed, individuals with a chronic disease have a 1.5% higher absenteeism rate. Diabetes has the most detrimental effect, increasing absenteeism by 3.4% in women. Individuals with overweight show an additional 1% in absences. Individuals with at least one chronic condition are almost 20% more likely to retire early.

Four effects on the labour market are taken into account in the OECD SPHeP-NCDs model: absenteeism, presenteeism, employment rate and early retirement. Comparing the business-as-usual and no-overweight scenarios, it was found that, on average across OECD countries, labour market output (which combines workforce participation, employment, and productivity when employed) will decrease by 0.38% due to overweight-related absenteeism (Figure 3.10). Presenteeism – where employees are present at work but less productive – will decrease the labour market output of individuals by 0.81% on average. As overweight reduces the likelihood of being employed, OECD countries will see, on average, a 0.43% decrease in labour market output due to overweight-related unemployment. Overweight also increases the number of people who retire early, decreasing the labour market output by 0.05% average in OECD countries. These effects are similar in EU28 and G20 countries, though the impact of overweight on presenteeism in the G20 is slightly lower, at -0.69%.
Figure 3.10. The impact of overweight on the labour market

Percentage difference in labour market output due to overweight and its impact on absenteeism, presenteeism, employment and early retirement, per capita, average 2020-50

Note: Labour market output includes workforce participation, employment rate, and productivity when employed, and is calculated for the working-age population.
Source: OECD analyses based on the OECD SPHeP-NCDs model, 2019.

While these numbers may appear small at an individual level, translating them to the population level highlights that overweight has a considerable impact on the labour market. Overweight will effectively reduce the workforce by the equivalent of 54 million full-time workers on average per year across the 52 countries. Combined with changes in the population size due to overweight, increases in presenteeism account for an equivalent of 18 million fewer full-time workers, reduced employment accounts for 28 million, and increased absenteeism reduces the workforce by the equivalent of 8 million full-time workers. In the EU28, the equivalent of 6 million full-time workers is lost due to overweight, with 1 million due absenteeism, and about 2.5 million each due to presenteeism and reduced employment.

The reduction in labour market participation and productivity due to overweight carry costs for the economy. In the case of absenteeism and presenteeism, wages are paid without a return in productivity. In the case of unemployment and early retirement, productive workers are lost from the workforce. All four factors can be expressed as lost labour market output through a human capital approach. The human capital approach uses future earnings to put a monetary value on lost productivity (Jo, 2014[29]). In this report, average country wages adjusted for projected changes in productivity were applied.4

On average, OECD countries will lose USD PPP 863 per capita per year in labour market output due to overweight (Figure 3.11). The averages for EU28 countries and G20 countries are lower. These differences are partially driven by wage differences between countries – with lower wages in countries such as India, Indonesia and South Africa reducing the lost overall output for G20 countries. Presenteeism
has the greatest economic impact on the labour market, and accounts for nearly half of the lost output. Absenteeism and employment rate account for roughly a quarter each.

The economic impact of overweight on the labour market varies greatly between countries. In the United States, overweight will cost the economy USD PPP 1 667 per year per person. This is 19 times more than in South Africa, where the labour market costs are only USD PPP 88 per year per person. In addition to the differences in overweight and disease prevalence, this is for a large part driven by the wage differential.

**Figure 3.11. Economic impact of overweight on the labour market**

Impact on per capita labour market output based on average wages, per year, in USD PPP, average 2020-50

Source: OECD analyses based on the OECD SPHeP-NCDs model, 2019.

StatLink  
https://doi.org/10.1787/888934007183

### 3.5. At a macroeconomic level, GDP in OECD countries will be 3.3% lower due to overweight

The impact of overweight on life expectancy, health expenditure and labour market productivity can be combined into one overall macroeconomic effect. To model this, the outputs of the business-as-usual and no-overweight scenarios from the OECD SPHeP-NCDs model were fed into the OECD long-term economic model (see Box 3.4). This model was used to understand the impact of overweight on GDP and on the overall tax rate.

On average in OECD countries, GDP will be 3.3% lower each year due to the impact of overweight (Figure 3.13). The impact in G20 and 23 EU countries is similar, at 3.5% and 3.3%, respectively. The GDP impact varies by country: from 1.6% in Japan to over 5% in Mexico. Across all the 46 countries included in the analysis, this equates to a total of USD PPP 5.3 trillion from 2020-50, similar to the average annual GDP of Germany or Japan. Importantly, these results do not take into account that an increase in life expectancy due to no overweight may mean that people will work for longer and retire later. If the retirement age is increased by two-thirds of a year for every year of additional life expectancy, the impact of overweight on GDP would be doubled, with the average for OECD countries going from 3.3% to 6.8% (see Annex 3.A for more details).
Box 3.4. Linking the OECD SPHeP-NCDs model with the OECD long-term economic model

The impact of overweight on the larger economy was evaluated using the OECD long-term economic model (see Box 1 in Guillemette and Turner (2017[30])). The OECD long-term economic model extends the short-run projections of the twice-yearly OECD Economic Outlook (EO) out to 2060 (OECD, 2018[31]). The EO includes historical estimates and short-run projections of potential output for each country based on a Cobb-Douglas production function with trend input components, namely trend labour efficiency, trend employment and the productive capital stock. This same production function sits at the core of the long-term model.

