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ECONOMIC CONSULTING

Fighting smoking with alternative nicotine products

Exemplified by the public health effects of Swedish snus

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Summary

Smoking has severe negative health impacts. Smokers are approximately 2.5 times more likely to die of smoking-related diseases than non-smokers, and 25 times more likely to die of lung cancer. Smoking shortens life with a decade.

Consequently, not starting smoking and quitting smoking has large health benefits and is beneficial at any age. A young smoker who quits before age 30 reduces his excess mortality risk with 97 per cent and adds a decade to life expectancy. An older smoker who quits before age 65 reduces his excess mortality risk with 75 per cent and adds 4 years to life expectancy.

About 6 per cent of the male adult population in Sweden smoke. This is by far the lowest share of smokers in the EU. On average about 28 per cent of the men in the EU smoke. The lower smoking prevalence in Sweden has had clear effects on public health. Sweden has the lowest number of smoking-attributable male deaths in Europe, the lowest number of smoking-attributable lung cancer deaths, and the lowest number of smoking-attributable new cancer cases.

Male smokers and male smoking-related health in Sweden and the EU

Per cent and per 100,000 males

	Share of current smokers (%)	Smoking-attributable deaths (per 100,000)	Smoking-attributable lung cancer deaths (per 100,000)	Smoking-attributable new cancer cases (per 100,000)
Sweden	6	135	42	93
Average EU	28	296	109	251
Difference SE-EU	22 pp	-162	-67	-157
Difference (%)		-55	-61	-62

The lower Swedish smoking prevalence among men can to some degree be explained by a historically higher cigarette price, on average. But the higher price is insufficient to explain the full difference in smoking behaviour compared to other EU member states. Furthermore, in countries like Ireland, the United Kingdom and France cigarette prices has been significantly higher than in Sweden for a long period of time. But the higher prices in these countries have not been able to cut smoking rates among males to Swedish levels.

To a limited degree the differences in smoking behaviour may, but are not likely to, be explained by Sweden being an early adopter and/or a more stringent user of smoking control policies such as smoke-free air, packaging requirements or health warnings. Compared to other EU member states, Sweden do not stand out neither as an exceptionally early adopter, nor as an exceptionally strict user of smoking control measures. Furthermore, some countries like Finland and Italy can in some smoking regulation areas be seen as forerunners, but still with larger shares of male smokers than in Sweden.

From a policy perspective the remaining difference between Sweden and the EU to explain the lower Swedish smoking prevalence among men is the possibility for Swedes to choose a much less harmful nicotine product, namely Swedish snus. Snus is a nicotine substitute to smoking and has reduced both the uptake of smoking and helped smokers to quit. Snus has thus saved many Swedes from premature death.

During the last two decades several new nicotine products has been introduced. Examples are nicotine pouches and electronic cigarettes. Most has been assessed to be much less harmful than smoking cigarettes and the negative health impacts are believed to be on the same magnitude as Swedish snus. But the long-term public health consequences of these products cannot directly be assessed due to their relative short history on the markets.

The potential of snus to reduce smoking-related harm among men in the EU

Number of males 35+ and change in per cent

Smoking-attributable	Current EU policy	EU policy allowing snus	Reduction	Reduction (%)
Deaths	441 354	230 447	**-210 907**	-48 %
Lung cancer deaths	143 247	69 372	**-73 875**	-52 %
New cancer cases	330 059	155 203	**-174 856**	-53 %

Snus use on the other hand, has a long tradition in Sweden, and the public health impacts are clear. Assessing the possible public health impact if snus were allowed to be sold in the EU may be used as an estimate of the long-term health impacts of the new less harmful nicotine products.

An EU policy allowing the sales of snus, and indirectly new nicotine products, can be estimated to reduce the number of male smoking-attributable deaths with about 210 000 per year. The number of smoking-attributable lung cancer deaths is estimated to be reduced with about 75 000 and the number of smoking-attributable new cancer cases with 175 000 per year. This calculation presumes an uptake of, and substitution to, snus among European men to the same degree as in Sweden.

Speeding up the transition to a smoke-free United Kingdom

The tobacco policy in the United Kingdom is regarded as one of the best in Europe, and cigarette prices are among the highest. As a result, the country has one of the lowest smoking prevalences in Europe, ranking behind Sweden and Norway. In contrast, Sweden's tobacco policy is ranked 21st, and the price of cigarettes is approximately half that of the United Kingdom and on par with the EU average. However, despite these disparities, projections indicate that smoking rates in Sweden are expected to approach zero by around 2030, which is more than 10 years earlier than in the United Kingdom.

By learning from the experiences of Sweden and Norway, the United Kingdom can expedite its efforts in combating smoking. The lesson drawn from Norway and Sweden is that higher tax rates on cigarettes are only part of the solution. The other crucial part is providing smokers with viable less harmful nicotine alternatives, as cigarette prices rise. This entails adopting a neutral policy approach toward different types of less harmful nicotine products, including vaping, snus, and nicotine pouches.

It is estimated that implementing a tobacco policy like Norway's can shorten the timeframe for the United Kingdom to achieve smoke-free status by 6 years for men and 3 years for women. In addition, implementing such a policy would potentially

save approximately 450,000 Britons from premature death caused by smoking-attributable diseases in total up to 2030. Furthermore, it could contribute to an increase of 7 million years in life expectancy in total for the British population up to 2030.

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1 Introduction

Snus is many times less harmful to health than tobacco smoking. As snus contains nicotine, snus acts as a substitute to smoking. Snus is used by smokers to quit, and some choose to start using snus instead of start smoking. Snus can therefore be seen as a consumer product with a potential to reduce the harm from smoking.

During the last two decades several new nicotine products has been introduced, many believed to have health impacts on par with snus. The long-term public health consequences of the new nicotine products cannot directly be assessed due to their relative short history on the markets. Snus has on the other hand been available in Sweden for more than a hundred years with clear effects on public health.

Against this background Haypp Group AB has commissioned Lakeville to assess the potential of snus as an instrument to reduce the public health harm from tobacco smoking in the EU. The results of such an assessment can be used as an estimate for the possible long run health effects of the new nicotine products.

Some previous studies and critique

Rodu and Cole (2003) estimates 200,000 smoking-attributable deaths among men in the EU would be avoided yearly with Swedish smoking rates. The authors believe the lower Swedish smoking rates probably is due to the use of snus. Levy et.al (2006) estimate a reduction in smoking prevalence in the U.S. with up to 3.1 percentage points if snus or similar nicotine products were to be introduced. Gartner et.al. (2007) assess the potential public health effects of snus in Australia. They conclude there is little difference in health adjusted life expectancy between smokers who quit and smokers who switch to snus. They conclude a relaxing of the restrictions on the sales of snus in Australia is more likely to produce a net benefit than harm. The Snus Commission (2017) estimates that the lives of 355,000 men could be saved on a yearly basis if other EU member states matched the Swedish smoking-attributable mortality rate. Djurdjevic et.al. (2019) estimate that had snus not been available in Sweden, the number of smoking-attributable deaths among Swedish men would have been 24,000 higher between 1980-2009, or approximately 800 more deaths per year.

The above-mentioned assessments depend crucially on an assumed causal relationship between increased snus use and decreased smoking prevalence. In some studies, the full reduction in smoking and smoking-attributable mortality in Sweden is attributed to snus use. Tomar et.al. (2003) questions the causal relationship and points out that the lower smoking rates may be explained by Sweden being an early adopter and a more stringent user of tobacco control policies. The use of taxes to reduce smoking is one example where Sweden historically has taxed cigarette consumption to a higher degree than many other European countries. Assessments of the potential of snus to reduce smoking must compensate for this price effect, and the effects of other control instruments, on smoking behaviour or the role of snus risks being overestimated.

The purpose of this report

The aim of this study is to assess the potential of snus as an instrument to reduce the harm from smoking. More specifically the report tries to estimate the potential of snus in reducing the number of smoking-attributable deaths and the incidence of smoking-attributable cancer cases. The results should not be interpreted as a case for allowing snus sales in the EU. Rather, the results should be seen as an estimate of the possible long run public health effects of the new and less harmful nicotine products, such as nicotine pouches and e-cigarettes.

The contribution of this report is the inclusion of price as a determinant of smoking behaviour when assessing the potential of snus, and a summary of possible differences in the use of other instruments that may explain differences in cigarette consumption. In contrast to other studies the results reported here are adjusted for differences in smoking behaviour due to differences in cigarette price policy.

Method used and its limitations

The potential of snus as a harm reduction instrument is assessed by estimating the reduction in smoking-attributable deaths and cancer cases, assuming that other EU member states adopt Sweden's tobacco policy. With Swedish tobacco policy the share of smoking-attributable deaths in EU member states is assumed to converge to Swedish levels. The resulting difference in the number of smoking-attributable deaths is interpreted as a total policy effect. This includes effects of a higher average price of cigarettes in Sweden and possible other effects resulting from historical differences in policy use. The effect of price is deducted from the total effect. The resulting difference is interpreted as the harm reducing effect of snus.

There are many other instruments used in tobacco policy: tobacco advertising bans, smoking bans, and health warnings are some examples. The harm reducing effects of such measures are difficult to assess, partly because they have changed over time, partly because some of the measures have been introduced relatively recently in many EU member states. Compared to many other EU member states, Sweden neither stands out as an early adopter, nor as stricter user of such measures in such a way that the measures can explain differences in smoking behaviour.

Snus users are predominantly male. More than 20 per cent of the Swedish and Norwegian male population 15 years and older use snus daily as compared to approximately 6-8 per cent among Swedish and Norwegian women. The share of female snus users has increased during the last decade. But the potential harm reducing effects among women substituting from cigarettes to snus are most likely not measurable due to the long lag periods between starting smoking and the development of smoking-related diseases. Because of this the harm reducing potential of snus is only assessed for male smokers.

Information on the number of former smokers is relatively inconsistent and shows large discrepancies between years and countries, making the data hard to interpret and use. The smoking-attributable harm among former smokers is thus difficult to estimate. The assessment is limited to how snus may contribute to reduce the harm among European male current smokers. The potential effect of the availability of snus on former smokers is not included.

The assessed measures of harm reduction are limited to number of deaths, lung cancer deaths and cancer cases. Smoking affects many other measures of individual health, public health, and quality of life. Smoking also has an economic impact on individuals, society, and public sector. None of the potential positive effects on these measures are assessed due to lack of data for all EU member states. The total positive effect for the EU is thus much broader than reported in this report.

2 The rationale for and use of smoking policy

Smoking has severe negative health impacts. Smokers are approximately 2.5 times more likely to die of smoking-attributable diseases than non-smokers. Up to two-thirds of deaths among smokers can be attributed to smoking. Smoking shortens life with a decade. The extra gross cost of smoking is 1.8 per cent of global GDP.

Quitting smoking has large health benefits. Smoking cessation is beneficial at any age and reduces the excess mortality risk from smoking with more than 70 per cent. A young smoker who quits before age 30 reduces his excess mortality risk with 97 per cent and adds a decade to his life expectancy.

The extra costs of smoking for non-smokers and incomplete information about the risk of smoking motivates governmental regulation. Smoking regulation and cigarette prices differ across countries. Such differences affect cigarette consumption and use, and by extension the level of smoking-attributable diseases.

Sweden has historically differed in its use of tobacco control policies as compared to other EU member states in mainly two areas: higher excise taxes on cigarettes and allowing for the sales of snus. Sweden's historically higher price on cigarettes is not sufficient to explain the lower rates of smoking in Sweden compared to the rest of EU.

Differences in the use of other policy instruments such as smoke-free air, packaging requirements or health warnings may, but are not likely to, explain some of the remaining differences in smoking behaviour. Consequently, they are not likely to explain the differences in the level of smoking-attributable diseases either.

The remaining difference in tobacco policy use between Sweden and the EU is the tradition of snus use in Sweden and the prohibition of the sales of snus in the rest of EU. Snus is thus most likely a key factor explaining the lower smoking rates in Sweden.

2.1 The case for regulating smoking

Smoking is associated with an excess risk for many diseases. Lung cancer, heart attack, stroke and COPD are some examples. The extra costs of smoking for non-smokers, negative health effects of passive smoking, and incomplete information about the risks of smoking motivates government regulation of smoking.

2.1.1 The health effects of smoking and quitting smoking

Smoking has severe negative health impacts. Swedish smokers are 26 times more likely to die in lung cancer than non-smokers, 25-40 times more likely to die of COPD, approximately 3 times more likely to die of coronary heart disease and 2.5 times more

likely to die of stroke.[1] The excess mortality risk of Swedish smokers corresponds to the risk measured in other high-income countries.

In total smokers are approximately 2.5 times more likely to die of smoking-attributable diseases than non-smokers.[2]

Smoking kills at least half of all men and women who smoke.[3] Banks et.al. (2015) estimates up to two-thirds of deaths among current Australian smokers can be attributed to smoking. On average smokers lose an estimated decade of their life.[4] Half of those smokers is middle-aged (ages 30–69 years), thus losing up to 20-25 years of their life.[5]

Number of times a smoker in the U.S. is more likely to die by age and disease

Relative risks of current and former smokers as compared to non-smokers (RR= 1).

Figure 1: Relative mortality risk men

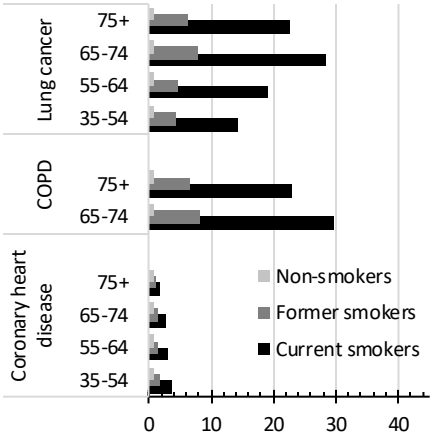
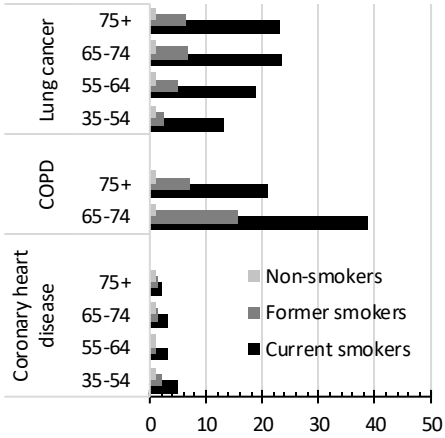


Figure 2: Relative mortality risk women



Source: U.S. Department of Health and Human Services (2020)

The excess risk differs considerably between diseases

The excess mortality risk of smokers is considerably higher for lung-related diseases such as lung cancer and COPD compared to other smoking-related diseases (Figure 1 and Figure 2). The proportion of avoidable deaths among current smokers is the highest for the lung-related diseases, and between 92 to 97 per cent of lung cancer and COPD deaths can be attributed to smoking.[6] This can be compared to about 50 to 75 per cent of coronary hearts diseases which can be attributed to smoking. For all smoking-related diseases, up to 67 per cent can be attributed to smoking.

The health benefits of smoking cessation

Quitting smoking is associated with large health benefits, independently of the age of cessation.[7] Smokers who started at a young age and stop before the age of 30 may gain a decade in life expectancy and reduce the excess risk of dying of smoking with up to 97 per cent (Table 1 and Table 2), thus avoiding nearly all the excess risk.

[1] Socialstyrelsen (2014).
[2] Mehta and Preston (2012), U.S. Department of Health and Human Services (2020).
[3] Jha (2020).
[4] U.S. Department of Health and Human Services (2020) and Jha (2020).
[5] Jha (2020).
[6] Jha (2020).
[7] U.S. Department of Health and Human Services (2020) and Jha (2020).

The gain in life expectancy and the reduced risk are significant also for older smokers who quit. Stopping smoking at age 60 has the potential of adding four years of life and reduces the risk of dying of smoking with up to 75 per cent.

The gains of smoking cessation by age of cessation and sex

Table 1: Gain in life-expectancy
Number of years

Age of cessation	Gain in years of life
25-34	10 years
35-44	9 years
45-54	6 years
55-64	4 years

Table 2: Reduction in mortality risk
Relative reduction in excess risk among former smokers as compared to current smokers in per cent

Age of cessation	Men	Women
Before 30	97 %	97 %
Before 40	90 %	90 %
35-54	78 %	72 %
55-64	76 %	79 %
65-74	72 %	72 %
75+	71 %	71 %

Source: Jha (2020) and U.S. Department of Health and Human Services (2020).

2.1.2 The case for regulation

The extra gross cost of smoking is estimated to 2.5 per cent of GDP in Europe and 1.8 per cent of GDP in the world.[8] A recent Swedish study estimated the gross costs to 32 billion SEK ($3.8 billion, €3.2 billion).[9] More than half of the costs is loss in market production due to smoking-attributable sick-leave and premature death. About one third is public health costs.

The rationale for the use of economic instruments

A large part of the 32 billion SEK in gross costs are paid for by the smokers themselves and poses no extra burden to non-smokers or the rest of society. But the remainder of the cost are external costs and paid for by others. From an economic efficiency perspective this motivates government intervention to raise cigarette prices to cover all costs from smoking. This by using economic instruments.

The use of economic instruments is primarily motivated by the incentives they provide for smokers to behave in a more socio-economic efficient way. By adjusting the market price on cigarettes, policy makers try to add the external costs of smoking to the price, predominantly as excise duties. Excise duties also ensure smokers are the ones who pay for the extra costs.

