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Reducing the exceptional affordability of hand-rolling tobacco using tax escalators: a health and economic impact modelling study for England

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ABSTRACT

Background Hand-rolling tobacco (HRT) remains more affordable than factory-made (FM) cigarettes in the UK, which could undermine the health benefits of tobacco tax increases. This study modelled health and economic impacts of raising HRT duty annually to reduce this affordability gap.

Methods We used the Sheffield Tobacco and Alcohol Policy Model V.2.5.0, an individual-level microsimulation, to project tobacco consumption, spending and health outcomes for adults in England aged 18–89 from 2024 to 2030. Four duty policies were compared against a business-as-usual scenario of duty rising 2% above the Retail Price Index (RPI) annually: Policy A increased duty by RPI+12% in 2024 only (the UK Government's October 2023 policy); Policy B applied RPI+10% annually to align with FM duty by 2030; Policy C applied RPI+12% annually; and Policy D applied RPI+18% annually to equalise average HRT and FM prices by 2030.

Results Policy A was estimated to prevent 1770 deaths, add 36 947 life years and save the National Health Service £12 million, with greater gains in deprived areas. Policies B–D achieved larger health benefits and reduced inequalities, but increased spending by people who smoke. Policy D generated £3.19 billion additional tax revenue and reduced tobacco industry revenue by £400 million by 2030. Revenue effects depended on assumptions about how higher HRT prices affected FM consumption.

Conclusions Sustained duty increases on the least expensive tobacco products could deliver substantial public health gains and reduce health inequalities. Such measures should coincide with strong enforcement against illicit tobacco and comprehensive smoking cessation support.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Increasing tobacco taxes is a well-established method for reducing smoking rates and addressing health inequalities.
⇒ In the UK, the lower cost of hand-rolling tobacco (HRT) compared with factory-made (FM) cigarettes potentially undermines tax effectiveness by offering a more affordable alternative.

WHAT THIS STUDY ADDS

⇒ Our modelling study estimated that consistently increasing HRT tax at a steeper rate than FM cigarette tax could prevent substantially more premature deaths and further reduce health inequalities.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Countries with lower cost tobacco options, like HRT in the UK, can close affordability gaps by implementing higher annual tax increases on these specific products.
⇒ To maximise impact, these targeted tax increases should be part of a broader tobacco control strategy that includes support for quitting and measures to reduce the supply of and demand for illicit (untaxed) tobacco.

INTRODUCTION

Smoking remains the leading preventable cause of death, disease and health inequalities worldwide and in the UK.[1 2] The economic cost of tobacco smoking in the UK exceeds £21.8 billion annually, affecting the National Health Service (NHS), employers and the broader economy.[3] Supporting people to quit tobacco smoking could also bring substantial economic dividends to local areas.[4] Estimates from the Smoking Toolkit Study for England show a recent slowing of the rate of decline in tobacco smoking over recent decades (defined and hereafter referring to the smoking of factory-made (FM) and hand-rolled tobacco (HRT) cigarettes).[5 6] Monthly monitoring data for England in May 2025 estimate the prevalence of smoking to be 15.1% of the population, ranging from 9.3% for people in managerial and professional occupations to 24.1% for people who are unemployed or on the lowest incomes.[7]

In the UK, the main types of tobacco product are FM cigarettes, accounting for 74% (£6229 million) of tobacco product duties in 2024, and loose or hand-rolling tobacco, accounting for 23% (£1934) of tobacco product duties.[8] Both products are subject to a specific duty, set per 1000 FM cigarettes or per kilogram of HRT. FM cigarettes then have two further tax components: (1) an ad valorem duty, calculated as a percentage of the retail price, and (2) a minimum excise tax (MET), which is incurred if retail prices are set low enough that the total of specific and ad valorem duty payable is below the MET threshold.[9] The percentage of

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people who smoke at least some HRT has been rising over recent decades[10–14]; for England in 2024, this was estimated at 54.5%.[7] A major reason for this trend is that HRT is substantially more affordable than FM cigarettes,[13–15] partly because it is subject to lower rates of tax per cigarette stick (with one hand-rolled stick assumed to contain 0.5 g of HRT[16]). In November 2023, the specific duty applied to cigarettes was £316.70 per 1000 sticks (31.7 p per stick) compared with £412.32 per kg (20.6p per stick) for hand-rolled tobacco.[17]

In most years since 1993, UK tobacco tax policy has employed a tobacco duty escalator, under which tobacco product duty has risen annually by a certain percentage above Retail Price Index (RPI) inflation. This escalator has gradually reduced the affordability of tobacco, but HRT remains significantly more affordable.[18] In addition, people who regularly smoke HRT are able to make their consumption more affordable by rolling cigarette sticks containing less tobacco.[16] Furthermore, the tobacco industry has routinely followed a pricing strategy that aims to keep a subset of the cheaper brands of both FM cigarettes and HRT relatively more affordable in the environment of ongoing tobacco duty increases.[19–21] They do so by reducing profits from the cheapest brands relative to the premium brands, a strategy that can lead to increasing price variation among brands within the FM cigarette and HRT product categories.[22]