The OECD SPHeP-NCDs model was used to model the employment rate, productivity, population dependency ratio (dependency ratio is the ratio of dependents [people younger than 15 or older than 64] to the working-age population), increase in life expectancy, and health care cost for the business-as-usual scenario and the no-overweight scenario. These outputs were then used as inputs for the OECD-ECO model to obtain the overall impact on GDP and fiscal pressure (see Figure 3.12). Fiscal pressure is measured as government primary revenue needed to stabilise the public debt ratio as a % of GDP. This is equivalent to an overall tax rate, which is what is reported in this chapter.

Each scenario is run with and without an adjustment for the effective retirement age. In the adjusted scenarios, the impact of overweight on life expectancy is assumed to also affect the effective retirement age. For the results presented in the report the conservative, non-adjusted scenarios were used. The results with the adjustment can be found in Annex Figure 3.A.4 and Annex Figure 3.A.5.

Figure 3.12. Link between the OECD SPHeP-NCDs and the OECD long-term economic models

Figure 3.13. The impact of overweight on GDP

Percentage difference in GDP due to overweight, average 2020-50


StatLink 2 https://doi.org/10.1787/888934007202

Figure 3.14. The impact of overweight on the overall tax rate

Percentage point difference in government primary revenue as percentage of GDP due to overweight, average 2020-50

Note: The impact is expressed in percentage points. For example, an impact of 0.77 in France reflects an increase of government primary revenue needed to stabilise the public debt ratio from 55.58% to 56.63% of GDP


StatLink 2 https://doi.org/10.1787/888934007221
Another measure explored in the analysis of the long-term macroeconomic burden of overweight is fiscal pressure. Fiscal pressure is measured as government primary revenue (as percentage of GDP) needed to stabilise the public debt ratio, and is equivalent to an overall tax rate (under the assumption that governments respond to rising fiscal pressure by raising additional revenue). Due to overweight the tax rate will be 0.62 percentage points of GDP higher in the OECD on average, which is similar to the EU23 average (Figure 3.14). In a number of smaller European countries the impact is negative. This is partially a result of the large impact of overweight on life expectancy in those countries: as obesity lowers life expectancy, there are fewer elderly people, which lowers the dependency ratio and, with it, the tax rate.

The impact of overweight on the overall tax rate can be translated into an equivalent impact on per capita taxes for the public. On average in the OECD, every person will be subject to USD PPP 359 per year in additional taxes due to overweight (Figure 3.15).

Figure 3.15. Equivalent per capita tax increase due to overweight

Per capita annual tax needed to cover the increased fiscal pressure due to overweight, in USD PPP, average 2020-50

![Graph showing equivalent per capita tax increase due to overweight across OECD countries.](https://doi.org/10.1787/888934007240)


3.6. Investment in the prevention and treatment of overweight is needed to reduce its impact on health and the economy

Overweight carries considerable cost to both individuals and society over the next 30 years. Overweight is associated with a number of NCDs, and will reduce population-wide life expectancy by up to four and half years. Countries will spend around 8% of their health care budget on treating overweight and related conditions. Overweight will also have an impact on the labour market, effectively reducing the workforce by 54 million people across the 52 countries. In the OECD, this will cost countries on average USD PPP 863 per capita per year in lost labour market output. Combined, the impact of overweight on life expectancy, health expenditure and labour market output will result in a 3.3% lower GDP on average in OECD countries. As the overall tax rate increases, individuals face an equivalent tax of USD PPP 359 per year.
In addition to these economic costs, overweight has an impact on education – as described in Chapter 4 – which may result in further long-term effects on labour market productivity. It is therefore crucial to invest in the prevention and treatment of overweight and reduce its burden on individuals and society. Countries have started to implement a number of policies and interventions to prevent and reduce overweight, which are described in Chapter 5. Chapter 6 of this report uses the OECD SPHeP NCDs model to test the cost-effectiveness of a number of these policies to understand their impact on the economic burden of overweight.
References


THE HEAVY BURDEN OF OBESITY © OECD 2019


Annex 3.A. Additional analyses

Disease incidence by age group and sex

As overweight reduces life expectancy, it decreases the over 80 year-old population group and thus the number of new diseases that this group will develop (Annex Figure 3.A.1). Due to this effect, overall disease incidence due to overweight of some conditions – mostly those less associated to overweight – decreases.

Annex Figure 3.A.1. The impact of overweight on disease incidence by age group and sex

Total number of cases due to overweight, by sex and 10-year age group, total 2020-50

Source: OECD analyses based on the OECD SPHeP-NCDs model, 2019.

StatLink: https://doi.org/10.1787/888934007259

Life-years and disability-adjusted life-years lost

OECD countries will lose on average 3 291 life years per 100 000 population every year due to overweight, over the period 2020 to 2050 (Annex Figure 3.A.2). This rate is higher in EU28 countries, which will lose 3 935 life years per 100 000 every year. In addition to its impact on mortality, obesity also increases the number of years lived with disease or disability. These two effects can be combined and measured as disability-adjusted life-years (DALYs). On average, countries in the OECD will lose 3 908 DALYs per 100 000 population every year due to overweight. Eastern European countries see a relatively high impact of overweight on life-years lost.