The rationale for the use of administrative instruments

Passive smoking imposes harm on non-smokers that is not always possible to remedy using economic instruments. Administrative instruments include laws, regulations, and social norms with the purpose to set behavioural boundaries to reduce harm from smoking. The purpose is not primarily to reduce consumption but may have such an effect. One example is smoking bans. To have effect the administrative instruments must be complemented with monitoring and sanctions in case of non-compliant behaviour. Thus, they come with compliance costs.

[8] Goodchild (2017).
[9] Andersson et.al. (2017).

Box 1. Lives and life years saved by smoking cessation

The reduced excess mortality risks in Table 2 imply both an increased life expectancy and a decreased probability for former smokers of not dying in smoking-related diseases.

From these observations it is possible to make simple calculations of how many years of life that is added to a group of smokers that quit smoking. It is also possible to calculate how many lives that are saved from dying in smoking-related diseases in that group.

Number of life years saved by quitting smoking

Based on the figures in Table 1 quitting smoking before the age of 35 increases life expectancy with 10 years. For a group of 100 quitters aged 34 or less this implies 1,000 years of added life years. Similarly, for 100 smokers aged between 55-64 quitting will add 400 years of added life years.

Number of lives saved by quitting smoking

It is important to note that all smokers do not die from smoking. Accidents, other diseases, and other death causes accrue to approximately 50 per cent of deaths among smokers, i.e., 50 per cent of both smokers and former smokers will die of other causes.

This can be interpreted as if 100 smokers quit smoking, a maximum of only 50 lives can be saved from dying in smoking related diseases. For a group of 100 former smokers who quit before the age of 30, this means that the reduced risk of 97 per cent only can be applied to 50 persons in the group. That is, 97 % of the 50 former smokers who would otherwise die of smoking is saved from dying by smoking. From 100 quitters aged below 30, 49 is saved from a premature death by smoking.

Table 3: Lives saved by quitting smoking

Per cent and number of lives

	Reduction in risk		Number of lives saved per 100 quitters	
Age of cessation	Men	Women	Men	Women
Before 30	97%	97%	49	49
Before 40	90%	90%	45	45
35-54	78%	72%	39	36
55-64	76%	79%	38	40
65-74	72%	72%	36	36
75+	71%	71%	36	36

Source: Lakeville based on Jha (2020).

Example of lives and years added

According to McNeill et.al. (2021) 50,000 smokers stopped smoking in 2017 with a vaping product who would otherwise have carried on smoking. Assuming these former smokers are uniformly distributed over age groups, 10,000 lives were saved from premature smoking-related deaths and 111,000 years were added to society due to the possibility of quitting smoking by vaping.

The rationale for the use of information-based instruments

There is evidence that smokers have incomplete or incorrect information about the risks of smoking. The lower proportion of smokers in the U.S. compared to Europe has been explained by a stronger belief in the negative health effects among Americans.[10] There is also evidence that smokers underestimate the risks due to over-optimism.[11]

Lack of information and behavioural misjudgements motivates governmental intervention. Information-based instruments are designed to address such behavioural inconsistencies. Information-based instruments include information and education. The purpose has historically primarily been to change behaviour by ensuring the individual has full information. New information-based instruments have been introduced with ground-breaking research within the area of behavioural economics. Nudging is one new approach with the goal to help people make better decisions and change their behaviour.

2.2 The use of tobacco policy instruments in the EU

Differences in the use of policy instruments may lead to differences in consumption and use of cigarettes. The health consequences of smoking are significantly lagged and historical differences in the use of such instruments is therefore important to understand the current public health status.

The European Commission points out smoking as the single largest avoidable health risk, and the most significant cause of premature death in the EU. Against this background EU has introduced several tobacco control measures regulating products, marketing, trade, and other areas. The rules are predominantly laid down in the different EU tobacco directives.[12] Over time the EU has harmonised the use of tobacco control policies.

In this section we focus on policy use differences between Sweden and the EU which may affect the levels of cigarette consumption and use. The measures used are divided into economic, administrative, and information-based instruments.

2.2.1 Differences in the use of economic instruments

EU taxation of cigarettes is regulated as a minimum excise tax with the main purpose of limiting the illicit trade and own import of cigarettes between member states with low and high cigarette taxes.[13] The rules were implemented 2014 but were decided upon in 2010 after a long preparation period. To be in line with the minimum levels member states started raising excise taxes rates before 2014.

Swedish cigarette taxes in comparison

Even though EU cigarette taxation has been harmonised since 2014 both cigarette prices and the total tax share differ significantly between member states (see Figure 3 and Figure 4). Ireland has the highest price on cigarettes €0.71 per cigarette, followed by France (€0.51) and Finland (€0.45). Bulgaria (€0.14) and Poland (€0.16) has the lowest prices. On average a cigarette costs €0.28 in the EU.

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[10] Cutler and Glaeser (2006).
[11] Sutton (1999).
[12] Tobacco Advertising Directive (2003/33/EC), Tobacco Products Directive (2014/40/EU) and Council directive 2010/12/EU.
[13] The rules stipulate the excise tax to be a minimum of 60 per cent of sales price, and at least €90 per 1,000 cigarettes.

The first Swedish significant excise tax increase on cigarettes was in 1992. During the 1990s taxes were changed several times, with both increases and decreases. From 2012 the excise tax on tobacco is price indexed and is adjusted once a year. The Swedish cigarette price is 5 per cent higher than the EU average 2023. Calculated as an average since 2010 the Swedish cigarette price was 23 per cent higher than the EU average.

The price of cigarettes and total tax share in the EU 2023

Figure 3: Price of cigarettes
Weighted price (WAP) EUR per 1,000 cigarettes

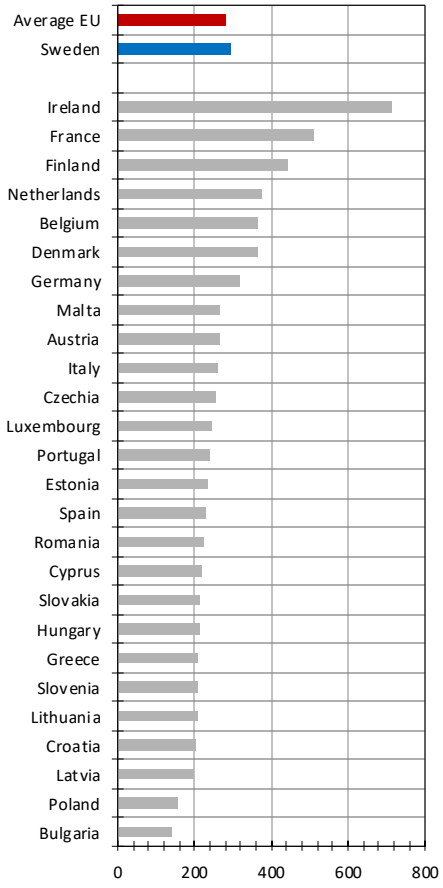
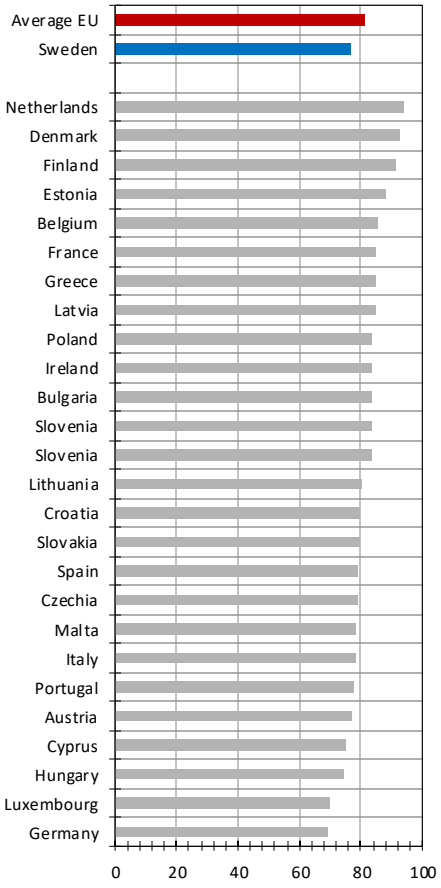


Figure 4: Total tax share
Per cent of WAP (including VAT)



Source: European Commission (2023).

Consequences for comparisons between countries

The historically higher price on cigarettes in Sweden is a key measure to understand differences in cigarette consumption and use between member-states. The price differences must be considered when comparing the resulting health effects on population level, and when assessing the impact of different policy instruments on public health.

2.2.2 Differences in the use of administrative instruments

The Tobacco Products Directive from 2014 introduced many new administrative tobacco measures.[14] The majority were not intended to control consumption or use, but to control wholesale and retail markets to reduce illicit trade.

Unit packets

In 2014, unit packets were introduced with the requirement of containing at least 20 cigarettes. Such a measure is predominantly targeted to reduce smoking among youths and may reduce consumption and use.

Sweden was an early adopter and has had a unit packet regulation in place since 2005, with a minimum requirement of 19 cigarettes per packet. Is difficult to estimate the impact of such a 11-year lag of difference in legislation between Sweden and other EU member states on cigarette consumption, use and health. But it is a possible difference in tobacco policy use, which to some degree may have reduced Swedish smoking more than in other countries.

Swedish snus

The Tobacco directive of 2014 renewed the prohibition of the sale of tobacco for oral use, including snus, from 1992 except for Sweden. Finland is the only EU member state where snus has been consumed to a measurable degree, but only to a limited extent compared to Sweden. The EU sales ban from 1992 consequently did not affect snus consumption in the EU in a substantial way.

The use of snus among Swedish men dates back long before before WWII and the more widespread introduction of cigarettes in Europe after WWII. Swedish consumption of snus and cigarettes is strongly negatively correlated over time. The increase in cigarette consumption up to the mid-1970s corresponds to a substantial decrease in snus consumption.[15] The reverse holds for the period after 1975.

The use of snus and the ban of snus sales is thus a significant difference in policy between Sweden and the EU and must be included to explain differences in smoking behaviour and smoking-related diseases.

Smoke-free air and smoking bans

EU do not regulate smoke-free air or smoking bans, but their recommendation is to strengthen smoke-free legislation within public spaces. Each member state decides if and how smoking bans are to be used. Smoking bans is a measure which can affect cigarette consumption and use.[16]

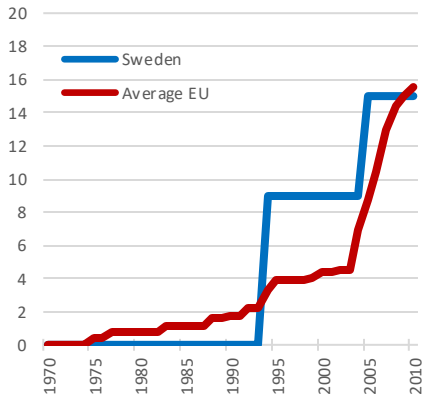
Despite a lack of a coordinating legislation, widespread smoking bans was introduced in most EU member states by 2005 or slightly after. Smoke-free air policies is not a new measure and Finland has had workplace smoking restrictions since 1977. Sweden cannot be singled out neither as an early adopter of smoke-free air policy, nor as a country with more extensive smoke-free policies compared to other EU countries (see Table 4 and Figure 5). Sweden introduced the more extensive smoking bans, e.g. restaurants etc., at the same time as many other EU member states in about 2005.

[14] Tobacco Products Directive (2014/40/EU).
[15] See Nguyen et.al. (2012) figure 13-14 or Rutqvist et.al. (2011) figure 1.
[16] Levy et.al. (2004).

Table 4: First year of introduction of any smoke-free air policy

Member state	Year
Italy	1975
Finland	1977
Portugal	1983
Spain	1988
Netherlands	1990
France	1992
Sweden	**1994**
Austria	1995
Ireland	1995
Germany	2002
United Kingdom	2005

Figure 5: Smoke-free tobacco control policy index



Note: The smoke-free tobacco control policy index measures the extent a country has introduced tobacco control policies to promote smoke-free public areas. The average is based only on the countries listed in the table.
Source: Lakeville based on Nguyen et.al. (2012).

Differences in the use of smoke-free air policies among the EU member states are thus neither a likely explanation of differences in cigarette consumption between states, nor of differences in smoking-related diseases.

2.2.3 Differences in the use of information-based instruments

The effects of information-based instruments on smoking behaviour are mixed. Some studies show limited effects of advertising on smoking prevalence, others cannot find any effect. Traditional text-based health warnings, or weak warnings, may have short run effects, but at most limited long run effects on smoking behaviour. Large graphic warnings on packages, strong warnings, has been shown to have some effect.

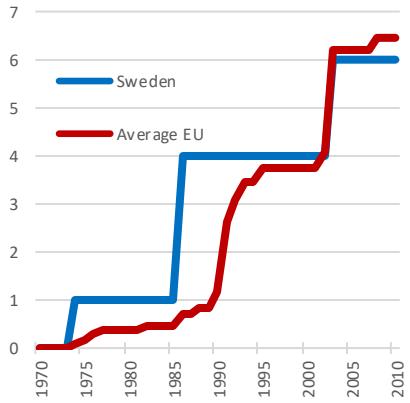
From 2014 large graphical health warnings are required on all cigarette packages in the EU.[17] Before 2014 individual EU member states had their own, mostly weak warnings, labelling rules. Sweden may to some degree be seen as an early adopter of health warnings on packages in 1974, but only of the weak warning type (see Table 5 and Figure 6).

[17] Tobacco Products Directive (2014/40/EU).

Table 5: First year of introduction of health warnings

Member state	Health warnings
Sweden	**1974**
Austria	1975
France	1976
Finland	1977
Germany	1982
Spain	1988
Netherlands	1990
Ireland	1991
Portugal	1991
United Kingdom	1991
Italy	1993

Figure 6: Health warnings tobacco control policy index



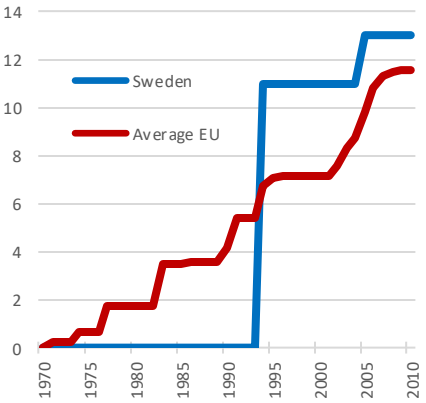
Note The health warnings tobacco control policy indices measure the extent a country has introduced tobacco control policies in different areas. The average is based only on the countries listed in the table.
Source: Lakeville based on Nguyen et.al. (2012).

Swedish tobacco policy concerning advertising and health warnings thus do not stand out in such a manner that it can be expected to explain differences in smoking prevalence or smoking-related diseases to any greater extent.

Table 6: First year of introduction of advertising bans

Member state	Advertising bans
Ireland	1971
Germany	1974
Finland	1977
Italy	1983
Portugal	1983
Netherlands	1990
United Kingdom	1990
France	1991
Spain	1994
Sweden	**1994**
Austria	1995

Figure 7: Advertising tobacco control policy index



Note The advertising tobacco control policy indices measure the extent a country has introduced tobacco control policies in different areas. The average is based only on the countries listed in the table.
Source: Lakeville based on Nguyen et.al. (2012).

3 Smoking and public health in the EU

About 6 per cent of the male adult population in Sweden smoke. This is the lowest share of smokers in the EU and 22 percentage points lower than the EU average of 28 per cent.

The price of cigarettes has to some degree been higher in Sweden historically. But prices in several countries have passed the ones in Sweden and in Ireland and the France the price has been significantly higher for more than a decade. Despite the higher prices, smoking prevalence have not dropped to Swedish levels. Comparing Sweden to member states with lower cigarette prices, the price differences are not sufficient to explain the large differences in smoking behaviour.

The effect of Sweden's lower smoking prevalence on public health is clear. Sweden has the lowest number of smoking-attributable male deaths in Europe, the lowest number of smoking-attributable lung cancer deaths, and the lowest number of new smoking-attributable number of new cancer cases.

3.1 Nicotine consumption and use in the EU

Cigarette consumption is estimated to decrease with approximately 3-5 per cent if the price increases with 10 per cent.[18] The effects of price on consumption can be decomposed into prevalence rates and the quantity of cigarettes of those who smoke. With price increases the general finding is that half of the decrease in consumption is due to reduced prevalence. That is: 50 per cent of the reduction in consumption is due to fewer people smoke, either because they quit or fewer people start smoking, and 50 per cent is due to smokers smoke less cigarettes.[19]

3.1.1 Cigarette consumption and use

In Figure 8 and Figure 9 the effect of the introduction of the EU minimum excise tax in 2014 is clear. On average the cigarette price in the EU has increased with 45 per cent since 2010 in nominal terms. At the same time male smoking prevalence decreased with 6 percentage points: from 34 per cent in 2009 to 28 per cent in 2020. Overall, the price increases were accompanied with decreases in smoking rates in most EU member states, with few exceptions.

[18] Nguyen et.al (2012) and Levy et.al (2004).
[19] Levy et.al (2004).