The availability of cheap HRT is a public health concern because it offers a lower-cost alternative that can lead people who might otherwise have quit smoking due to rising tobacco prices to continue, and it offers an affordable entry point into smoking for young people. As a result, a range of policy approaches to reduce the affordability of HRT have been proposed, with the main one being to raise the rate of tax on HRT at a higher rate than on FM cigarettes.[23 24] Recent UK tobacco tax policy has done exactly this. In the Autumn Statement 2023, the government announced that duty on HRT would rise by 12% above RPI inflation, compared with 2% for FM cigarettes.[25] However, tobacco tax policy is reviewed annually; the tax differential between FM cigarettes and HRT could be decreased or increased in future years.

We therefore conducted a modelling study to investigate the impact of the Autumn Statement 2023 tax increase of RPI+12% for HRT on tobacco consumption, spending on tobacco products, mortality, hospitalisations and revenues to government and the tobacco industry. We assumed that the policy would stay in place for 1 year (2024) and then revert to a business-as-usual situation of RPI+2% (Policy A). In addition, we investigated three options for continuing the higher rate of tax on HRT. Each option began with the RPI+12% increase for 2024, and then continued the higher rate of tax on HRT at different rates for 2025–2030. This 2030 end point was chosen for illustrative purposes; it aligns with the smoke-free target year for England, set in 2019 and defined by reaching a population smoking prevalence of less than 5%.[26] The three options for continuing the higher rate of tax on HRT were: setting the annual duty rise for HRT so that HRT duty rates equalled those on FM cigarettes by 2030 (Policy B); extending the RPI+12% duty rise to occur annually (Policy C); setting the annual duty rise for HRT so that the average retail price of HRT equalled that of FM cigarettes by 2030 (Policy D).

METHODS

Modelling approach

The model is the Sheffield Tobacco and Alcohol Policy Model (STAPM; V.2.5.0), a dynamic microsimulation model, populated with data for England.[27 28] This model was used previously to estimate the impact in England of the UK Government's reforms to the alcohol duty system,[27] and the impact of minimum pricing for tobacco in Scotland.[29] Although in this study the use of the model focuses on tobacco, it also incorporates alcohol consumption to better reflect real-world co-consumption behaviours,[30] as consumption of tobacco and alcohol in the UK is closely linked.[31–33] The model simulates the future population of men and women aged 18–89 in 1-year intervals of age and calendar year. The modelled population is socioeconomically stratified by quintiles of the Index of Multiple Deprivation (IMD), a small-area composite measure of socioeconomic conditions.[34] The model is initiated in 2017, policy changes applied from 2024 and outcomes are estimated over 20 years to 2043. All monetary figures are presented in 2024 prices without discounting.

The model estimates how tobacco tax changes affect tobacco prices relative to the business-as-usual situation of an RPI+2% duty escalator on both HRT and FM cigarettes. Evidence is used on how the tobacco industry adjusts profit margins in response to tax rises,[20] and on how consumer purchasing of HRT and FM cigarettes, and alcohol products, responds to changes in tobacco retail prices.[35] Consumer expenditure on 2 tobacco and 10 alcohol products is estimated for 800 population subgroups defined by combinations of age category (18–24, 25–34, 35–49, 50+), sex (men/women), socioeconomic conditions (IMD quintiles), 5 tobacco consumption categories (smoke-free, >0–10, >10–20, >20–30, >30 cigarettes on average per day) and 4 alcohol consumption categories, based on the National Institute for Health and Care Excellence alcohol-use definitions,[36] defined based on average weekly units of alcohol consumed (*abstain*; *lower-risk*, 0–14 UK standard units alcohol (10 mL ethanol) per week; *increasing-risk*, >14 units and for men ≤50 units or women ≤35 units; *higher-risk*, above increasing-risk levels). This detailed stratification allowed us to account for variations in purchase volumes and prices paid, enabling comparisons of policy impacts on specific subgroups. The model then estimates the impact on the future trajectories of tobacco and alcohol consumption, consumer expenditure, industry revenue and government tax revenues from duty and value added tax, mortality, hospital admissions and the NHS costs of these admissions.

A model overview is provided below, with further details in online supplemental 1.