THE HEAVY BURDEN OF OBESITY © OECD 2019
Annex Figure 3.A.2. The impact of overweight on life-years lost

Life-years (LYs) and disability-adjusted life-years (DALYs) lost per year per 100,000 population due to overweight, average 2020-50

Source: OECD analyses based on the OECD SPHeP-NCDs model, 2019.

This is roughly in line with the results from the Global Burden of Disease study (The GBD 2015 Obesity Collaborators, 2017[32]). They found that high BMI was associated with 1,630 DALYs per 100,000 globally, including lower income countries. Looking specifically at the regions considered in this report, GBD estimated the impact of overweight, for 2017, at 2,587 DALYs per 100,000 for OECD countries, 2,614 for the EU28 and 2,082 for G20 countries (IHME, 2018[33]). The OECD SPHeP-NCDs model, at 3,908, 4,495 and 3,289 DALYs respectively, is higher as they look at the average impact over the next 30 years, rather than the current burden. For example, the OECD model takes into account that, in the next 30 years, the population in OECD, EU28 and G20 countries is expected to live longer and become older. This will cause an increase in the incidence of NCDs. Nevertheless, the OECD and the GBD estimates are in the same order of magnitude. Moreover, both studies find that the impact in EU28 countries is greater than for OECD countries, and smallest in G20 countries. The SPHeP-NCDs Technical Documentation (available at http://oecdpublichealthexplorer.org/ncd-doc) describes in more detail the verification of our results against other studies.

Across all 52 countries, the large majority of DALYs are lost in the 50-90 age group, with almost half (49%) being lost between the ages of 60-80 (Annex Figure 3.A.3).
Annex Figure 3.A.3. The impact of overweight on DALYs lost by age group and sex

Total disability-adjusted life-years (DALYs) lost per year due to overweight, average 2020-50

Macro-economic impacts adjusted for changes in the retirement age

In a society without overweight (the “no overweight” scenario), life expectancy would be one to four years higher than in the business-as-usual scenario. In such a scenario, the effective retirement age would likely be higher. This possibility is taken into account in alternative calculations of GDP and fiscal pressure: for each year of increased life expectancy, the legal retirement age is assumed to be two-thirds of a year higher.

Adjusting for a higher retirement age, the impact of overweight on GDP is doubled: the average impact for OECD countries goes from -3.3% to -6.8% (Annex Figure 3.A.4). The estimated impact of overweight on the overall tax rate is also affected by the retirement age adjustment: the average impact in OECD countries increases from 0.62 percentage points of GDP to 1.75 percentage points of GDP (Annex Figure 3.A.5).
Annex Figure 3.A.4. The impact of overweight on GDP, adjusted for higher retirement age

Percentage difference in GDP due to overweight, average 2020-50

Note: Assumes a two-third year increase in legal retirement age for every one year increase in life expectancy.

StatLink 2 https://doi.org/10.1787/888934007316

Annex Figure 3.A.5. The impact of overweight on the overall tax rate, adjusted for higher retirement age

Percentage point difference in government primary revenue as percentage of GDP due to overweight, average 2020-50

Note: Assumes a two-third year increase in legal retirement age for every one year increase in life expectancy.

StatLink 2 https://doi.org/10.1787/888934007335
Notes

1 Throughout this chapter, the nutritional status of individuals is defined according to WHO guidelines and thresholds and uses body-mass index (BMI). Overweight is defined as a BMI higher than 25 kg/m²; pre-obesity is defined as a BMI of 25-30 kg/m²; and obesity is defined as a BMI higher than 30 kg/m². Obesity can be further divided into class I, class II and class III obesity. Class I obesity is the milder form of obesity and is defined as a BMI of 30-35 kg/m²; class II obesity is defined as a BMI of 35-40 kg/m²; while class III obesity is defined as a BMI over 40 kg/m². Morbid obesity includes class II and class III obesity and is defined as a BMI higher than 35 kg/m². Further information can be found in Chapter 2 – Box 2.1. Using body mass index (BMI) to define levels of adiposity.

2 Health expenditure measures the final consumption of health care goods and services for personal health care including curative care, rehabilitative care, preventative care, ancillary services and medical goods but not long-term care.

3 The human capita approach is based on assumptions simplifying the economic dynamics leading to economic losses including, for example, assumptions on reserve labour force, friction costs, and the impact on reserve wages.

4 Another approach to costing the impact of overweight on the labour market is to use welfare payments (sick leave, unemployment and disability payments) and retirement cost. However, as policies on these payments vary considerably across countries, the resulting cost becomes a reflection of welfare and pension policy as much as of the cost of overweight. In addition, it is difficult to combine these different costs together with lost output for presenteeism into one metric. For these reasons, this report has used lost output as based on wages for all elements of labour market impacts.
Please cite this chapter as:


DOI: https://doi.org/10.1787/6cc2aacc-en