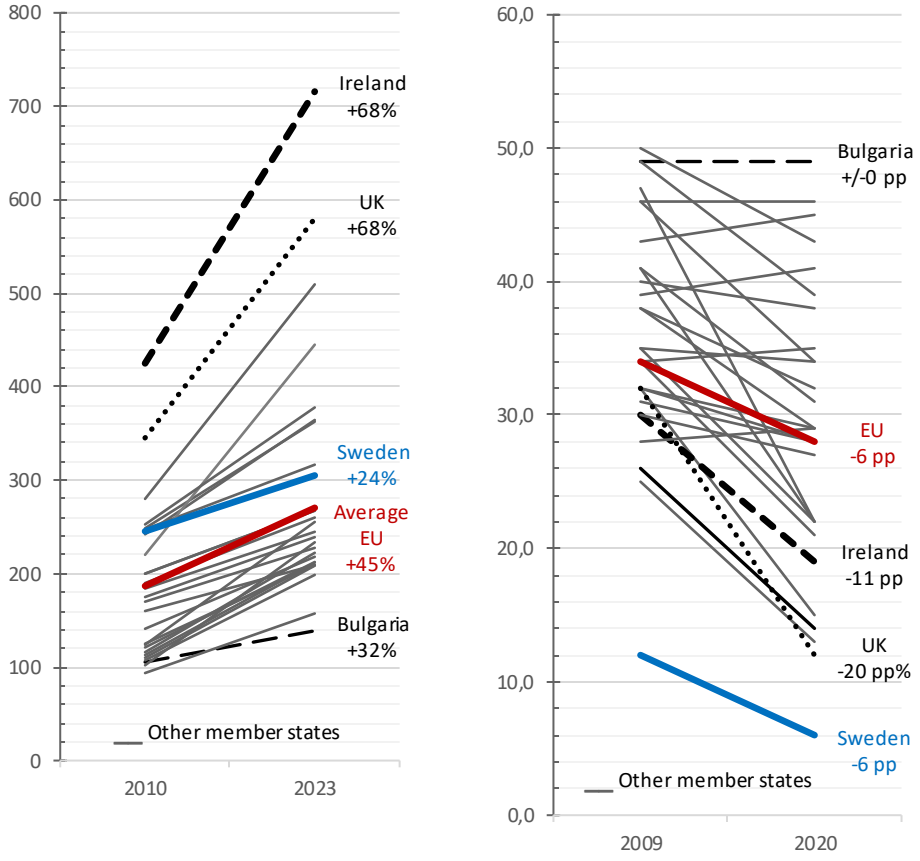
Change the share of smokers in Sweden compared to the EU

In Sweden, the price increase was comparatively modest: only 24 per cent. In countries with more substantial price increases, like Finland, the Netherlands and Belgium, cigarettes are now more expensive than in Sweden compared to a decade ago. Despite the relatively moderate Swedish price increase, the share of daily male smokers decreased on par with the EU average: i.e. with 6 percentage points.

Cigarette prices and daily male smokers in EU member states

Figure 8: Price of cigarettes 2010 and 2023 **Figure 9: Male Smokers 2009 and 2020**

Weighted average price (WAP) EUR per 1,000 cigarettes *Percentage share of population 15+*



Source: European commission (2023) and Eurostat (2022).

Share of smokers in Sweden compared to the EU

Cigarette prices in Ireland, France, United Kingdom, Finland, the Netherlands, Belgium, Denmark, and Germany are the highest in Europe and significantly higher than in Sweden.

Despite higher cigarette prices, the number of male smokers per capita are more than double in all these countries compared to Sweden (Table 7). In Ireland the price is 143 per cent higher, but the number of smokers is three times as high. In Germany, with approximately the same prices, the number of smokers is almost five times as high. On average the number of smokers in the EU is 4.7 times higher than in Sweden (Table 7).

Consequently, the lower smoking prevalence in Sweden cannot fully be explained by higher prices. The lower share of smokers is also difficult to explain with respect to differences in use of other tobacco policies. Both Ireland and the United Kingdom has had much stricter tobacco control policies in place than Sweden and for a longer period.

Table 7: Cigarette prices and share of male smokers

Price in EUR 2023, price difference in per cent, share of male smokers 2020, multiplicative factor

Member state	Price (EUR)	Price compared to Sweden (per cent)	Share of male daily smokers (per cent)	Number of male daily smokers compared to Sweden (factor)
Average EU	280	-5	28	4.7
Sweden	294	-	6	-
Ireland	716	+143	19	3.2
France	509	+73	29	4.8
United Kingdom	580	+97	12	2.0
Finland	445	+51	14	2.3
Netherlands	378	+28	13	2.2
Belgium	364	+24	21	3.5
Denmark	363	+23	15	2.5
Germany	317	+7	28	4.7

Source: European commission (2023) and Eurostat (2023).

3.1.2 Snus consumption and use in Norway and Sweden

With the above background it is difficult to ignore snus as an important factor explaining the particularly low smoking rates among Swedish males.

Since 2004 the share of daily Swedish snus users has been relatively constant. The share of male users has decreased slightly at the same time as the share of female users has increased. In Norway, the use of snus has increased since 2005 and Norwegians now use snus to the same extent as Swedes (Figure 11).

Figure 10: Share of snus users in Sweden

Percentage share of population 15+

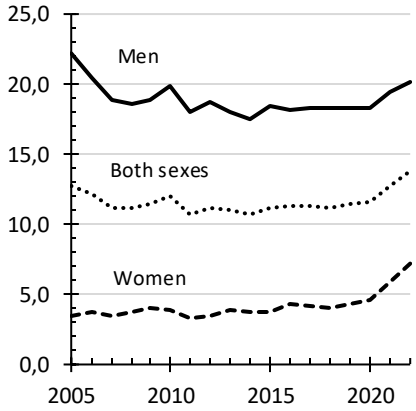
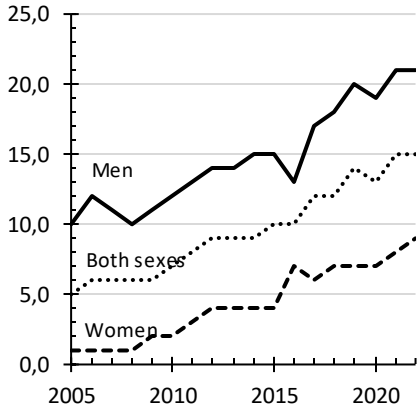


Figure 11: Share of snus users Norway

Percentage share of population 15+



Source: Folkhälsomyndigheten (2023) and Statistisk sentralbyrå (2023a).

Smoking and snus use in Norway

The increased use of snus in Norway the last two decades has been accompanied by a significant reduction in smoking (see Figure 12 and Figure 13), and among all age groups (Figure 14). Since 2005 the share of smoking Norwegians fell from 25 per cent to 7 per cent of the population 16-74 years, or with 18 percentage points. At the same time the share of snus users increased from 5 per cent of Norwegians to 15 per cent, or with 10 percentage points.

Figure 12: Female nicotine users in Norway

Percentage share of population 15+

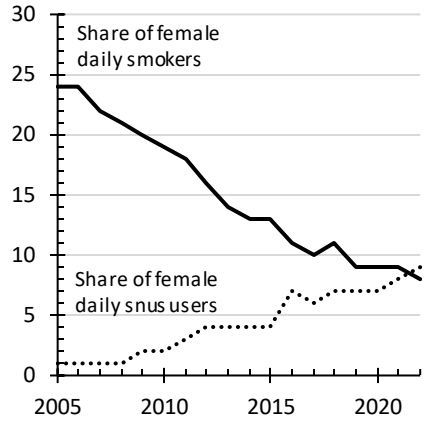
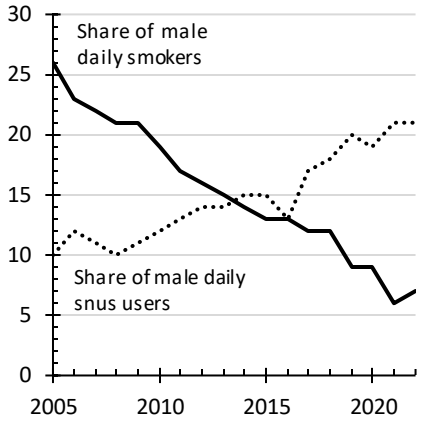


Figure 13: Male nicotine users in Norway

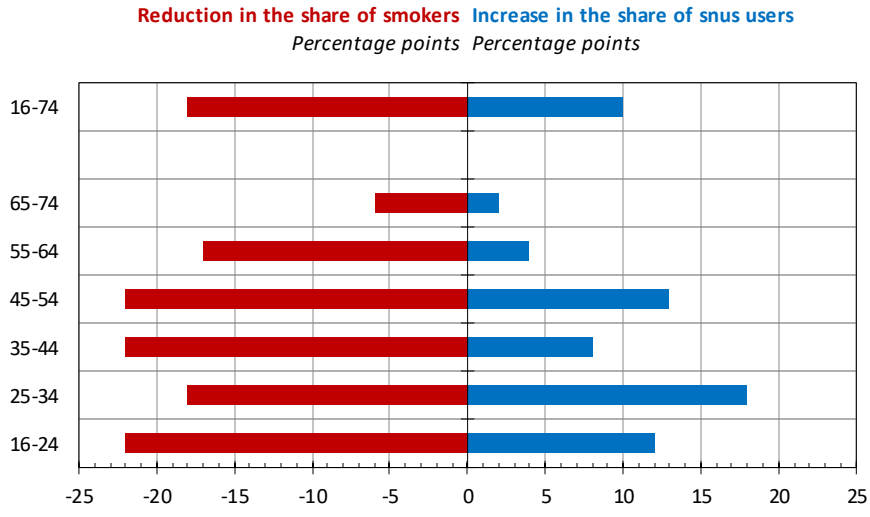
Percentage share of population 15+



Source: Statistisk sentralbyrå (2023a).

Norwegian studies suggests that snus has been the most common method for smoking cessation.[20] Furthermore, most Norwegian snus users are former or current smokers. The share of dual users, and smokers who were former snus users, has decreased. At the same time, dual users smoke fewer cigarettes compared with current smokers.[21]

Figure 14: Change of Norwegian daily smokers and daily snus users 2005–2022



Source: Statistisk sentralbyrå (2023a).

[20] Lund and Lund (2014)
[21] Lund, Vedøy and Bauld (2016)

3.2 Smoking attributable deaths and cancer cases in the EU

Differences in smoking behaviour has consequences for public health. Sweden has both the lowest smoking prevalence among men and the lowest rate of cancer deaths in the EU (Figure 15 and Figure 16).

Lung cancer is almost exclusively attributable to smoking. Among Swedish males, aged 35+, 63 men out of 100,000 died of lung cancer in 2020. This is less than half of the EU average of 136 men.

In the EU about 360 men out of 100,000 died of cancer in 2020. This is 137 men, or 40 per cent more than in Sweden.

Male cancer mortality vs. daily smoking prevalence in EU member states 2020

Figure 15: Lung cancer deaths
Dead males 35+ per 100,000, age standardised

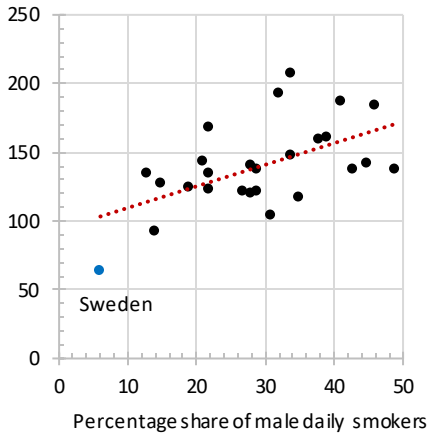
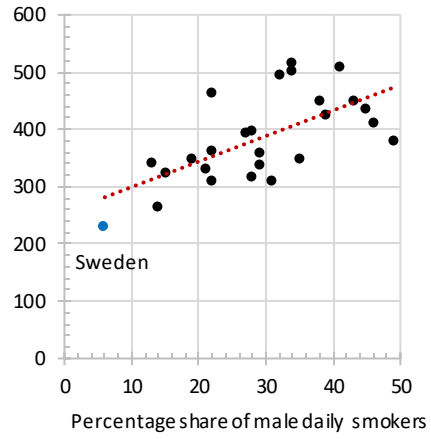


Figure 16: Total cancer deaths
Dead males 35+ per 100,000, age standardised



Source: Eurostat (2023) and European Commission (2023).

3.2.1 Number of smoking-attributable deaths

Even though the effects of smoking on public health are clear, not all deaths or cancers are attributable to smoking. The share of the public health consequences due to smoking to a large degree depends on the type of disease, the share of the population that smokes, and the age of smokers.

In this and the next section the number of deaths and new cancer cases attributable to smoking is estimated. The method and assumptions for the estimations are described in Appendix 1. Depending on data availability the estimation base years used are 2017 and 2020. When possible, estimates for Iceland and Norway is also included. Data on the number of former smokers is relatively inconsistent and shows large discrepancies between years and countries, making the data hard to interpret and use. The number of smoking-attributable deaths among former smokers is thus not included in the estimates.

Almost 450,000 male current smokers died of smoking-attributable diseases in the EU, Norway, and Iceland in 2017 (see Table 13 in Appendix 1). This estimate only includes male current smokers. Smoking-attributable deaths due to male passive smoking and among male former smokers are excluded. The estimate is thus a lower bound of total smoking-attributable deaths among European men.

Smoking-attributable deaths in Sweden compared to the EU

The number of deaths in Sweden stands out in an EU perspective. Sweden has the lowest number of smoking-attributable male deaths in Europe: 135 men per 100,000, less than half of the EU average of 296 men (Figure 18).

Smoking-attributable deaths among male current smokers in Europe 2017

Figure 17: Number of male deaths

Dead males 35+

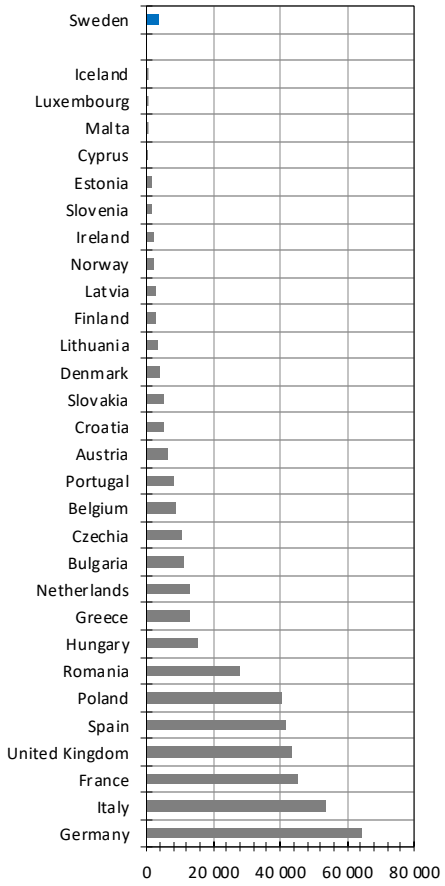
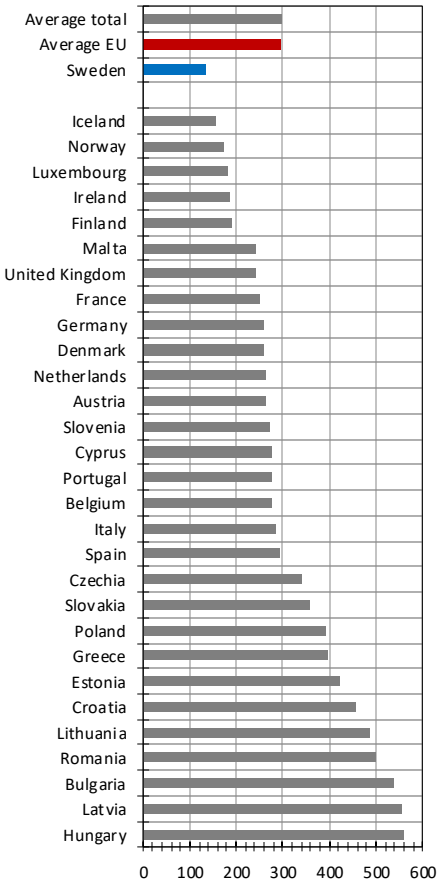


Figure 18: Number of male deaths

Deaths per 100,000 males 35+



Source: Lakeville.

Lung cancer deaths

Lung cancer can almost exclusively be attributed to smoking, and about 170,000 men died from lung cancer during 2020. Almost 85 per cent of these death, or 140,000 cases, can be attributed to smoking among current male smokers.

By focusing on one of the most relevant smoking-attributable diseases the effect of Swedish policy is more pronounced. Only 42 lung cancer deaths per 100,000 among Swedish men 35+ can be attributed to smoking. This is about 60 per cent lower than the EU average, with 109 deaths. Compared to Ireland, with the next lowest level of lung cancer cases in the EU (70 cases), the Swedish level is about 40 per cent lower.