Data

The model was initiated in 2017, based on a pooled data sample from the 2016–2018 Health Surveys for England (a representative sample of the English population). Tobacco consumption is recorded as whether someone has never smoked, currently smokes or used to smoke, with further information on the average number of cigarettes smoked per day, split into HRT and FM cigarettes and the elapsed time since quitting. Data on prices paid for FM cigarettes and HRT was from the Living Costs and Food Survey (LCFS),[37] a nationally representative survey of UK households in which respondents complete a 2-week household spending diary (see online supplemental 1, Section 2.3). The distributions of prices paid were quantified in terms of the proportion of sticks purchased within sequential £0.02 price bands for the price paid per stick (assuming 0.5 g tobacco per HRT stick[16]). A limitation of these data is that the quantity of tobacco purchased for a certain price is not recorded; we overcame this by inferring the quantities purchased using market research data from AC Nielsen to estimate the modal pack size

at each point of the price distribution (see online supplemental 1, Section 2.3.1).[32] For each of the 800 modelled subgroups, price distributions were produced for HRT and FM cigarettes (ie, 1600 distributions in total). These price distributions were subsequently matched to individuals within each subgroup of the simulated population. Price distributions were initially estimated to correspond to 2017 (after the introduction of the MET). Tobacco consumption and price distributions were then projected forward to 2024 (when the policy effects are applied), accounting for ongoing declines in smoking rates and tax changes in the intervening period. An additional parameter was also incorporated to adjust the lower end of the FM cigarette price distribution to account for products being sold at prices below the MET threshold (see online supplemental 1, Section 6.4).

The effect of tax changes on retail prices

The model calculates how tobacco duty changes affect the price distributions of purchased products (see online supplemental 1, Section 5.1). This calculation uses empirical evidence on how industry pricing strategies modify the extent to which duty rises are passed through to effects on retail prices at each point in the price distribution.[20] The change in the average retail price for HRT and FM cigarettes is then calculated by model subgroup.

The effect of changes in retail prices on consumer behaviour

Changes in product price are modelled to affect product consumption using price elasticities of demand (see online supplemental 1, Section 3), which describe the percentage change in the consumption of a product (itself or another) due to a 1% change in its average price. 'Own-price' elasticities describe how demand for a product depends on its own price, and 'cross-price' elasticities describe how demand for a product depends on the price of other products. The elasticities used in this study come from published analysis of LCFS data by Pryce *et al*[35] In each subgroup, the percentage change in the average price per stick is used to calculate: (1) the change in the proportion of people who consume a particular product or not, using participation elasticities, and (2) the change in how much of that particular product is consumed, given that someone does consume that product, using conditional consumption elasticities.

The health effects of changes in consumption

Changes in the consumption of tobacco and alcohol are modelled to affect mortality and morbidity (hospital admissions) across 84 tobacco-attributable and/or alcohol-attributable disease categories identified by the International Classification of Diseases, 10th Revision classification. In each year of the simulation, each individual is assigned a relative risk for each disease based on their current and past tobacco and alcohol consumption (see online supplemental 1, Section 4.1 for the sources of the relative risk estimates). The effects of changes in consumption are applied to the rates of mortality and morbidity within each subgroup by calculating potential impact fractions,[38] a relative factor of change derived from the change in the average relative risk of a disease. The model subsequently calculates change to the numbers of deaths (from all causes) each year, total years of life lost due to death, tobacco-related and alcohol-related hospital admissions and the NHS costs of these admissions.

Modelled policy options

Figure 1 shows the change in duty per stick of HRT in four alternative policy scenarios:

- **Policy A:** A one-time increase in HRT duty of RPI+12% applied in 2024. From 2025 onwards, the duty returns to RPI+2%.
- **Policy B.** A one-time increase in HRT duty of RPI+12% applied in 2024 (as in Policy A). After that, the duty increases at a rate of RPI+10% each year, so that by 2030 the specific duty per stick on HRT equals the specific duty per stick on FM cigarettes.
- **Policy C.** An annual increase in HRT duty of RPI+12% begins in 2024 and continues at this rate every year through to 2030.
- **Policy D.** A one-time increase in HRT duty of RPI+12% applied in 2024. Following this, the duty increases annually at a rate of RPI+18% so that by 2030, the average retail price of HRT equals that of FM cigarettes.

The effects of Policy A are quantified in comparison to the business-as-usual scenario of an annual RPI+2% increase in the duty on HRT and FM cigarettes. Policies B, C and D are compared with Policy A.

Sensitivity analyses

Sensitivity analyses focused on the largest source of uncertainty—consumer responses to retail price changes. In our base case analyses, we used only price elasticity of demand estimates from the Pryce *et al* study that were statistically significant at the 95% level, with non-significant estimates set to zero (see online supplemental table 8.1a and 8.1b, Section 8). This restriction set cross-price effects between HRT and FM cigarettes to zero, but left some significant cross-price effects between tobacco and alcohol products. We then conducted two sensitivity analyses: (S1) use all price elasticity estimates, including non-significant ones, that is, the full set of consumer responses; (S2) set any statistically significant cross-price elasticities between tobacco and alcohol to zero, showing the influence of cross-price effects between tobacco and alcohol products.

RESULTS

In 2024 the model estimated that there were 6.7 million people who smoked, representing 15.36% of the population aged 18–89 (table 1). Smoking prevalence increased with deprivation, at 25.20% in the most deprived IMD quintile versus 7.72% in the least deprived. The average number of cigarettes smoked per day and the proportion of these sticks that were HRT both tended to increase with deprivation. People who smoke spent an average of £38.96 per week on tobacco, totalling £13.58 billion, comprised of £2.47 billion to the tobacco industry and £11.11 billion in tax to government.

By 2030, smoking prevalence was 13.01% (table 2; see in online supplemental figure 2 for the modelled trend by sex and IMD quintile). Average weekly spending per person who smokes had increased to £42.37, due to the RPI+2% duty escalator applied to HRT and FM cigarettes. Cumulatively from 2024 to 2030, revenue to the tobacco industry was £16.11 billion, with government tax revenue £76.00 billion.

Table 2 shows the estimated impact of the Autumn Statement 2023 policy of a RPI+12% increase to HRT duty applied in 2024, returning to RPI+2% thereafter (Policy A), and the further impact of continuing the higher rate of increase in HRT duty until 2030 at RPI+10% (Policy B), 12% (Policy C) or 18% (Policy D). The principal finding is that higher rates of increase in HRT duty lead to larger

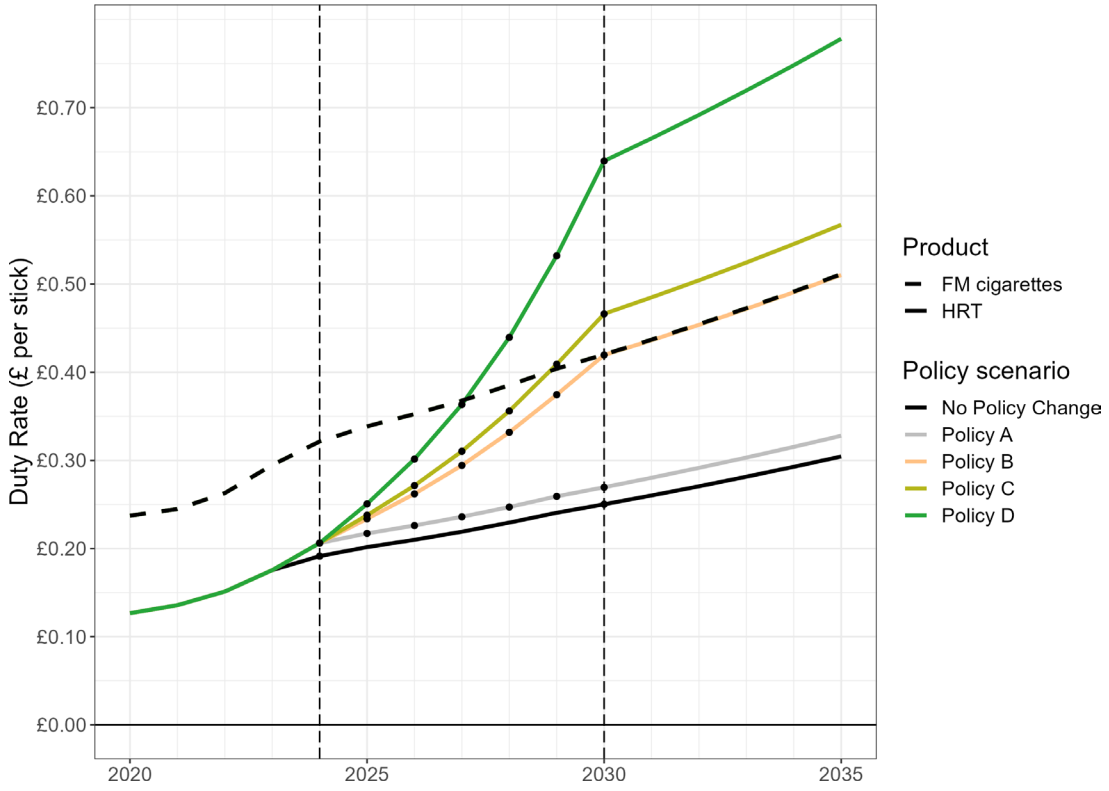

Figure 1 Annual trends in specific duty on HRT and FM cigarettes. The duty (GBP per stick, assuming 0.5 g HRT per stick) for HRT and FM cigarettes under a business-as-usual scenario (RPI+2% annual increase) and four policy scenarios. Policy A (Autumn Statement 2023) applies a one-time HRT duty increase of RPI+12% in 2024. Policy B applies a one-time HRT duty increase of RPI+12% in 2024, followed by RPI+10% annual increases to equalise HRT and FM duty by 2030. Policy C applies consistent annual HRT duty increases of RPI+12% from 2024 to 2030. Policy D applies a one-time HRT duty increase of RPI+12% in 2024, then RPI+18% annual increases to equalise average HRT and FM retail prices by 2030. FM, factory-made; GBP, Great British pound; HRT, hand-rolling tobacco; RPI, Retail Price Index.

overall health improvements and a larger reduction in health inequalities (figure 2).