Smoking-attributable lung cancer deaths among male current smokers in Europe 2020

Figure 19: Number of male deaths

Dead males 35+

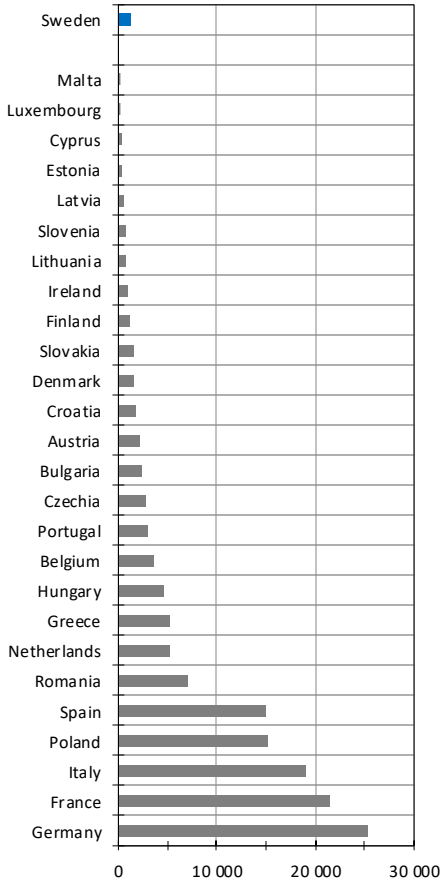
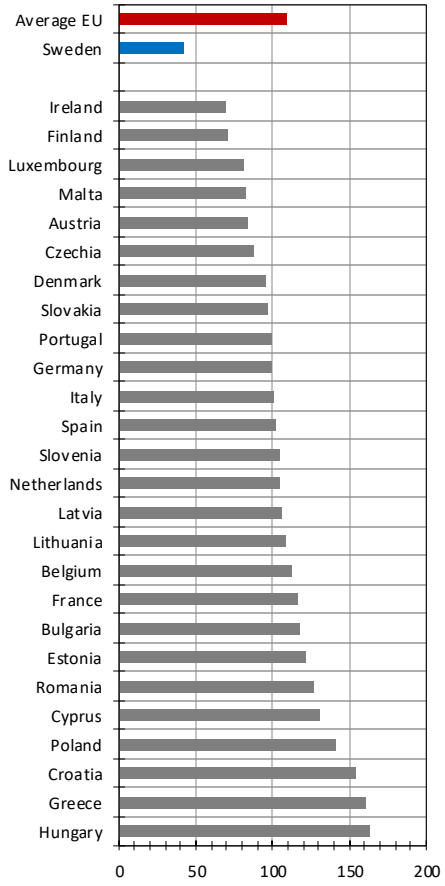


Figure 20: Number of male deaths

Deaths per 100,000 males 35+



Source: Lakeville.

3.2.2 Number of smoking-attributable cancers

In 2020 approximately 750,000 males 35+ were diagnosed with a smoking-related type of cancer. Of these 330,000 cases can be attributed to smoking (Table 15 in Appendix 1). This estimate only includes male current smokers. Smoking-attributable cancers due to male passive smoking and among male former smokers are not included. The estimate is thus a lower bound of total smoking-attributable new cancer cases among men in the EU.

The effect of Swedish tobacco policy is clear by comparing the number of new cancer cases per 100,000 male inhabitants. Sweden has the lowest number of smoking-attributable new cancer cases among males in the EU: 93 men per 100,000 compared to the EU average of 263 cases (Figure 22).

Smoking-attributable new cancer cases among male current smokers in the EU 2020

Figure 21: Number of new cancer cases

New cases among males 35+

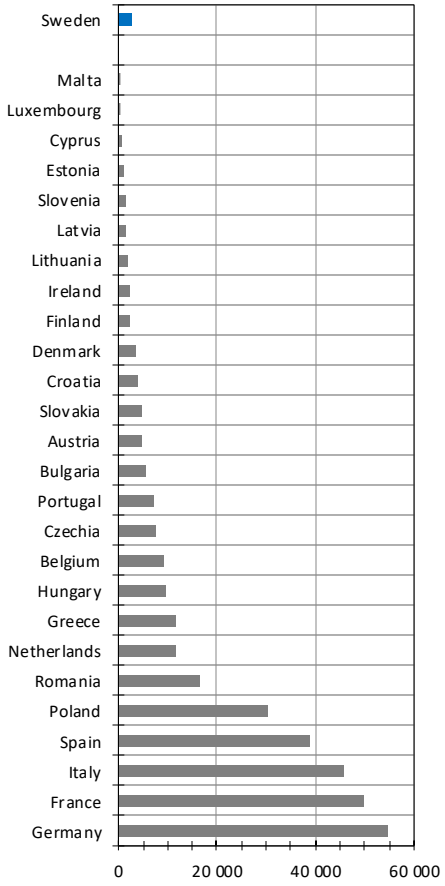
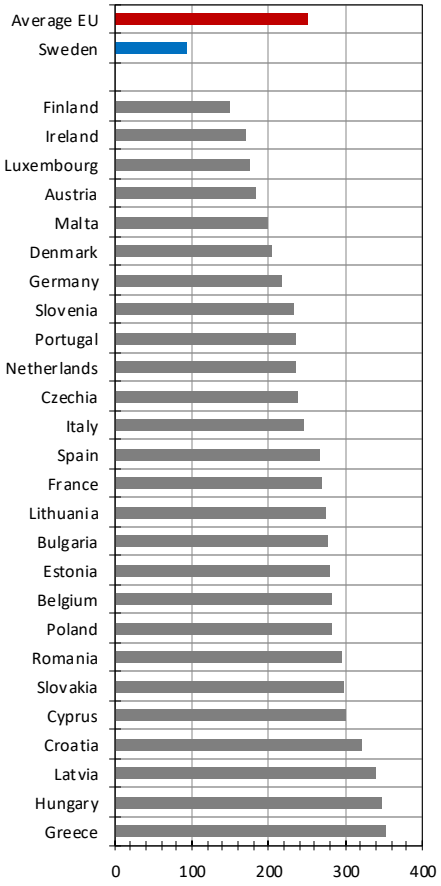


Figure 22: Number of new cancer cases

Cases per 100,000 males 35+



Source: Lakeville.

4 The potential for harm reduction in EU

The effects of applying Swedish tobacco control policy in other EU members states can be divided into two effects: effects due to a change in cigarette prices and effects due to changes in the use of other policies. The price effect can be estimated by standard economic practices. The effects of other instruments are hard to separate. The historical main difference, save for price, is allowing for sales and the use of snus in Sweden. Effects of differences in the use of other policies are most likely limited.

The Swedish strategy of allowing the sale of snus is estimated to reduce the number of deaths in Sweden with approximately 3,400 men per year.

Allowing the sale of snus in the EU is estimated to reduce the number deaths with approximately 210,000 men in total and the number of lung cancer deaths with about 74,000 per year. The number of new cancer cases among men is estimated to be reduced with 175,000 cases per year.

4.1 The potential to reduce the number of smoking-attributable deaths in the EU

In this section two calculations are presented. The first is the potential of snus to reduce the number of overall smoking-attributable deaths and is based on the number of deaths by cause reported by EUROSTAT for 2017.[22] The second is the potential of snus to reduce the number smoking-attributable lung cancer deaths and is based on the number of lung cancer deaths reported by ECIS for 2020[23]. The two data sets contain different countries. As an example, the United Kingdom is included in the 2017 data but not in the data from 2020.

Reduction of smoking attributable deaths in Sweden

The cigarette prices in Finland, Denmark, Germany, Netherlands, and Belgium have on average approximately matched the Swedish price over the last decade. Using the smoking prevalence in these countries as a base line comparison it is possible to estimate the effect of Swedish tobacco policy, excluding the effect of price on public health.

According to such a comparison, the Swedish snus policy reduces the number of smoking-attributable deaths in Sweden with 3,400 men per year. This can be

[22] Eurostat (2023).
[23] European Commission (2022).

compared to the 800 men Djurdjevic et.al. (2019) reports to be saved by allowing the sales of snus. The lower figure reported by Djurdjevic et.al. (2019) may to some degree be explained by their limited scope: only including lung cancer, COPD, IHD and stroke.

4.1.1 The potential to reduce overall smoking-attributable deaths

In 2017 the male EU population 35 years or older was about 150 million.[24] Of these, 1.5 million, or 1 per cent, died in smoking-related diseases. Of the 1,5 million deaths, 440,000 can be attributed to smoking.

Potential protective effect of Swedish snus policy on number of deaths among males in the EU, Norway and Iceland

Figure 23: Reduction of deaths
Dead males 35+

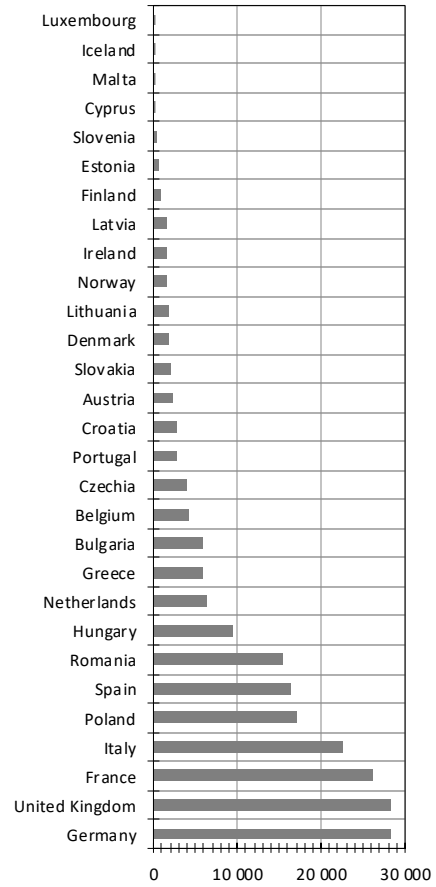
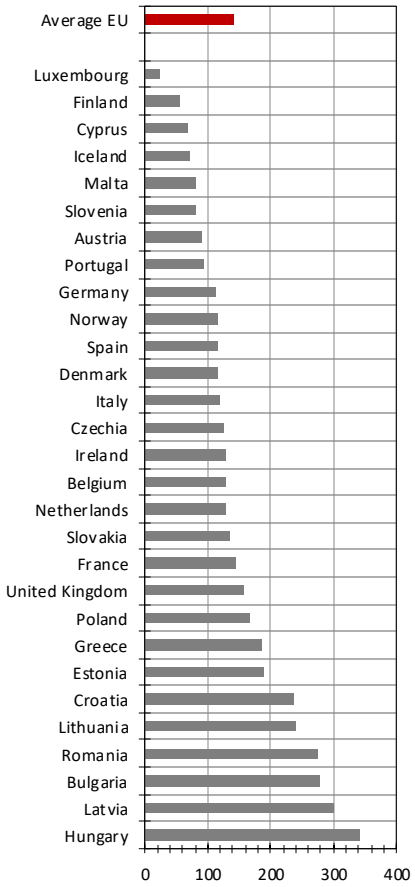


Figure 24: Reduction of deaths
Deaths per 100,000 males 35+



Source: Lakeville.

Total effect and price effect

Replacing European tobacco policy with Swedish tobacco policy is estimated to reduce the number of smoking-attributable deaths among European men with approximately 240,000 men (see Table 16 in appendix 1, Column *Total effect*).

[24] This includes Norway and Iceland.

The effect of imposing Swedish taxes on other member states is estimated to reduce the number male deaths with approximately 31,000. In some countries the taxes are higher than in Sweden. In these cases, applying a Swedish tax rate will increase the number of smoking related deaths (see Table 16 in appendix 1, Column *Price effect*).

The effect of allowing for the sale of snus

The residual effect of Swedish tobacco policy, that is the total effect minus the price effect, is 210,000 fewer male deaths. The residual effect is interpreted as the effect of allowing for the sales of snus (see Table 16 in Appendix 1, Column *"Snus" effect*). This can be compared to 200,000 fewer deaths reported by Rodu and Cole (2003), and 355,000 fewer deaths reported by The Snus Commission (2017).

Measured as deaths per 100,000 men, allowing for the sales of snus can on average be expected to reduce the number of smoking-attributable deaths with approximately 142 men per year (see Figure 24). The reduction in individual member states differ significantly depending on cigarette price and smoking prevalence. The reduction in smoking attributable deaths in Hungary is expected to be the largest (342 men per 100,000) due to their low cigarette price and high smoking prevalence.

4.1.2 Potential to reduce the number of lung cancer deaths

In 2020 the male EU population 35 years or older was about 130 million.[25] Of these, 170,000, or 1 out 1,000 men died during 2020 from lung cancer. Of the 170,000 lung cancer deaths, 140,000, or 84 per cent, can be attributed to smoking.

With Swedish tobacco policy almost 90,000 of the lung cancer deaths could have been avoided (Table 17, Column *Total effect*). 14,000 of these due to higher prices in line with Swedish policy (Table 17, Column *Price effect*).

The effect of allowing for the sale of snus

The residual effect, or the effect of allowing snus, is that almost 74,000 of the lung cancer deaths could have been avoided (Table 17, Column *"Snus" effect*).

Measured as deaths per 100,000 men, allowing for the sales of snus can on average be expected to reduce the number of lung cancer deaths with approximately 50 men per year (see Figure 26). The effect in individual member states differ depending on cigarette price, smoking prevalence, and current lung cancer mortality rates. The largest reductions can be expected in Hungary and Greece where the number of deaths is estimated to decrease with more than 90 men per 100,000.

[25] United Kingdom is not included,

Potential protective effect of Swedish snus policy on lung cancer deaths among males in the EU

Figure 25: Reduction in lung cancer deaths
Dead males 35+

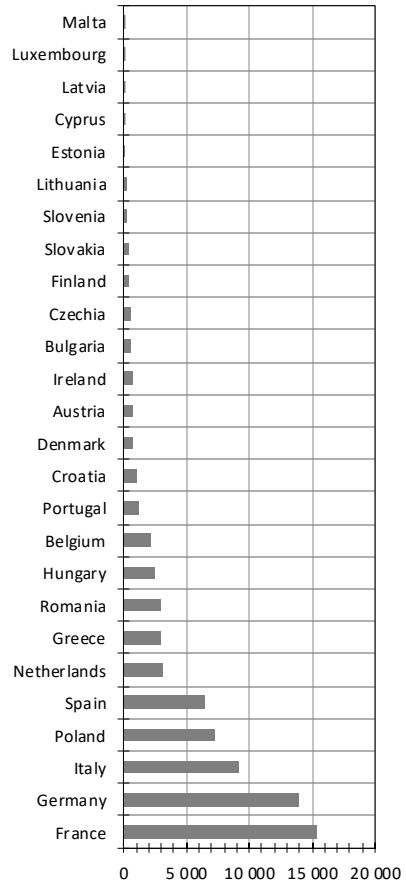
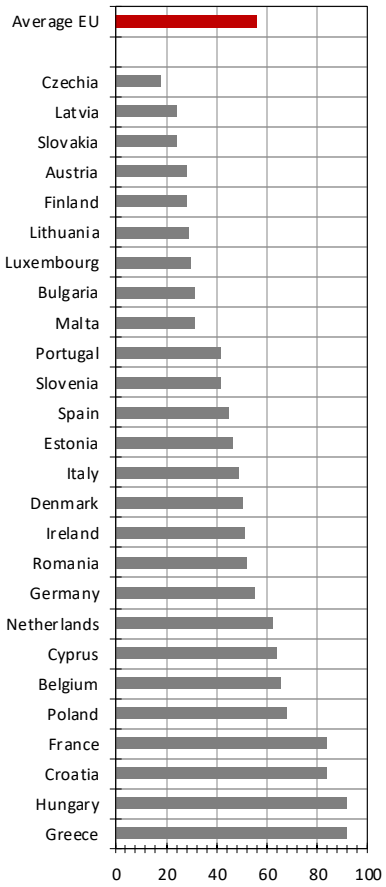


Figure 26: Reduction in lung cancer deaths
Deaths per 100,000 males 35+



Source: Lakeville.

4.2 The potential to reduce smoking-attributable cancers in the EU

In 2020 the male EU population 35 years or older was about 130 million.[26] Of these, 750,000, or 5 out of 1,000 men, was diagnosed with some form of cancer in 2020. Of the 750,000 new cancer cases, 330,000, or 44 per cent, can be attributed to smoking.

With Swedish tobacco policy approximately 210,000 of all new cancer cases among males could have been avoided (see Table 18, Column *Total effect*). The effect of higher Swedish prices stands for a reduction with 35,000 cases (see Table 18, Column *Price effect*).

The effect of allowing for the sale of snus

The residual effect of Swedish tobacco policy, or the effect of snus, is 175,000 fewer new cancer cases among European men (see Table 18, Column *"Snus" effect*).

[26] United Kingdom is not included,

Measured as new cancer cases per 100,000 men, allowing for the sales of snus can on average be expected to reduce the number of new cancer cases with approximately 130 men per year (see Figure 28). The effect in individual member states can be expected to differ depending on cigarette price, smoking prevalence, and current cancer incidence rates. The largest reduction can be expected in Greece where the number of new cancer cases is estimated to decrease with more than 200 cases per 100,000.

Potential protective effect of Swedish snus policy on new cancer cases among males in the EU

Figure 27: Reduction in new cancer cases
New cases among males 35+

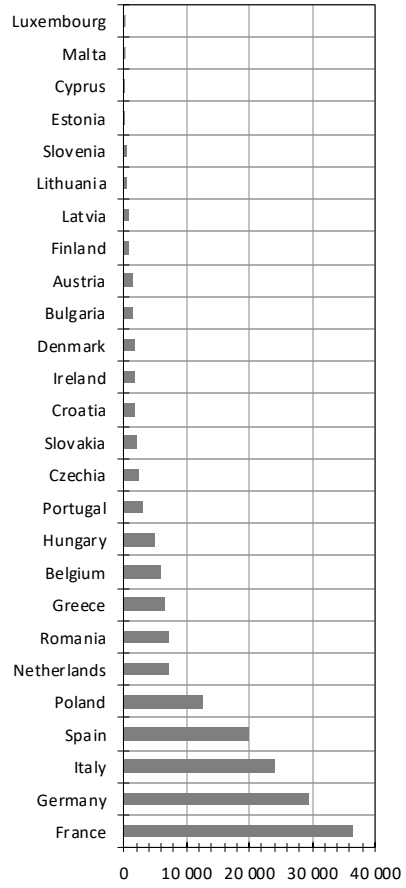
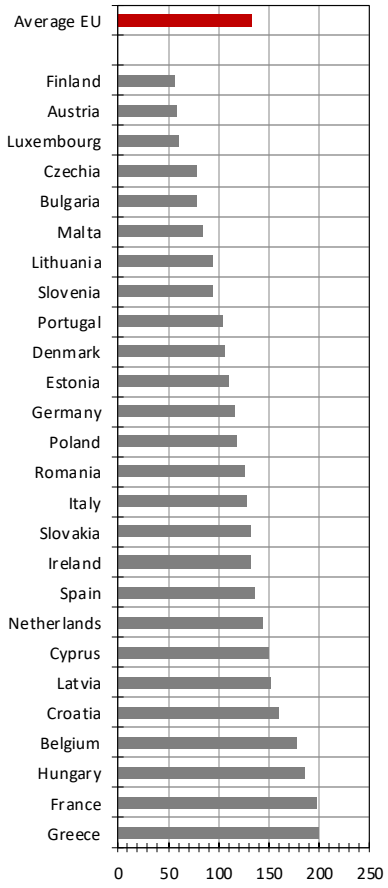


Figure 28: Reduction in new cancer cases
Cases per 100,000 males 35+



Source: Lakeville.

5 Nicotine use and policy in Sweden, Norway, and the UK

Sweden, Norway, and the United Kingdom have the lowest smoking prevalence rates in the EU, and over the past decade, smoking rates have significantly decreased. This trend can mainly be attributed to an assertive tobacco policy that includes higher tobacco excise taxes combined with a policy that does not restrict the availability of less harmful alternative nicotine products.

The higher taxes on cigarettes and the access to smoking substitutes have facilitated the countries' transition towards a smoke-free society. In Sweden and Norway, snus has long served as an alternative to smoking, primarily among men. More recently, women in both Sweden and Norway have switched from smoking to nicotine pouches. As a result, the proportion of smokers in Sweden and Norway is expected to drop below five per cent of the population within a few years.

Approximately 13 per cent of the population in the United Kingdom smoke cigarettes on a daily basis, which is lower than in most EU member states and significantly below the EU average of 25 per cent. One significant factor contributing to the lower smoking rate is that around 5 per cent of Britons use vaping devices. Approximately half of the vapers state that they use e-cigarettes to aid them in quitting smoking. Against that background, the British government actively encourages smokers to swap cigarettes for vapes to achieve its smoke-free ambitions by 2030.[27]

In this chapter we discuss the use of policy instruments, the consumption of nicotine products, and how the United Kingdom can speed up its transition to a smoke-free society by encouraging Britons to use less harmful alternative nicotine products.

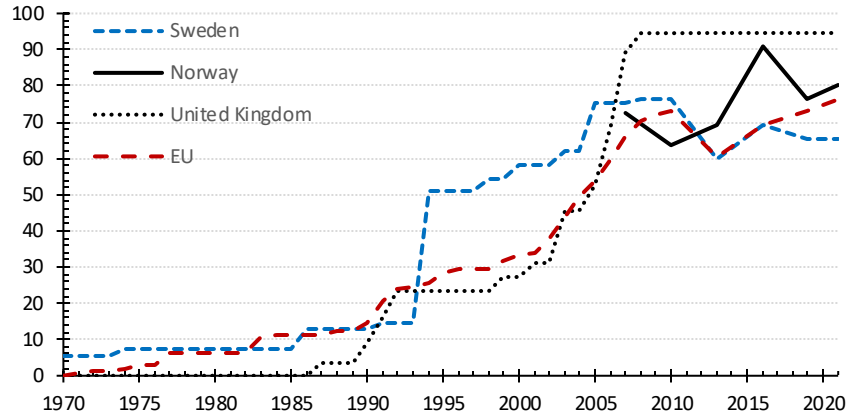
5.1 Use of nicotine policy instruments

Before the 1990s, the use of tobacco control measures was not widespread in Europe. Sweden was one of the few countries that introduced health warnings on cigarette packets and provided assistance for quitting smoking as early as the 1970s.

[27] GOV.UK (2023).

Figure 29: Total score of administrative and information instruments use

Tobacco control scale score. Maximum = 100.



Note: The Tobacco control scale charted here only includes smoke free areas, advertising bans, health warnings and cessation help, and is rescaled to have a maximum of 100.
Source: Nguyen (2012) and Tobacco Control Scale (2023).

Figure 30: Smoke free areas score

Tobacco control scale score. Maximum = 22.

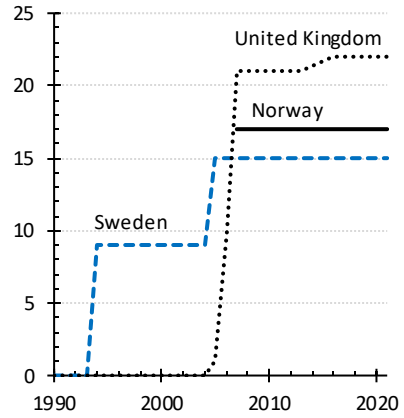


Figure 31: Advertising bans score

Tobacco control scale score. Maximum = 13.

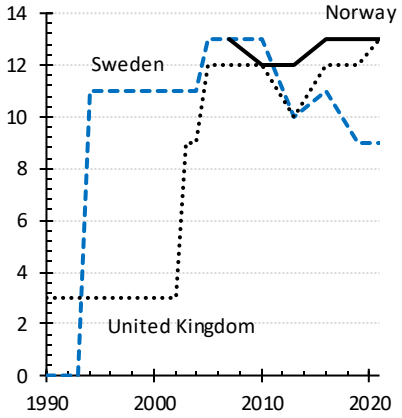


Figure 32: Health warnings score

Tobacco control scale score. Maximum = 10.

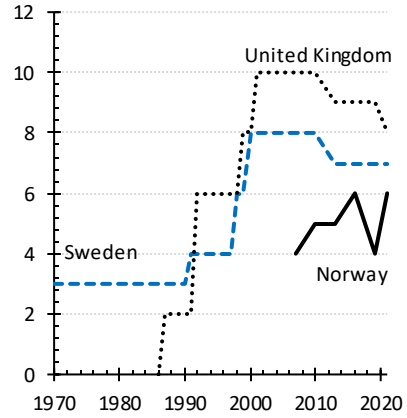
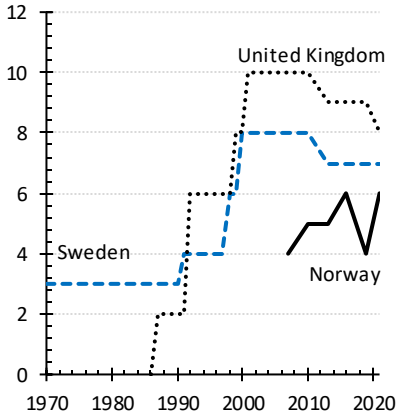


Figure 33: Cessation help score

Tobacco control scale score. Maximum = 10.



Source: Nguyen (2012) and Tobacco Control Scale (2023).

The use of administrative and information instruments

The 1990s witnessed a shift in the use of both administrative and informational policy instruments. Sweden implemented smoking bans in some premises and introduced comprehensive advertising restrictions in 1993. In the United Kingdom, similar legislation was passed approximately 10 years later and is now more extensive, as shown in Figure 29. The British government's tobacco control policy is ranked to be the most stringent in Europe, along with the Irish. Currently, Sweden's tobacco control measures are ranked 21st out of 37 countries.[28] Norway has had a similar development of tobacco control as Sweden, but there are no tobacco control scale measurements before 2007.

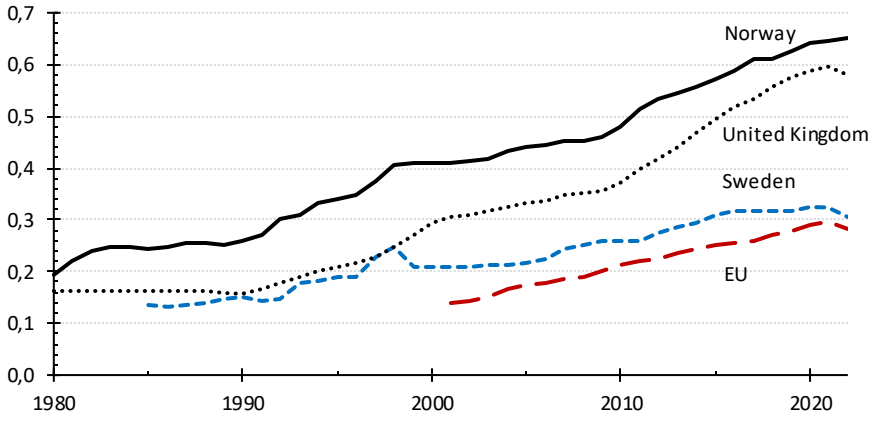
Sweden was an early adopter of certain tobacco control measures, but on average, the EU, and especially the United Kingdom and Ireland, has caught up. Sweden was not the first to implement tobacco policies compared to some EU member states. Despite ranking lower than both the United Kingdom and Ireland in all tobacco control areas, Sweden still has a significantly lower smoking prevalence. Therefore, administrative and informational measures only to a limited degree can explain the differences in smoking prevalence between countries.

The use of economic instruments

Taxing smoking is one of the most effective policy instruments to reduce smoking, and the Norwegian government has actively used higher excise taxes on smoking for a long period of time attempting to reduce smoking. The inflation-adjusted price of cigarettes in Norway has tripled since 1980 and a single cigarette cost over 0.6 euro in 2022, as shown in Figure 34.

Figure 34: Real price of cigarettes

Euro per cigarette in 2022 prices



Note: The price is not adjusted for exchange rates in order to reflect the development of cigarette prices relative to other products and services for an average consumer residing in the respective country.

Source: Statistiska centralbyrån (2023), Statistisk sentralbyrå (2023b), Office for National Statistics (2023a).

In both Sweden and the United Kingdom, the taxation of cigarettes led to a relatively comparable price development until the turn of the millennium. But in 1997, Sweden attempted a significant change in its taxation policy by implementing an almost 50 per cent increase in the tax rate. However, this shift was unsuccessful as it resulted in a

[28] Tobacco Control Scale (2023).

substantial rise in the consumption of smuggled illicit cigarettes and personal imports. In 1999, the government decided to reduce the tax on cigarettes to restrict the growth of black-market tobacco.

This setback represented a turning point in how the Swedish government used the tax instrument to reduce smoking. Despite continuously raising the cigarette tax and increasing the real price, they were hesitant to raise taxes at the same pace as Norway and the United Kingdom after the turn of the millennium. As a result, the price increases in Sweden have been relatively modest in comparison. As of 2022, the price of a single cigarette in Sweden is approximately half the price in both Norway and the United Kingdom. Compared to the EU, the price of cigarettes in Sweden is only slightly higher than the EU average. Despite this minimal price difference, the smoking prevalence in the EU is 2.5 times higher than in Sweden.

In the United Kingdom, the turn of the millennium instead marked a starting point for a more assertive use of taxes to combat smoking. Since 2000 the price of cigarettes has increased almost with 120 per cent in real terms and adjusted for inflation. This can be compared to 45 per cent in Sweden and 60 per cent in Norway.

The United Kingdom's notable tax increases and relatively high cigarette prices have resulted in a decline in the number of smokers and the amount of cigarettes consumed compared to the EU averages. However, smoking rates in the United Kingdom have not yet reached the low levels observed in Sweden and Norway. At the same time, cigarette prices in Ireland, France, Finland, Belgium, and Denmark have been higher than in Sweden for a long time, without being able to reduce smoking to Swedish levels.

This suggests that the price of cigarettes plays a significant role in explaining smoking behaviour, but it is not the sole determinant. While higher cigarette taxes can contribute to reducing smoking rates, achieving a substantial decrease requires the implementation of additional measures in combination with tax increases.

The effects of available alternative nicotine products

The tobacco control measures reported above by The Tobacco Control Scale (2023) do not include administrative policies that explicitly prohibit the sale or use of alternative nicotine products. Since such products can be viewed as substitutes to smoking, administrative policies that hinders their sales or use have a detrimental effect on reducing smoking. Not including such bans or prohibitions as a tobacco control measure will skew the description of why Sweden, Norway and the United Kingdom have been so successful in combating smoking compared to most other EU member states.

One of the most significant administrative policy distinctions between Sweden and the EU (and the United Kingdom), is the prohibition of snus sales in the EU, which has been in place since 1992. This EU restriction in availability has limited the possibility of both British and European consumers to choose less harmful nicotine products instead of smoking.

Neither Sweden not Norway have restricted the availability of less harmful alternative nicotine products such as snus, and the more recently introduced nicotine pouches and e-cigarettes. Compared to the situation in most EU member states Britons, Swedes and Norwegians have a higher prevalence of using alternative nicotine products. The widespread use of snus and nicotine pouches is notable in Sweden and Norway. In the United Kingdom Britons prefer vaping, see Figure 36.

Access to alternative products becomes particularly important when governments increase cigarette taxes. As the price of smoking rises, smokers will seek alternatives. Without alternatives, many smokers will continue to smoke despite the higher price.

With the availability of various types of snus, nicotine pouches, and e-cigarettes on the market, smokers can more easily find substitutes that satisfy their nicotine needs.

Thus, the availability of less harmful nicotine alternatives is crucial in combating smoking. Without such alternatives, achieving the smoke-free targets set by governments becomes an uphill battle.

5.2 Nicotine use

Smoking prevalence in Sweden has consistently been the lowest in Europe for a considerable period. The share of smokers is approaching 5 per cent for both men and women. Norway is not far behind, with a smoking prevalence of 7,5 per cent. The current smoking prevalence in the United Kingdom, 12.9 per cent, was surpassed by Sweden 15 years ago and by Norway 7 years ago, indicating that the United Kingdom lags behind in reducing smoking rates, see Figure 37.

Even though the United Kingdom lags behind Sweden and Norway, the three countries are unmatched combating smoking in comparison with all other member states in the EU. This is evident from the low prevalence of smokers as shown in Figure 35.

Figure 35: Share of smokers
Per cent of population 15 years or over

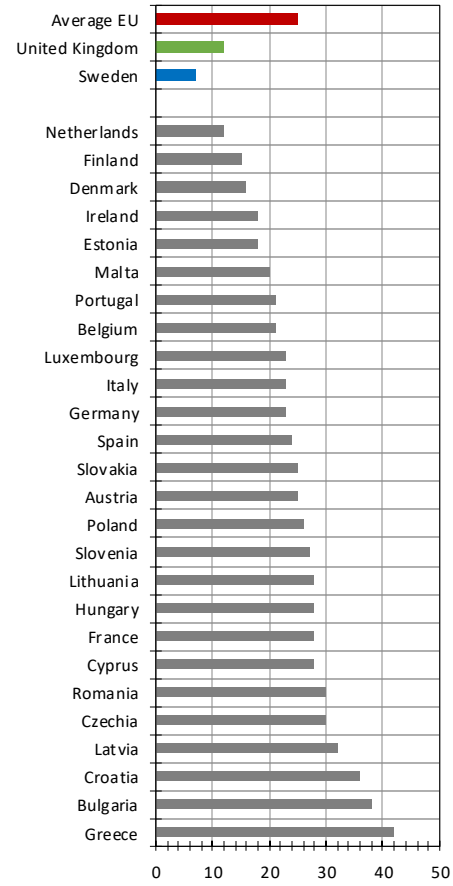
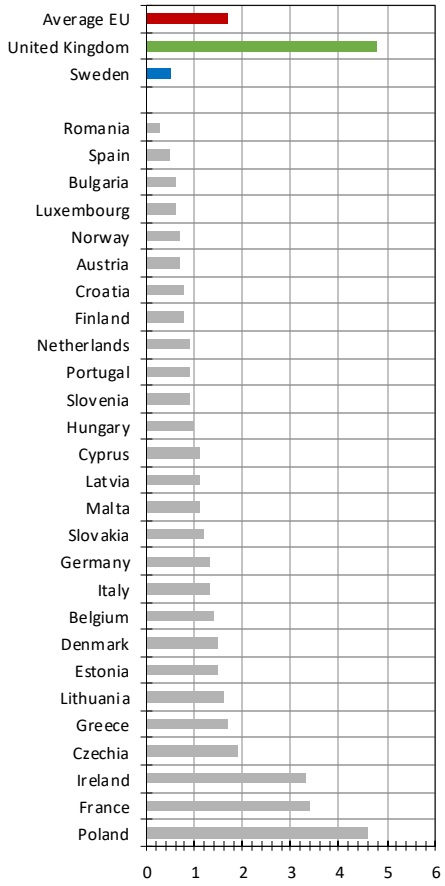


Figure 36: Share of vapers
Per cent of population 15 years or over



Source: Lakeville based on Eurostat (2022).

The Norwegian experience

Norway previously had a high prevalence of smokers, but the number of daily smokers has decreased significantly from over 40 per cent of the population during the early 1970s to 7.5 per cent in 2022. This rapid decline was accompanied by an increase in the use of snus and, in recent years, the use of nicotine pouches as well (see Figure 37 and Figure 38). As a result, the number of smokers has declined more rapidly in Norway compared to both Sweden and the United Kingdom.