Impact of the UK Government's Autumn Statement 2023 (Policy A)

Table 2 shows the estimated impact of the one-time RPI+12% increase in HRT duty, which was estimated to lead to 17 437 fewer people who smoke in 2030 (an absolute change in smoking prevalence in 2030 of −0.04%). The average spending on tobacco per person who smokes was estimated to increase by £0.21 per week. Tobacco industry revenue up to 2030 decreased by £120 million, while government tax revenue from tobacco increased by £380 million. Total deaths over 20 years were estimated to fall by 1770, resulting in 36 947 additional years of life lived, 6473 fewer hospital admissions and an NHS cost saving of £12 million. These health effects were larger in the most deprived IMD quintiles (998 fewer deaths) than the least deprived (201 fewer deaths).

Impact of continuing higher rates of increase in HRT duty (Policies B, C and D)

Compared with Policy A, which reverted the HRT duty increase from RPI+12% to RPI+2% in 2025, Policies B, C and D—maintaining increases of RPI+10%, 12% and 18% respectively until 2030—led to progressively larger improvements in overall health and reductions in health inequalities (table 2; figure 2). These benefits were associated with larger reductions in smoking prevalence, but also larger increases in spending on tobacco by people who continue to smoke. For example, with Policy D, spending in 2030 increased by £5.27 per week (table 2). Faster increases in HRT duty also led to larger reductions in tobacco industry revenue, for example, £400 million less by 2030 with Policy D, but more government tax revenue, for example, £3.19 billion more by 2030 with Policy D (table 2).

Sensitivity analyses

Table 3 presents a sensitivity analysis of the impact of the Autumn Statement 2023 (Policy A) and the effects of maintaining higher HRT duty increases (Policies B, C and D). Detailed results are provided in online supplemental tables 2 and 3.

The first analysis investigated the impact of incorporating all cross-price elasticities (including non-statistically significant ones between HRT and FM cigarettes, and between tobacco and alcohol products). Doing so nearly doubled the impacts on smoking prevalence and health, due mainly to the complementary relationship between HRT and FM cigarettes, in which increases in HRT duty reduce FM cigarette consumption. This analysis also revealed a large impact of cross-price elasticity assumptions on government tax receipts. While the base case projected increases in government revenue with faster increases in HRT duty, incorporating cross-price effects reversed this to substantial decreases, caused by the lost tax revenue from FM cigarettes offsetting gains from HRT.

The second sensitivity analysis investigated the impact of the statistically significant cross-price effects between tobacco and alcohol products. The main effect of excluding the cross effects to alcohol was to reduce the estimated health benefits (table 3).

Table 1 Characteristics of the modelled England population in the comparator scenario at the end of 2024

	IMD-Q1 Least deprived	IMD-Q2	IMD-Q3	IMD-Q4	IMD-Q5 Most deprived	Total population
Population (millions)						
Total population (aged 18–89)	8.46	8.62	8.79	9.10	8.66	43.63
Modelled smoking prevalence (%) - end of 2024	7.72	11.33	14.00	18.24	25.20	15.36
Number of people who smokes	0.65	0.98	1.23	1.66	2.18	6.70
Tobacco consumption (average sticks per person who smokes per week)						
Average sticks per week	71.49	75.76	72.51	80.02	82.31	77.93
Percentage of consumed sticks that are HRT	38.06	45.28	41.56	48.93	45.61	44.91
Spending on tobacco						
Average GBP per person who smokes per week	£40.42	£37.53	£37.63	£37.90	£40.72	£38.96
Annual revenues to the tobacco industry and to the government in tax (billion GBP)						
Industry revenue from tobacco	£0.26	£0.35	£0.44	£0.59	£0.83	£2.47
Government revenue from tobacco duty and VAT	£1.11	£1.56	£1.97	£2.68	£3.79	£11.11
Total consumer spend on tobacco (industry revenue+government tax revenue)	£1.37	£1.91	£2.41	£3.27	£4.62	£13.58
Health consequences attributable to tobacco						
Deaths	2083	2648	3859	6510	10 021	25 122
Hospital admissions	5706	7677	11 396	19 103	29 425	73 307
Health consequences attributable to tobacco per 100 000 adults						
Deaths	25	31	44	72	116	58
Hospital admissions	67	89	130	210	340	168

GBP, Great British pound; HRT, hand-rolling tobacco; IMD, Index of Multiple Deprivation; Q, quintile; VAT, value added tax.

For example, in the base case, Policy D led to an additional 12 500 fewer deaths, but excluding cross effects to alcohol reduced this to 7969 fewer deaths. This is due to the estimated complementary relationship between tobacco and alcohol products, in which HRT price rises reduced alcohol consumption.