The contrast in the rate of decline is most evident when comparing the rate of smokers in Norway and the United Kingdom after the turn of the millennium. The smoking prevalence in Norway was 5 percentage points higher than in the United Kingdom in 2000. Twenty-two years later, in 2022, the prevalence in Norway was instead 6 percentage points lower, see Figure 37.

There are at least two explanations for this divergence in smoking rates between the two countries. Firstly, smoking among young Norwegians dropped very fast during this period (see Figure 43), resulting in fewer older smokers in subsequent years. The low share of young smokers was accompanied by a significantly higher share of snus users, see Figure 44. Secondly, Norwegian females started using snus and nicotine pouches to a larger extent, see Figure 42. Both developments were the result of Norwegians having the option to choose alternative nicotine products when the Norwegian government increased the tax rate on cigarettes. Since Norwegians had less expensive and less harmful options to continue smoking, the price effect of the increased taxes was accentuated, thereby accelerating the decline in smoking.

The Swedish experience

The slower increase in Swedish cigarette taxes, has resulted in a slower decline in smokers in Sweden compared to Norway, but similar to the decline observed in the United Kingdom. The slower decline can also be attributed to Sweden's long-standing tradition of snus use, which has helped keep the number of smokers low by providing an alternative to smoking, see Figure 37 and Figure 38. As a result, Sweden has consistently had a significantly lower prevalence of smokers compared to Norway.

The rate of decline in smoking rates among the elderly is generally low in most countries, except for Swedish older men. The prevalence of smoking among older Swedish men is lower, and the rate of decline in smoking rates is higher compared to older Swedish women, as well as the elderly populations in Norway and the United Kingdom. This can be attributed to the long-standing tradition of Swedish men using snus across all age groups, and the fact that Swedish men always have had the option to choose snus from a very young age.

Snus has never been popular among Swedish women, so snus did not constitute a realistic alternative to smoking for them. However, with the introduction of nicotine pouches in the Swedish market, Swedish women had a more attractive alternative. Nonetheless, for women above the age of 65, smoking habits may be difficult to break, and nicotine pouches might not be an appealing alternative for them. Consequently, the smoking prevalence among older Swedish women only decreases slowly.

These facts imply that reducing smoking among the elderly can be challenging, even with the introduction of alternative nicotine products to the market. The deeply ingrained smoking habits among older individuals, along with the limited perceived attractiveness of available alternatives, pose obstacles to achieving significant reductions in smoking rates among this demographic segment.

Figure 37: Daily smokers

Share of daily smokers in total population

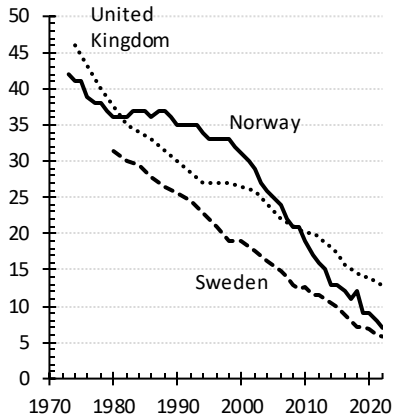


Figure 38: Daily non-smoking nicotine users

Share of daily snus and vape users in total population

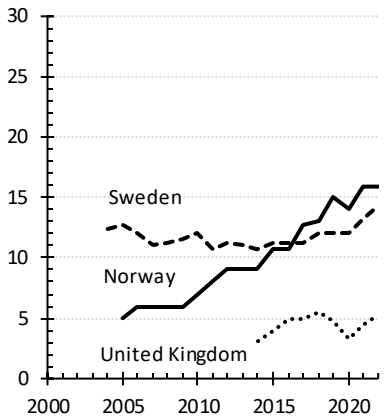


Figure 39: Daily male smokers

Share of daily smokers in total population

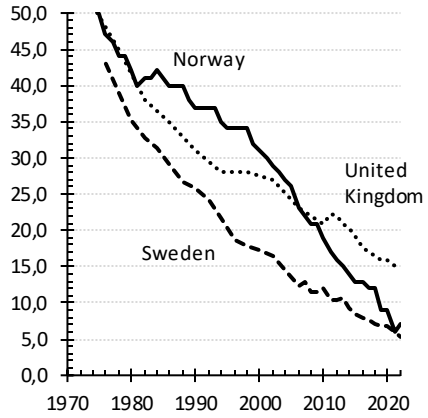


Figure 40: Daily male non-smoking nicotine users

Share of daily snus and vape users in total population

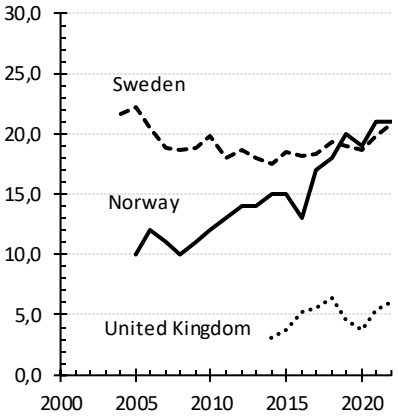


Figure 41: Daily female smokers

Share of daily smokers in total population

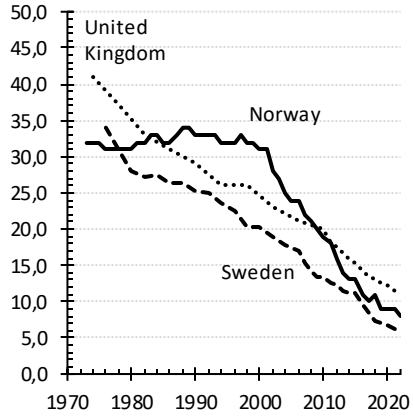
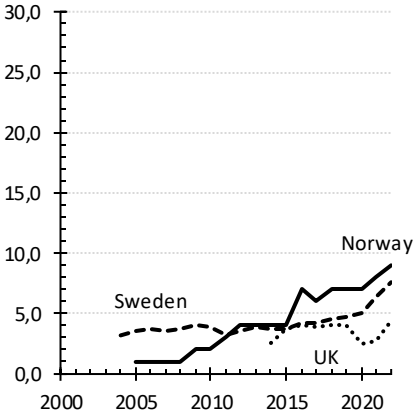


Figure 42: Daily female non-smoking nicotine users

Share of daily snus and vape users in total population



Note: Total population is defined as 16–84 in Sweden, 16–74 in Norway and 18+ in the UK. Nicotine pouches is included in snus.

Source: Statistiska centralbyrån (2019), Folkhälsomyndigheten (2023), Statistisk sentralbyrå (2023a), Office for National Statistics (2023b) and Statistiska centralbyrån (2019).

Figure 43: Daily young people smokers

Share of daily smokers in total population

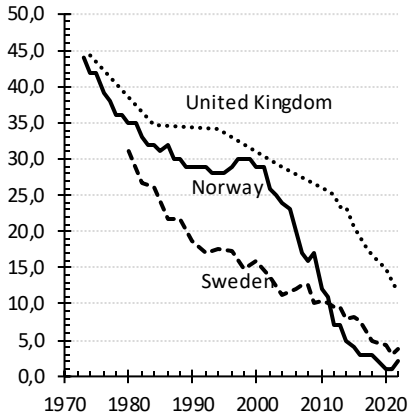


Figure 44: Daily non-smoking young people nicotine users

Share of daily snus and vape users in total population

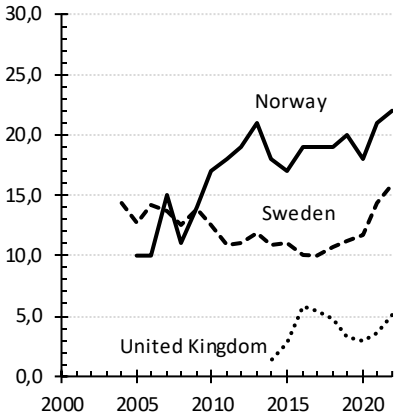


Figure 45: Daily young male smokers

Share of daily smokers in total population

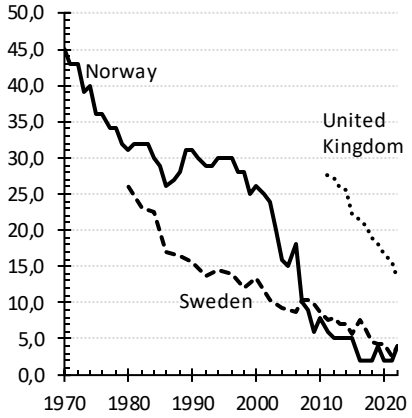


Figure 46: Daily non-smoking young male nicotine users

Share of daily snus and vape users in total population

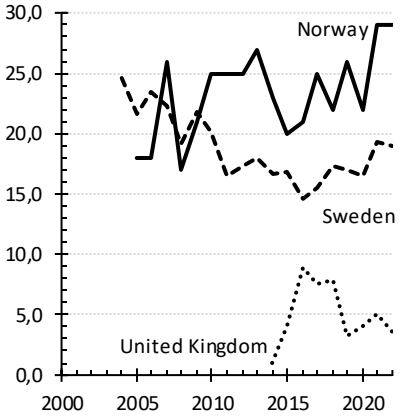


Figure 47: Daily young female smokers

Share of daily smokers in total population

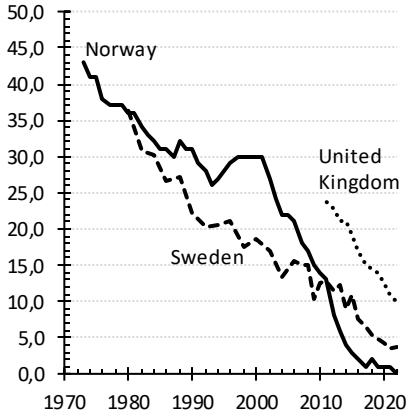
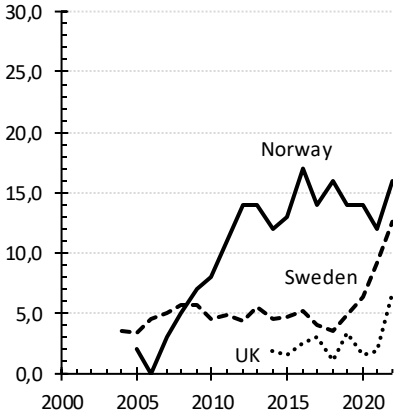


Figure 48: Daily non-smoking young female nicotine users

Share of daily snus and vape users in total population



Note: The young people population is defined as 16–24 up to 1999, and 16-29 from 2000 in Sweden, 16–24 in Norway and 18–24 in the UK. Nicotine pouches is included in snus.
Source: Statistiska centralbyrån (2019), Folkhälsomyndigheten (2023) Statistisk sentralbyrå (2023a) and Office for National Statistics (2023b).

The experiences of the United Kingdom

The share of smokers in the United Kingdom has decreased by 20 percentage points between 2009 and 2020. The decline in the United Kingdom is the largest in the EU and significantly larger than the EU average of 6 percentage points.

Only Sweden and Norway have fewer smokers per capita than the United Kingdom. The difference is significant, especially compared to Sweden, which has more than half the rate of smokers per capita. This is despite the much higher prices and price increases in the United Kingdom compared to Sweden. There are at least two explanations for this.

Firstly, in both Sweden and Norway consumers had relevant nicotine substitutes on the market when prices increased. Smoking Britons did not have this opportunity until e-cigarettes were introduced on the market around 2010. Consequently, higher cigarette taxes in the United Kingdom cannot be expected to have had the same degree of effect as in Sweden or Norway. The introduction of e-cigarettes seems to have accelerated the decline in smoking prevalence, especially among young people, see Figure 43 and Figure 44. One important explanation for this is the rapid uptake of vaping among Britons compared to other Europeans when e-cigarettes were introduced in 2010, see Figure 36.

Secondly, snus has for a long time been an accepted less harmful nicotine product, and nicotine pouches is very similar to snus. Swedes and Norwegians has had a long experience of alternative nicotine products without negative public health consequences. Switching from cigarettes to snus or nicotine pouches is thus not a question of switching from one harmful nicotine product to another, but a question of substituting to something much less harmful. To some extent, the lower usage levels of alternative and less harmful nicotine products in the United Kingdom can be attributed to the widespread perception that electronic cigarettes are at least as harmful as smoking traditional cigarettes. More than 40 per cent of the English population believes that vaping is equally or more harmful than smoking cigarettes. Among current smokers in England, the scepticism is even higher, with 50 per cent perceiving vaping as more or equally harmful as smoking.[29]

This scepticism can to some degree explain why the levels of vaping in the United Kingdom has not reached the usage levels of snus and nicotine pouches in Sweden or Norway. This is especially true for young males. Almost 30 per cent of young Norwegian males, and nearly 20 per cent of young Swedish males use snus or nicotine pouches. In comparison, only 4 per cent of young males in the United Kingdom engage in vaping. Combating smoking in the United Kingdom with the use of vaping products must overcome this scepticism towards less harmful alternative nicotine products to be successful.

5.3 The United Kingdom with Norwegian tobacco policy

The tobacco policy in the United Kingdom is ranked number one in Europe, with cigarette prices almost as high as in Norway.[30] On the other hand, Sweden's policy is ranked 21st, and the price of cigarettes is half that of the United Kingdom. Despite this, smoking prevalence in Sweden is significantly lower across all age groups and for both men and women, as shown in Figure 49 and Figure 50. These differences are difficult

[29] McNeill et.al. (2021).
[30] Tobacco Control Scale (2023).

to explain without considering the long-term use of snus in Sweden and, more recently, the use of nicotine pouches.

Future smoking prevalence

The rate of decline in smoking prevalence in Norway is high and significantly higher than in both Sweden and the United Kingdom. The success of Norwegian tobacco policy can be attributed to higher cigarette prices, access to less harmful smoking substitutes, and the knowledge among Norwegians that such products are much less harmful than smoking. A policy that does not discriminate between less harmful nicotine products has shown to be the best way forward.

In contrast, the tobacco policy in the United Kingdom has not equally efficiently shifted smokers towards less harmful alternative nicotine products. Factors such as the long-term ban on snus in the EU, misperceptions about the relative risks of vaping, and the low uptake of nicotine pouches have resulted in the United Kingdom lagging behind both Sweden and Norway. There is thus a potential for the United Kingdom to accelerate the reduction in smoking rates.

Figure 49: Male smoking prevalence 2022
Share of daily smokers

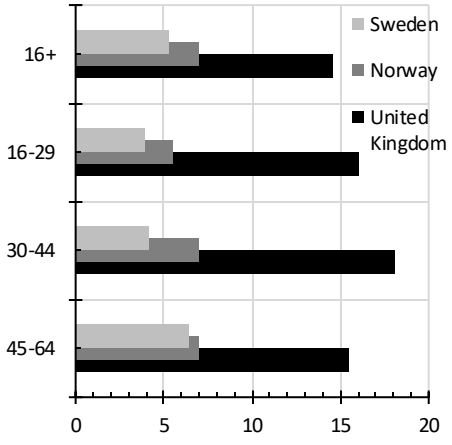
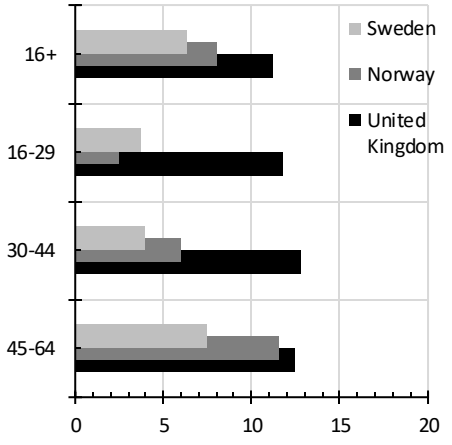


Figure 50: Female smoking prevalence 2022
Share of daily smokers



Note:
Source: Folkhälsomyndigheten (2023), Statistisk sentralbyrå (2023a) and Office for National Statistics (2023b).

The untapped potential of British tobacco policy

The projections in this report indicate that smoking rates in Sweden and Norway are expected to approach zero around 2030. However, in the United Kingdom, reaching such low rates cannot be expected until after 2040 based on the current rates of decline, as shown in Figure 51 and Figure 52.

As a policy experiment, replacing the rates of decline in smoking prevalence in the United Kingdom with the rates observed in Norway accelerates the speed of decline, particularly for the male population in the UK (see UK – Norwegian policy in Figure 51 and Figure 52).

While smoking rates may not reach zero before 2040, it is possible to consider the population in the United Kingdom as smoke-free when the smoking rate falls below 5 per cent. By promoting all types of alternative and less harmful nicotine products, similar to Norwegian and Swedish policy, the timeline for achieving this milestone can be reduced by 6 years for males and 3 years for females in the United Kingdom.

Figure 51: Male smoking prevalence

Share of daily smokers in total population

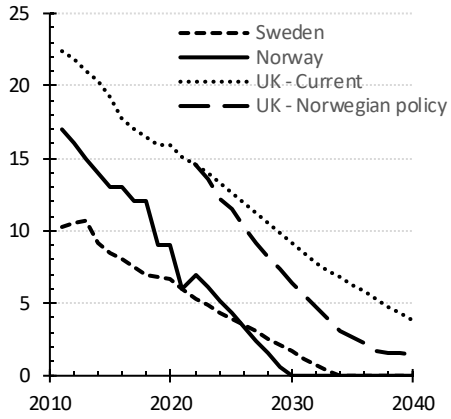
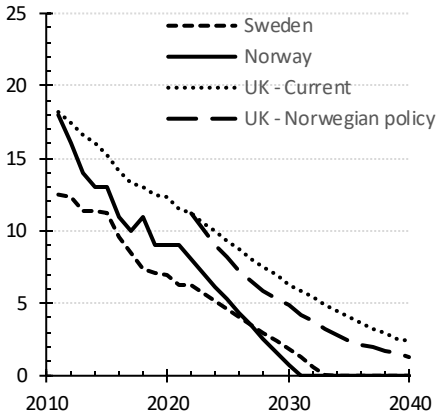


Figure 52: Female smoking prevalence

Share of daily smokers in total population



Note: UK – "Norwegian policy" is a projection of the smoking prevalence in the UK with Norwegian policy and Norweigian rates of decline in smoking prevalence for different age groups.
Source: Lakeville based on Folkhälsomyndigheten (2023), Statistisk sentralbyrå (2023a) and Office for National Statistics (2023b).

Smoke free generations

According to the projections, Swedish men are already smoke-free, while Norwegian men are expected to reach smoke-free status by 2025. In comparison, males in the United Kingdom are projected to become smoke-free by 2038, with 15 years remaining, see Table 8.

Swedish and Norwegian women will become smoke-free within a few years. However, middle-aged Norwegian women are lagging behind and are expected to become smoke-free within 6-7 years around 2030, see Table 9. One interpretation of this delay is that they did not have the alternative of snus or nicotine pouches during their formative years. It will take a decade before women in the United Kingdom can be classified as smoke-free in 2033.

The younger generations in Sweden and Norway are already smoke-free or will be soon. They all have had the option to choose snus or nicotine pouches instead of cigarettes. The United Kingdom lags behind by approximately a decade for both men and women in these younger groups.

Table 8: Years until males are smoke free

Age group	United Kingdom	Norway	Sweden
16–24	6	ASF	ASF
25–34	14	2	ASF
35–44	15	2	ASF
45–54	17	ASF	2
55–64	20	3	2
65–74	18	13	4
All men	**15**	**2**	**ASF**

Table 9: Years until females are smoke free

Age group	United Kingdom	Norway	Sweden
16–24	3	ASF	ASF
25–34	11	ASF	ASF
35–44	18	2	ASF
45–54	10	7	3
55–64	18	6	3
65–74	20	17	17
All women	**10**	**3**	**2**

Note ASF = Generation is Already Smoke Free. Smoke free is defined as a smoking prevalence lower than 5 per cent in the age group. The projection is based on the average reduction rate during the last 10 years in each age group.
Source: Lakeville.

Smoke free generations with a more ambitious policy

The projected years in which different generations in the United Kingdom may become smoke-free, following the implementation of an more ambitious Norwegian tobacco policy, are shown in Table 10 and Table 11. Norwegian tobacco policy has the potential to reduce the time remaining for males to achieve smoke-free status in the United Kingdom by up to six years, and for females by up to three years.

Table 10: Potential gain in years to reach smoke free generation among males

Age group	Current reduction rate	Accelerated reduction rate	Gain in years
18–24	2029	2027	2
25–34	2037	2034	3
35–44	2038	2034	4
45–54	2040	2031	9
55–64	2043	2031	12
65–74	2041	2041	0
All men	**2038**	**2032**	**6**

Table 11: Potential gain in years to reach smoke free generation among females

Age group	Current reduction rate	Accelerated reduction rate	Gain in years
18–24	2026	2025	1
25–34	2034	2029	5
35–44	2031	2031	0
45–54	2033	2033	0
55–64	2041	2030	11
65–74	2043	2033	10
All women	**2033**	**2030**	**3**

Note Smoke free is defined as a smoking prevalence lower than 5 per cent in the age group. The projection is based on the average reduction rate during the last 10 years in each age group.
Source: Lakeville.

For the younger age-groups in the United Kingdom, the potential gain in reaching smoke-free status ranges from 1 to 5 years. This relatively modest gain is primarily due to the currently high rates of decline in smoking rates among young people in the United Kingdom.

For middle-aged men, the potential gain is approximately one decade. This is because middle-aged men in Norway have shown a significant trend of quitting smoking and instead adopting the use of snus. To harvest this potential gain, it is crucial to raise awareness among males in the United Kingdom about the availability and benefits of less harmful alternatives such as vaping and nicotine pouches. If possible, also open for snus as a legal alternative to smoking.

However, for middle-aged women, there is no significant gain in reaching smoke-free status. This because middle-aged women in both Norway and the United Kingdom share a similar position, where they have not had readily available alternatives to smoking. It is likely that they find the current alternatives less attractive, resulting in similar patterns of continued smoking or quitting in both countries.

Lives and years saved

In addition to the gain in years towards achieving smoke-free generations, the impact of Norwegian tobacco policy can also be measured in terms of the number of lives saved from premature death due to smoking-related diseases and the number of added life years.

Lives saved up to 2030

With the implementation of Norwegian tobacco policy, it is projected that the number of smokers in 2030 would be approximately 1.2 million fewer compared to the scenario with the current policy. By applying the methods described in Box 1, it is estimated that approximately 450,000 British lives could be saved from premature death attributable to smoking in total up to 2030. This can be compared to the figure

that approximately 43 000 British fewer men 35+ die in smoking-attributable diseases per year with Swedish tobacco policy, Table 13. The 450,000 persons refer to the accumulated amount up to 2030 including women and other younger persons.

Life years saved up to 2030

The higher number of quitters resulting from the Norwegian tobacco policy also implies that these individuals are likely to live longer lives. Based on the methods described in Box 1, it can be estimated that the total increase in life expectancy for these individuals is approximately 7 million years in total up to 2030.

6 Concluding remarks

Transferring the results from snus to new nicotine products

The assessment of the effects of snus on public health is at best a reasonable first estimate. But the effects, on the male current smoking population only, are considerable. The results should thus serve as an indicator of the potential impact of the new nicotine products to mitigate the negative health effects of smoking.

Snus is a niche nicotine product. The new nicotine products differ in many aspects and can attract smokers from more demographic groups. A larger product variety, beyond snus, may over time lead to a larger share of people to quit and not start smoking at all, especially among women. Transferring the effects of snus on public health to the new nicotine products may hence be an underestimation.

How to interpret the results

The prohibition of snus sales in the EU and, on average, EU's historically more relaxed use of cigarette excise taxes most likely have contributed to higher smoking rates in the EU compared to Sweden.

It is possible to estimate the effect of Sweden's higher prices on cigarette consumption and use. Consequently, it is also possible to separate out the effects of the higher prices on Swedish public health measures such as smoking-attributable mortality risks and cancer incidence.

Based on the review in Chapter 1 there is limited evidence that Sweden has been an early adopter and a more stringent user of both administrative and information-based tobacco control policies, save for allowing the sale of snus. But the efficiency of such measures to reduce smoking is low. Even if there are any significant differences in policy, it is thus hard to separate out individual effects of different instrument on smoking behaviour.

Any effects due to differences in policy use between Sweden and the EU, such as Sweden's early adoption of health warnings, are therefore pooled with the allowing of the sale of snus in Sweden. The above presented reductions in the number of deaths and new cancer cases are thus an effect of total Swedish tobacco policy, excluding the price instrument. The figures may thus to some degree overestimate the role of snus as a policy tool to reduce smoking.

Critical assumptions for the calculations

The above calculations are dependent on at least three critical assumptions.

The first is an assumption of a causal relationship between an increase in the use of snus and a reduction in cigarette consumption. The above discussions indicate that there is such a relationship but is not a proof. The difference in smoking behaviour between Sweden and other member states can neither be explained by differences in prices, nor by differences in other tobacco control instruments. Even though the only

remaining policy difference is the use of snus there may be other explanations, such as a unique Swedish culture.

The second is an assumption of snus being a sufficiently attractive substitute to smoking for Europeans, and to the same extent as in Sweden. This may not necessarily be the case. The development in Norway, see Figure 11, is an example showing that snus uptake may be rapid and popular also among women.

The third is an assumption of a full transferability of Swedish policy in other EU member states. Such a transfer is not always possible.

Sources of errors

The reported figures are only based on the potential reduction in mortality and cancer incidence among male current smokers in the European population. This because Swedish women only to a limited degree use snus and the information on the share of former smoker is relatively inconsistent and shows large discrepancies between years and countries.

The potential to reduce female mortality and cancer incidence is thus relatively limited. In Norway, the female population have had a larger uptake of snus in combination with reduced smoking rates, but the potential health effects of female substitution are probably not measurable yet due to the long lag period between smoking initiation and falling ill in smoking-related diseases.

Limiting the analysis to only the male current smoking population implies the reported potentials being underestimations.

References

Andersson, E., Toresson Grip, E., Norrlid, H. and Fridhammar, A. (2017). *Samhällskostnaden för rökningsrelaterad sjuklighet i Sverige*. IHE Rapport 2017:4. Lund, Sverige: IHE.

Banks, E., Joshy, G., Weber, M. F., Liu, B., Grenfell, R., Egger, S., . . . Beral, V. (2015). *Tobacco smoking and all-cause mortality in a large Australian cohort study: findings from a mature epidemic with current low smoking prevalence.* Medicine for Global Health.

Cancer Intelligence Team, Cancer Research UK. (2023). Smoking prevalence projections for England, based on data to 2021. Cancer research UK.

Cutler, D. M. and Glaeser, E. L. (2006). *Why Do Europeans Smoke more than Americans?* Cambridge MA: National Bureau of Economic.

Djurdjevic, S., Pecze, L., Weitkunat, R., Luedicke, F., Fry, J. and Lee, P. (2019). *Using data on snus use in Sweden to compare different modelling approaches to estimate the population health impact of introducing a smoke-free tobacco product.* BMC Public Health.

European Commission (2022). *Cancer burden statistics and trends across Europe.* https://ecis.jrc.ec.europa.eu/index.php.

European Commission (2023). *Taxes in Europe Database v3*. https://ec.europa.eu/taxation_customs/tedb/taxSearch.html.

Eurostat (2022). *Smoking prevalence by sex*. https://ec.europa.eu/eurostat/databrowser/view/sdg_03_30/default/table?lang=en.

Eurostat (2023). *Causes of death - standardised death rate by NUTS 2 region of residence*. https://ec.europa.eu/eurostat/databrowser/view/hlth_cd_asdr2/default/table?lang=en.

Folkhälsomyndigheten (2023). *Tobakskonsumtion (självrapporterat) efter ålder, kön och år. Andel (procent)*. http://fohm-app.folkhalsomyndigheten.se/Folkhalsodata/pxweb/sv/A_Folkhalsodata/A_Folkhalsodata__B_HLV__aLevvanor__aagLevvanortobak/hlv1tobaald.px/.

Gartner, C. E., Hall, W. D., Vos, T., Bertram, M. Y., Wallace, A. L. and Lim, S. S. (2007). *Assessment of Swedish snus for tobacco harm reduction: an epidemiological modelling study*. The Lancet, 2010-2014.

Goodchild, M., Nargis, N. and Tursan d'Espaignet, E. (2018). *Global economic cost of smoking-attributable diseases*. Tobacco Control, 58-64.

GOV.UK (11 04 2023). *Smokers urged to swap cigarettes for vapes in world first scheme*. Smoking: https://www.gov.uk/government/news/smokers-urged-to-swap-cigarettes-for-vapes-in-world-first-scheme.

Jha, P. (2020). *The hazards of smoking and the benefits of cessation: A critical summation of the epidemiological evidence in high-income countries*. Elife. 2020 Mar 24;9:e49979. doi: 10.7554/eLife.49979. PMID: 32207405; PMCID: PMC7093109.

Levy, D. T., Chaloupka, F. and Gitchell, J. (2004). *The Effects of Tobacco Control Policies on Smoking Rates: A Tobacco Control Scorecard*. Journal of Public Health Management Practice, 338-353.

Levy, D. T., Mumford, E. A., Cummings, K. M., Gilpin, E. A., Giovino, G. A., Hyland, A., . . . Compton, C. (2006). *The potential impact of a low-nitrosamine smokeless tobacco product on cigarette smoking in the United States: Estimates of a panel of experts*. Addictive Behaviors, 1190-1200.

Lund, I. and Lund, K. E. (2014). *How Has the Availability of Snus Influenced Cigarette Smoking in Norway?* International Journal of Environmental Research and Public Health, 11705-11717.

Lund, K. E., Vedøy, T. F. and Bauld, L. (2016). *Do never smokers make up an increasing share of snus users as cigarette smoking declines? Changes in smoking status among male snus users in Norway 2003–15*. Addiction, 340–348.

McNeill, A., Brose, L., Calder, R., Simonavicius, E. and Robson, D. (2021). *Vaping in England: an evidence update including vaping for smoking cessation*. London: Public Health England.

Mehta, N. and Preston, S. (2012). *Continued Increases in the Relative Risk of Death From Smoking*. American Journal of Public Health, 2181-2186.

Nguyen, L., Rosenqvist, G. and Pekurinen, M. (2012). *Demand for Tobacco in Europe An Econometric Analysis of 11 Countries for the PPACTE Project*. Helsingfors: National Institute for Health and Welfare.

Office for National Statistics (2023a). *Inflation and price indices*. https://www.ons.gov.uk/economy/inflationandpriceindices/.

Office for National Statistics (2023b). *Adult smoking habits in the UK: 2022*. https://www.ons.gov.uk/releases/adultsmokinghabitsintheuk2022.

Palali, A. and van Ours, J. (2019). *The impact of tobacco control policies on smoking initiation in eleven European countries*. The European Journal of Health Economics volume, 1287–1301.

Rodu, B. and Cole, P. A. (2003). *The burden of mortality from smoking: Comparing Sweden with other countries in the European Union*. European Journal of Epidemiology, 19(2), 129-131.

Rutqvist, L. E., Curvall, M., Hassler, T., Ringberger, T. and Wahlberg, I. (2011). *Swedish snus and the GothiaTek® standard*. Harm Reduction Journal.

Socialstyrelsen (2014). *Registeruppgifter om tobaksrökningens skadeverkningar*. Socialstyrelsen.

Statistisk sentralbyrå (2023a). *Røyk, alkohol og andre rusmidler*. https://www.ssb.no/statbank/list/royk/.

Statistisk sentralbyrå (2023b). *Konsumprisindeksen*. https://www.ssb.no/statbank/table/03013/.

Statistiska centralbyrån (2019). *Undersökningar av levnadsförhållanden*. https://www.scb.se/hitta-statistik/statistik-efter-amne/levnadsforhallanden/levnadsforhallanden/undersokningarna-av-levnadsforhallanden-ulf-silc/.

Statistiska centralbyrån (2023). *Konsumentprisindex efter produkttyp, 1980=100. Månad 1980M01-2023M09*. https://www.statistikdatabasen.scb.se/pxweb/sv/ssd/START__PR__PR0101__PR0101A/KPI19Bas1980/.

Sutton, S. R. (1999). *How accurate are smokers' perceptions of risk?* Health, Risk & Society.

The Council of the European Union (2010). *COUNCIL DIRECTIVE 2010/12/EU of 16 February 2010 amending Directives 92/79/EEC, 92/80/EEC and 95/59/EC on the structure and rates of excise duty applied on manufactured tobacco and Directive 2008/118/EC*. The Council of the European Union.

The European Parliament and the Council of the European Union (2003). *DIRECTIVE 2003/33/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 May 2003 on the approximation of the laws, regulations and administrative provisions of the Member States relating to the advertising and sponsorship of tobacco products*. European Union.

The European Parliament and the Council of the European Union (2014). *DIRECTIVE 2014/40/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 3 April 2014 on the approximation of the laws, regulations and administrative provisions of the Member States concerning the manufacture, presentation and sale of tobacco and related products.* The European Parliament and the Council of the European Union.

The Snus Commission (2017). *Snus saves lives - A study of snus and tobacco-related mortality in the EU*. The Snus Commission.

Tobacco Control Scale (2023). *Tobacco Control Scale*. https://www.tobaccocontrolscale.org/.

Tomar, S. L., Connolly, G. N., Wilkenfeld, J. and Henningfield, J. E. (2003). *Declining smoking in Sweden: is Swedish Match getting the credit for Swedish tobacco control's efforts?* Tobacco Control, 12(4), 368-371.

U.S. Department of Health and Human Services (2020). *Smoking Cessation - A Report of the Surgeon General*. Rockville, MD: U.S. Department of Health and Human Services.

Appendix 1

Methods

Calculation of smoking-attributable share

The smoking-related diseases included in the assessment are listed in Table 12 with the respective relative risk for current smoking males by age. The number of deaths or new cases of cancers by disease, gender and age are from EUROSTAT[31] and ECIS[32]. Information on smoking prevalence is from EUROSTAT[33].

The share of deaths and the share of new cancer cases (incidence figures) attributable to smoking is calculated, for each disease (d) and age group (h), as:

$$\alpha_{d,h} * (RR_{d,h}-1) / (\alpha_{d,h} * (RR_{d,h}-1) + 1),$$

where α is the share of current smokers and RR is the relative risk.

Calculation of smoking-attributable deaths and new cancer cases

The smoking-attributable share is multiplied with the number of deaths and new cancer cases to calculate the number of smoking-attributable deaths and new cancer cases. This is done for all diseases and age groups.