DISCUSSION

The modelled estimates suggest that sustained, higher duty increases on HRT than on FM cigarettes could substantially reduce the health harms from tobacco. The reason this policy approach could be effective is because it would mean that HRT no longer provides a more affordable option for people to switch to as tobacco prices rise. It would also mean that entry into a regular smoking habit for young people becomes less affordable. The UK Government has already recognised the importance of this policy approach, introducing the RPI+12% rise in HRT duty in the Autumn Statement 2023.[25] Subsequently, in the Autumn Budget 2024, this policy was continued,[39] that is, Policy C was followed. Our findings show that this approach would need to continue for a further 4 years for the rate of specific duty on HRT to equal that on FM cigarettes, but that equalising the average retail prices of the two products would require higher rates of increase to HRT duty, in our example, an RPI+18% rise until 2030.

This study is the first to assess the long-term health and economic impacts of recent UK tobacco duty escalator changes. Our model, STAPM, builds on previous tobacco tax research by providing an individual-level simulation of tobacco consumption, enabling detailed analysis of policy effects on future health and economic inequalities and impacts on the costs of NHS secondary care. STAPM incorporates new UK price elasticities of demand estimated jointly for tobacco (separating HRT and FM cigarettes) and alcohol,[35] and directly models the effects on consumer spending, industry revenue and government tax receipts. A 2018 UK modelling study also found similar benefits from increasing the tobacco duty escalator.[40] Our study used broadly similar microsimulation methods, but was able to separate the impact of duty rises for HRT and FM cigarettes, which was possible due to our new price elasticity estimates. We also used up-to-date price, tax and consumption estimates and were able to model the socioeconomic inequalities in effects according to quintiles of the IMD. In addition, a strength of our modelling approach is its consideration of both tobacco and alcohol,[30] recognising that in the UK people often consume both tobacco and alcohol,[33] that spending on tobacco and alcohol products is closely linked,[31 32] and both are risk factors for many of the same diseases, for example, cancers.[41]

The main limitation of the modelling is the uncertainty around people's behavioural responses to changes in the price of HRT, particularly concerning the cross-price effects between HRT and FM cigarettes. The Pryce *et al* cross-price elasticity estimates used in this study suggest that when the price of HRT increases, the consumption of FM cigarettes will decrease.[35] However, the 95% CIs around these estimates leave room for the less likely possibility that they are substitutes, where an increase in the price of HRT could cause consumers to switch to FM cigarettes. In addition, the model does not investigate the potential effects of the HRT price increases for the consumption of other tobacco products, for example, cigarillos and heated tobacco, or for the use of e-cigarettes and other nicotine-containing products. Cigarillos in the UK are subject to less tax than cigarettes,[42] making them an affordable alternative to cigarettes that could see increased use as HRT price increases. Treating cigarillos as cigarettes to ensure they are subject to the same regulations and rate

Table 2 Estimated impact of Policy A, the Autumn Statement 2023, which increased duty on HRT by RPI+12%, and the further potential impact of three policy options for continuing the higher rate of increase in HRT duty (Policies B, C and D)

	Business-as-usual comparator	Policy scenarios			
Policy scenario		**(A) Autumn Statement 2023**	**(B) Equivalised duty rate**	**(C) Extended Autumn Statement 2023**	**(D) Equivalised average retail price**
HRT duty rise* (2024)	2%	12%	12%	12%	12%
Annual HRT duty rise (2025–2030)	2%	2%	10%	12%	18%
		Policy A vs business-as-usual	**Policy B vs Policy A**	**Policy C vs Policy A**	**Policy D vs Policy A**
Smoking prevalence in 2024 (% of population)					
Total population	15.36	−0.08	–	–	–
Smoking prevalence in 2030 (% of population)					
Total population	13.01	−0.04	−0.29	−0.37	−0.62
IMD-Q1 (least deprived)	6.19	−0.01	−0.12	−0.14	−0.20
IMD-Q2	9.80	−0.03	−0.23	−0.28	−0.45
IMD-Q3	11.12	−0.03	−0.26	−0.32	−0.54
IMD-Q4	15.14	−0.05	−0.43	−0.53	−0.88
IMD-Q5 (most deprived)	22.12	−0.07	−0.58	−0.76	−1.20
Average weekly spending on tobacco (GBP per person who smokes)					
2024	£38.96	£0.41	–	–	–
2030	£42.37	£0.21	£2.65	£3.25	£5.27
Total consumer spending on tobacco (billion GBP)					
2024	£13.58	£0.07	–	–	–
2030	£12.71	£0.02	£0.49	£0.58	£0.89
Cumulative impact (2024–2030) on tobacco industry revenue and government tobacco tax revenues (billion GBP)					
Industry revenue from tobacco	£16.11	−£0.12	−£0.18	−£0.26	−£0.40
Government revenue from tobacco duty and VAT	£76.00	£0.38	£1.76	£2.06	£3.19
Cumulative 20-year impact (2024–2043) on health outcomes					
Total deaths	9 497 376	−1770	−5710	−8847	−12 500
Deaths IMD-Q1 (least deprived)	1 754 499	−201	−345	−508	−812
Deaths IMD-Q2	1 878 315	140	−360	−510	−971
Deaths IMD-Q3	1 943 182	−136	−1105	−1266	−2139
Deaths IMD-Q4	1 928 405	−574	−1378	−2221	−2925
Deaths IMD-Q5 (most deprived)	1 992 974	−998	−2523	−4341	−5652
Years of life lost	141 093 103	−36 947	−134 783	−181 819	−277 852
Hospital admissions	40 347 574	−6473	−21 745	−29 232	−44 807
NHS admissions costs (million GBP)	£74 142	−£12	−£40	−£54	−£82

*The increase above RPI inflation.
GBP, Great British pound; HRT, hand-rolling tobacco; IMD, Index of Multiple Deprivation; NHS, National Health Service; Q, quintile; RPI, Retail Price Index.

of tax could minimise this risk. There is evidence from the USA of cross-price effects between tobacco and e-cigarettes,[43] but little evidence for the UK. Understanding the cross-price effects between tobacco products and e-cigarettes has become more important in the UK following the government's announcement of a new duty on e-liquids to be introduced in October 2026, accompanied by a one-off rise in tobacco duty.[44] The intention is to increase the cost of vaping, particularly to deter young people who have never smoked tobacco regularly from vaping, and to maintain the price difference between e-cigarettes and tobacco so that e-cigarette price increases do not drive up tobacco smoking. At the same time, the provision of free e-cigarette starter kits, such as through the UK's 'Swap to Stop' scheme,[45] may increasingly function as a financial incentive for people who smoke to quit. While there is evidence of how tobacco price increases might specifically affect smoking initiation by young people,[46] recent UK evidence is lacking. Further research to understand how price increases affect young people's smoking in the UK will also prove useful to understand how tax policy on tobacco and e-cigarettes might support the effectiveness of the policy measures proposed in the UK Government's Tobacco and Vapes Bill,[47] which includes annually raising the legal age of tobacco sale by 1 year of age from 2027.

It is therefore important to consider tax escalators for tobacco as one part of a coordinated tobacco control strategy. In the UK, there are already a strong set of non-price measures that complement price-based approaches, such as bans on tobacco advertising and plain packaging.[1] In addition, it is vital that any