Calculation of the total potential protective effect of Swedish tobacco policy

The assessment assumes a thought experiment where Swedish tobacco policy is imposed on other EU member states. Over time this is assumed to result in smoking prevalence rates and smoking-attributable mortality rates converging to Swedish levels. In a resulting steady state smoking-attributable deaths and new cancer cases per capita are assumed to be the same in all countries for every disease and age group, respectively. This share is multiplied with the number of males 35+ to get the number of smoking-attributable deaths and new cancer cases with Swedish policy.

The difference between the smoking-attributable deaths and new cancer cases with Swedish policy and the current national policy is defined as the "*Total effect*".

Calculation of the price effect

The effect of price is calculated in three steps.

First, the price differences between Sweden and the individual member states are estimated. Prices are calculated as average price (WAP) over the last decade (2010-

[31] Eurostat (2023).
[32] European Commission (2022).
[33] Eurostat (2022).

2020). The price differences are multiplied with an assumed price elasticity of 0.5 to get the price effect on quantity (dQ%).[34]

Second, the above price effect on quantity is used to calculate the effect on smoking prevalence as if smoking prevalence is a measure of quantity. This results in a change in prevalence (dQ), for each member state and age group.

Third, the relationship, semi-elasticity, between smoking prevalence and smoking-attributable deaths is estimated for the EU (ePD).

Fourth, the "*Price effect*" is calculated as the change in prevalence (dQ) multiplied with the semi-elasticity ePD.

Calculation of the "snus" effect

The residual between the "*Total effect*" and the "*Price effect*" can be interpreted as the effect of all other differences in policy measures between the individual member state and Sweden. Historically policy measures have differed between member states. It is hard, almost impossible, to evaluate how such policy differences may have affected smoking behaviour over time.

Beside price, the use of snus is the most prominent difference in use of policy measures in European tobacco policy. It is thus not unreasonable to interpret the difference between the "*Total effect*" and the "*Price effect*" as a consequence of the use snus and term it as a "*Snus effect*". The effect from snus may be overestimated if there are significant differences over time in the use of other tobacco policy measures.

[34] This is the higher own price elasticity bound reported in meta-studies. The reason for using the higher bound is to secure a high as possible price effect from imposing Swedish tobacco policy in order not to overestimate other policy effects.

Extra tables and figures

Table 12 includes the smoking-related diseases in the assessment and the relative risks of current male smokers. Relative risks can differ significantly between studies and countries. The risks listed here is from a Swedish meta-study and the reported values corresponds reasonably well with figures reported in other studies.

Table 12: List of smoking-related diseases and their relative mortality risks compared to non-smokers

Code	Disease	Age group	Relative risk
A15-A19_B90	Tuberculosis	All ages	4.6
C00-C14	Malignant neoplasms of lip, oral cavity and pharynx	All ages	15.97
C15	Malignant neoplasm of esophagus	All ages	14.51
C16	Malignant neoplasm of stomach	All ages	3.32
C18-C21	Malignant neoplasm of colorectum	All ages	4.28
C22	Malignant neoplasm of liver and intrahepatic bile ducts	All ages	3.4
C25	Malignant neoplasm of pancreas	All ages	4.56
C32	Malignant neoplasm of larynx	All ages	27.62
C33_C34	Malignant neoplasm of trachea, bronchus and lung	All ages	35.95
C53	Malignant neoplasm of cervix uteri	All ages	1.59
C64	Malignant neoplasm of kidney, except renal pelvis	All ages	3.9
C67	Malignant neoplasm of bladder	All ages	5.49
I_OTH	Other and unspecified disorders of the circulatory system	All ages	3.27
I20-I25	Ischemic heart diseases	35-44	9.5
I20-I25	Ischemic heart diseases	45-54	9.5
I20-I25	Ischemic heart diseases	55-64	5.3
I20-I25	Ischemic heart diseases	65-74	3.9
I20-I25	Ischemic heart diseases	75+	2.8
I30-I51	Other forms of heart disease	All ages	3.27
I60-I69	Cerebrovascular diseases	35-44	9.8
I60-I69	Cerebrovascular diseases	45-54	9.8
I60-I69	Cerebrovascular diseases	55-64	6.8
I60-I69	Cerebrovascular diseases	65-74	4.8
I60-I69	Cerebrovascular diseases	75+	2.9
J09-J11	Influenza	35-44	6.8
J09-J11	Influenza	45-54	6.8
J09-J11	Influenza	55-64	6.8
J09-J11	Influenza	65-74	4.2
J09-J11	Influenza	75+	4.2
J12-J18	Pneumonia	35-44	6.8
J12-J18	Pneumonia	45-54	6.8
J12-J18	Pneumonia	55-64	6.8
J12-J18	Pneumonia	65-74	4.2
J12-J18	Pneumonia	75+	4.2
J40-J44_J47	Bronchitis, emphysema and COPD	All ages	30.18

Source: Lakeville based on Andersson et.al. (2017)

Table 13: Smoking attributable deaths among male current smokers 35+ in the EU, Iceland and Norway 2017

Number of males aged 35+ and shares in per cent

Region	Population	Deaths in smoking-related diseases	Smoking attributable deaths		
			Deaths	Deaths per 100,000	Share of deaths (%)
Austria	2,531,475	24,068	6,652	263	28
Belgium	3,197,119	28,158	8,850	277	31
Bulgaria	2,105,566	43,731	11,389	541	26
Croatia	1,185,503	17,507	5,434	458	31
Cyprus	218,001	1,697	600	275	35
Czechia	3,110,793	37,358	10,639	342	28
Denmark	1,628,449	14,134	4,204	258	30
Estonia	341,378	4,864	1,446	423	30
Finland	1,567,718	14,753	2,997	191	20
France	18,155,108	140,291	45,389	250	32
Germany	24,971,205	263,937	64,361	258	24
Greece	3,233,522	37,335	12,883	398	35
Hungary	2,753,073	46,441	15,461	562	33
Iceland	87,194	623	137	157	22
Ireland	1,242,527	8,984	2,327	187	26
Italy	18,785,700	186,636	53,372	284	29
Latvia	501,434	9,422	2,782	555	30
Lithuania	732,065	13,199	3,573	488	27
Luxembourg	166,508	1,113	301	181	27
Malta	131,877	1,153	319	242	28
Netherlands	4,906,133	38,906	12,861	262	33
Norway	1,453,120	10,292	2,518	173	24
Poland	10,303,540	127,292	40,339	392	32
Portugal	3,009,410	30,285	8,281	275	27
Romania	5,596,781	100,908	27,994	500	28
Slovakia	1,483,695	18,290	5,298	357	29
Slovenia	627,649	6,218	1,723	274	28
Spain	14,184,609	119,616	41,910	295	35
Sweden	2,804,551	24,048	3,779	135	16
United Kingdom	17,890,262	164,814	43,534	243	26
Total	**148,905,965**	**1,536,073**	**441,354**	**296**	**29**

Source: Lakeville

Table 14: Smoking attributable lung cancer deaths among male current smokers 35+ in the EU 2020

Number of males aged 35+ and shares in per cent

Region	Population	Deaths in lung cancer	Smoking attributable lung cancer deaths		
			Deaths	Deaths per 100,000	Share of deaths (%)
Austria	2,610,105	2,553	2,183	84	86
Belgium	3,269,896	4,437	3,673	112	83
Bulgaria	2,092,663	2,780	2,475	118	89
Croatia	1,191,520	2,122	1,842	155	87
Cyprus	232,814	341	305	131	89
Czechia	3,193,305	3,282	2,823	88	86
Denmark	1,649,921	2,032	1,571	95	77
Estonia	356,167	492	433	122	88
Finland	1,604,896	1,490	1,136	71	76
France	18,495,597	25,214	21,475	116	85
Germany	25,264,320	31,663	25,311	100	80
Greece	3,261,079	5,920	5,225	160	88
Hungary	2,774,108	5,191	4,545	164	88
Ireland	1,319,817	1,193	925	70	78
Italy	18,775,531	22,772	18,954	101	83
Latvia	503,093	601	536	107	89
Lithuania	744,019	917	810	109	88
Luxembourg	177,340	183	145	82	79
Malta	150,174	149	125	83	84
Netherlands	5,024,159	6,323	5,239	104	83
Poland	10,676,634	17,444	15,090	141	87
Portugal	3,037,314	3,614	3,034	100	84
Romania	5,598,702	8,062	7,078	126	88
Slovakia	1,539,927	1,720	1,499	97	87
Slovenia	651,437	819	679	104	83
Spain	14,536,043	17,346	14,918	103	86
Sweden	2,898,048	1,819	1,222	42	67
Total	**131,628,629**	**170,479**	**143,247**	**109**	**84**

Source: Lakeville

Table 15: Smoking attributable new cancer cases among male current smokers 35+ in the EU 2020

Number of males aged 35+ and shares in per cent

Region	Population	New cancer cases	Smoking attributable new cancer cases		
			Cases	Cases per 100,000	Share of new cases (%)
Austria	2,610,105	10,606	4,768	183	45
Belgium	3,269,896	20,809	9,214	282	44
Bulgaria	2,092,663	10,757	5,792	277	54
Croatia	1,191,520	7,974	3,828	321	48
Cyprus	232,814	1,284	702	302	55
Czechia	3,193,305	17,147	7,585	238	44
Denmark	1,649,921	9,857	3,378	205	34
Estonia	356,167	2,025	1,000	281	49
Finland	1,604,896	7,162	2,401	150	34
France	18,495,597	107,393	49,704	269	46
Germany	25,264,320	139,522	54,609	216	39
Greece	3,261,079	22,030	11,541	354	52
Hungary	2,774,108	19,022	9,667	348	51
Ireland	1,319,817	6,381	2,257	171	35
Italy	18,775,531	111,892	45,944	245	41
Latvia	503,093	3,270	1,710	340	52
Lithuania	744,019	4,135	2,047	275	50
Luxembourg	177,340	763	313	176	41
Malta	150,174	679	301	200	44
Netherlands	5,024,159	29,681	11,834	236	40
Poland	10,676,634	59,492	30,213	283	51
Portugal	3,037,314	18,102	7,140	235	39
Romania	5,598,702	32,596	16,520	295	51
Slovakia	1,539,927	9,582	4,585	298	48
Slovenia	651,437	3,917	1,522	234	39
Spain	14,536,043	85,718	38,776	267	45
Sweden	2,898,048	11,482	2,708	93	24
Total	**131,628,629**	**753,278**	**330,059**	**251**	**44**

Source: Lakeville

Table 16: Potential protective effect of Swedish tobacco policy on male deaths in the EU, Norway and Iceland

Number of dead males 35+

Region	Smoking attributable deaths			Reduction in smoking attributable deaths		
	With current national policy	With Swedish prices	With Swedish policy	Price effect	"Snus" effect	Total effect
Austria	6,652	5,701	3,384	-951	-2,318	-3,269
Belgium	8,850	8,435	4,280	-415	-4,154	-4,570
Bulgaria	11,389	8,635	2,797	-2,755	-5,837	-8,592
Croatia	5,434	4,413	1,582	-1,021	-2,831	-3,853
Cyprus	600	437	290	-162	-147	-310
Czechia	10,639	8,008	4,088	-2,631	-3,920	-6,551
Denmark	4,204	4,074	2,181	-130	-1,893	-2,023
Estonia	1,446	1,103	451	-342	-652	-994
Finland	2,997	2,999	2,112	2	-887	-886
France	45,389	50,484	24,413	5,094	-26,071	-20,976
Germany	64,361	62,287	33,875	-2,074	-28,412	-30,486
Greece	12,883	10,365	4,383	-2,517	-5,983	-8,500
Hungary	15,461	13,024	3,615	-2,437	-9,409	-11,846
Iceland	137	178	115	41	-63	-22
Ireland	2,327	3,221	1,627	894	-1,594	-700
Italy	53,372	47,927	25,386	-5,445	-22,541	-27,986
Latvia	2,782	2,178	664	-604	-1,514	-2,118
Lithuania	3,573	2,737	972	-836	-1,765	-2,601
Luxembourg	301	256	218	-45	-38	-83
Malta	319	281	175	-38	-106	-144
Netherlands	12,861	12,947	6,563	86	-6,384	-6,298
Norway	2,518	3,606	1,926	1,088	-1,680	-591
Poland	40,339	30,671	13,533	-9,668	-17,138	-26,806
Portugal	8,281	6,893	4,046	-1,388	-2,847	-4,235
Romania	27,994	22,736	7,384	-5,258	-15,352	-20,609
Slovakia	5,298	3,941	1,925	-1,357	-2,017	-3,373
Slovenia	1,723	1,351	832	-371	-520	-891
Spain	41,910	35,268	18,844	-6,642	-16,424	-23,066
Sweden	3,779	3,779	3,779	0	0	0
United Kingdom	43,534	52,414	24,004	8,880	-28,410	-19,530
Total	**441,354**	**410,351**	**199,444**	**-31,003**	**-210,907**	**-241,910**

Source: Lakeville

Table 17: Potential protective effect of Swedish tobacco policy on male lung cancer deaths in the EU

Number of dead males 35+

Region	Smoking attributable lung cancer deaths			Reduction in smoking attributable lung cancer deaths		
	With current national policy	With Swedish prices	With Swedish policy	Price effect	"Snus" effect	Total effect
Austria	2,183	1,845	1,101	-338	-744	-1,082
Belgium	3,673	3,535	1,379	-138	-2,156	-2,294
Bulgaria	2,475	1,539	883	-936	-656	-1,592
Croatia	1,842	1,499	503	-342	-997	-1,339
Cyprus	305	247	98	-58	-149	-207
Czechia	2,823	1,927	1,347	-896	-580	-1,476
Denmark	1,571	1,531	696	-39	-836	-875
Estonia	433	315	150	-118	-165	-283
Finland	1,136	1,136	677	1	-459	-459
France	21,475	23,260	7,800	1,786	-15,460	-13,675
Germany	25,311	24,613	10,655	-697	-13,959	-14,656
Greece	5,225	4,381	1,375	-845	-3,005	-3,850
Hungary	4,545	3,717	1,170	-828	-2,547	-3,375
Ireland	925	1,238	557	313	-681	-368
Italy	18,954	17,160	7,918	-1,794	-9,242	-11,036
Latvia	536	333	212	-203	-121	-324
Lithuania	810	528	314	-282	-214	-496
Luxembourg	145	128	75	-16	-53	-70
Malta	125	111	63	-14	-48	-62
Netherlands	5,239	5,268	2,119	29	-3,149	-3,120
Poland	15,090	11,813	4,503	-3,277	-7,310	-10,587
Portugal	3,034	2,554	1,281	-480	-1,273	-1,753
Romania	7,078	5,288	2,361	-1,790	-2,927	-4,716
Slovakia	1,499	1,021	649	-478	-371	-849
Slovenia	679	549	275	-130	-274	-404
Spain	14,918	12,629	6,130	-2,289	-6,499	-8,788
Sweden	1,222	1,222	1,222	0	0	0
Total	**143,247**	**129,387**	**55,512**	**-13,860**	**-73,875**	**-87,735**

Source: Lakeville

Table 18: Potential protective effect of Swedish tobacco policy on new cancer cases among males in the EU

Number of new cancer cases among males 35+

Region	Smoking attributable new cancer cases			Reduction in smoking attributable new cancer cases		
	With current national policy	With Swedish prices	With Swedish policy	Price effect	"Snus" effect	Total effect
Austria	4,768	3,983	2,439	-785	-1,544	-2,329
Belgium	9,214	8,893	3,055	-321	-5,838	-6,159
Bulgaria	5,792	3,617	1,955	-2,175	-1,662	-3,837
Croatia	3,828	3,032	1,113	-796	-1,919	-2,715
Cyprus	702	567	218	-135	-350	-485
Czechia	7,585	5,503	2,984	-2,083	-2,519	-4,601
Denmark	3,378	3,287	1,542	-92	-1,745	-1,837
Estonia	1,000	725	333	-274	-393	-667
Finland	2,401	2,403	1,500	1	-903	-902
France	49,704	53,855	17,281	4,151	-36,574	-32,423
Germany	54,609	52,988	23,605	-1,621	-29,382	-31,003
Greece	11,541	9,577	3,047	-1,964	-6,530	-8,494
Hungary	9,667	7,743	2,592	-1,924	-5,151	-7,075
Ireland	2,257	2,983	1,233	727	-1,750	-1,023
Italy	45,944	41,775	17,543	-4,169	-24,233	-28,402
Latvia	1,710	1,238	470	-472	-768	-1,240
Lithuania	2,047	1,392	695	-655	-697	-1,352
Luxembourg	313	275	166	-38	-109	-147
Malta	301	268	140	-33	-128	-160
Netherlands	11,834	11,901	4,694	68	-7,207	-7,139
Poland	30,213	22,595	9,976	-7,619	-12,619	-20,238
Portugal	7,140	6,024	2,838	-1,117	-3,186	-4,303
Romania	16,520	12,359	5,231	-4,160	-7,128	-11,289
Slovakia	4,585	3,475	1,439	-1,110	-2,036	-3,146
Slovenia	1,522	1,220	609	-302	-611	-914
Spain	38,776	33,456	13,582	-5,320	-19,875	-25,195
Sweden	2,708	2,708	2,708	0	0	0
Total	**330,059**	**297,841**	**122,985**	**-32,218**	**-174,856**	**-207,074**

Source: Lakeville