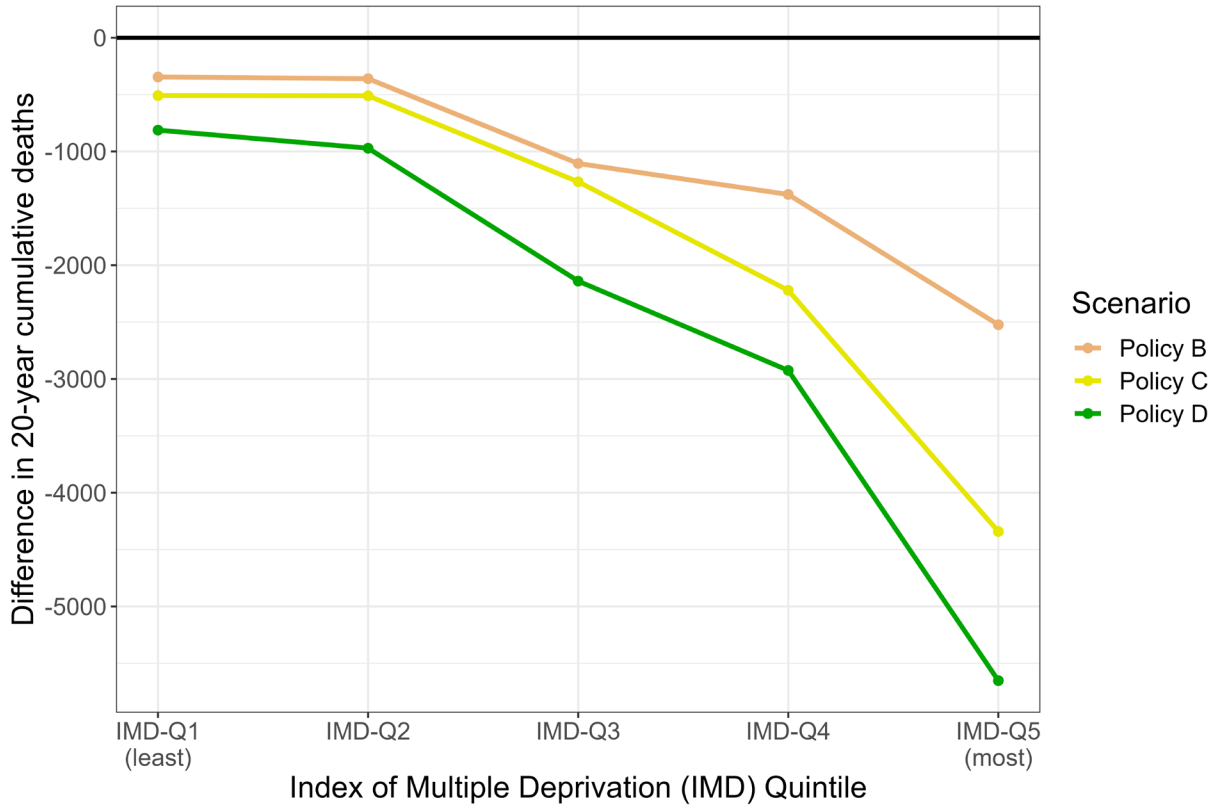

Figure 2 Impact on cumulative deaths over 20 years (2024–2043) by IMD quintile of continuing the higher rate of duty increase on HRT until 2030 (Policies B, C and D) versus the one-off Autumn Statement 2023 increase (Policy A). In the figure, IMD-Q1 corresponds to the least deprived area, and IMD-Q5 the most deprived. HRT, hand-rolling tobacco.

strategy involving price increases for the cheapest legally sold tobacco—such as HRT—is paired with investment in limiting the supply of illicit (untaxed) tobacco.[48 49] Given the UK's high tobacco tax levels,[50] illicit products already represent a substantially cheaper alternative that consumers may switch to when faced with further tobacco tax increases. The new UK Government strategy on illicit tobacco[51] aims to counter this by reducing the availability and affordability of illicit tobacco through enforcement against organised crime, and reducing its acceptability through media campaigns. Doing so should increase the public health effectiveness of tobacco tax rises. It is also important to invest in public health initiatives that support people in the most disadvantaged situations to quit smoking, given the risk that tobacco price increases could stigmatise or

Table 3 Sensitivity of results to alternative price elasticity of demand assumptions

Policy scenario	Base case: Pryce *et al* using statistically significant own and cross-price elasticities for tobacco and alcohol	S1: Use all cross-price elasticities including non-statistically significant ones	S2: Exclude statistically significant cross-price elasticities between tobacco and alcohol
Difference in 2030 prevalence of smoking			
Policy A vs business-as-usual	−0.04%	−0.08%	−0.04%
Policy B vs Policy A	−0.29%	−0.64%	−0.32%
Policy C vs Policy A	−0.37%	−0.79%	−0.38%
Policy D vs Policy A	−0.62%	−1.27%	−0.62%
Difference in government tax revenue from tobacco duty and VAT, 2024–2030 (billion GBP)			
Policy A vs business-as-usual	£0.38	−£0.82	£0.33
Policy B vs Policy A	£1.76	−£1.57	£1.32
Policy C vs Policy A	£2.06	−£1.71	£1.88
Policy D vs Policy A	£3.19	−£2.91	£2.89
Difference in 20-year (2024–2043) cumulative deaths from all causes			
Policy A vs business-as-usual	−1770	−2763	−1842
Policy B vs Policy A	−5710	−12 538	−4064
Policy C vs Policy A	−8847	−13 286	−6198
Policy D vs Policy A	−12 500	−26 323	−7969

GBP, Great British pound; VAT, value added tax.

impose financial burdens on individuals who may rely on cheap tobacco but who are not yet prepared to quit or may not be in a position to quit.[52]

In addition to using tax to increase the price of HRT, governments could also specify a minimum price threshold below which no tobacco could be sold.[29] However, while this could immediately raise the price of the most affordable tobacco, it would increase revenue for the tobacco industry rather than government. Furthermore, the sensitivity analysis in this study indicated that if HRT price increases cause people to reduce their consumption of FM cigarettes, then the government may also lose tax revenue. An alternative policy approach that could raise tobacco prices and raise tax revenue is the introduction of a wholesale tobacco price cap alongside a large duty increase for both HRT and FM cigarettes.[53–55] The price cap, acting as an upper limit on wholesale prices, would restrict tobacco industry profits from more expensive products, thus constraining their ability to subsidise the affordability of the least expensive tobacco. Simultaneously, the duty increase across all tobacco products could raise substantial government tax revenue from people who continue tobacco smoking. Some have suggested dedicating tobacco tax revenues to investment in stop smoking campaigns and services,[23 24] which would help to reduce smoking prevalence, and therefore tobacco tax revenues, to minimal levels.

While this study refers to the UK, which has relatively high tobacco taxes,[50] the problem of large price differentials among tobacco products, creating more affordable options, is an issue worldwide.[56] For example, HRT is popular as an affordable option in countries throughout Europe,[57] but in other countries it is different products, such as bidis in India,[58] that are the preferred affordable option. The successful implementation of higher HRT tax rises in the UK would provide strong evidence for similar targeted tax strategies internationally to reduce tobacco use prevalence.

In conclusion, the use of duty escalators to raise the price of the most affordable tobacco products could yield substantial public health improvements. However, this policy approach should be used as part of a tobacco control strategy that limits the use of illicit tobacco and invests in supporting people to stop smoking.

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