Infometrics

Smoked Tobacco Amendment Act: An Efficiency & Effectiveness Review

A report prepared for British American Tobacco, Imperial Brands and Japan Tobacco International

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Disclaimer

“If there is any lesson in the history of ideas, it is that good intentions tell you nothing about the actual consequences.”

Thomas Sowell, American economist.

Key findings

- Smoking rates in New Zealand have declined significantly in recent years, as smokers respond to amongst other things higher excise tax rates, and switch to vaping.
- The latest Ministry of Health data indicates 8% of adults were daily smokers in 2022, down from around 16.4% in 2012. On current trends, New Zealand is projected to achieve the smokefree target of no more than 5% of adults smoking by 2026, even without the Smokefree Environments and Regulated Products (Smoked Tobacco) Amendment Act 2022 (the STA or the Act).
- Some groups (e.g., Māori and Pasifika) have much higher smoking rates, though even amongst these groups smoking rates have declined sharply.
- This report accepts fully the goals of the Smokefree 2025 Action plan and the health benefits of reducing smoking rates in New Zealand. The purpose of this report is to examine the extent to which the recently passed STA measures will be effective and efficient in achieving this goal.
- The STA has three key elements: the Act reduces the number of retail outlets allowed to sell smoked tobacco products by over 90%; reduces the amount of nicotine allowed in smoked tobacco products by over 90%; and prohibits the sale of tobacco products to anyone born on or after 1 January 2009.
- While these goals are no doubt well intentioned, this report finds the STA is likely to impose substantial costs on New Zealanders' wellbeing. The Act is likely to increase illicit market activity and associated crime; increase unemployment and cause financial stress to retail store owners; increase travel costs as users have to travel further to find tobacco products; and increase inefficiencies as the government needs to find alternative sources of tax revenue.
- The costs imposed on New Zealanders from the Act that are considered quantifiable are estimated to total around $1.3 billion in present value terms over the next ten years.
- Other countries examined in the report where governments have attempted to control the use of tobacco or other addictive products by across-the-board supply-side controls have seen little or no reduction in consumption as users switched to illicit markets. Instead they have experienced increased illicit-market related crime, a loss of revenue to government and other perverse or negative outcomes.
- With NZ already well on track to achieve the smokefree goal and with the STA imposing substantial costs across society, this report questions the need for the Act.
- For those population groups that are unlikely to achieve the 5% target in the foreseeable future, a more targeted approach, rather than a blanket nation-wide ban, is likely to be more effective and impose a far lower cost on society.
- Overall, this report finds the STA is largely if not entirely redundant and highly costly. In some respects, the package may even be counterproductive in terms of discouraging smoking, such as if the growth in the illicit market sees the reduced price (tax-free) product being more available; if reduced nicotine levels lead people to smoke more low-nicotine cigarettes to satisfy their desired nicotine levels; or if the reduction in the number of retail outlets encourages people to bulk-buy cigarettes.

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Glossary

ABF	Australian Border Force
ACIC	Australian Criminal Intelligence Commission
ATO	Australian Tax Office
Adult	Person over the age of 15.
Age-sales ban	One of three main interventions of the STA, prohibiting the sale and delivery of smoked tobacco products to anyone born on or after 1 January 2009, creating the "smokefree generation".
ASH	Action on Smoking and Health
AUD	Australian dollar
BAU	Business as usual
Bootlegging	The illegal manufacture, distribution or sale of goods
CAD	Canadian dollar
CBAx	A spreadsheet model by the Treasury containing a common database to help organisations monetise impacts and do ROI analysis.
Contraband	Genuine manufactured cigarettes that are sold without the payment of applicable excise taxes in the market of consumption.
Counterfeit	Manufactured cigarettes that are illegally manufactured and carry the trademark and or branding of a legally manufactured brand without the consent of the owner.
CPI	Consumer Price Index
Current smoker	Has smoked more than 100 cigarettes in lifetime and currently smokes at least once a month.
Customs	New Zealand Customs Service
DALY	DALYs quantify the burden of disease combining years of healthy life lost due to premature death and years lived with disability, representing the overall impact of disease on a population's health.
Daily smoker	Has smoked more than 100 cigarettes in lifetime and currently smokes at least once a day.
Deadweight	Losses incurred due to the inefficient allocation of resources, particularly through taxation or restriction.
E-cigarette	An electronic cigarette is a battery-operated device that emits a vaporised solution, typically containing nicotine, which is inhaled.
ENDS	Electronic Nicotine Delivery Systems

EU	European Union
FCTC	WHO Framework Convention for Tobacco Control
FTE	Full-time equivalent
g	Gram
HALY	Health-adjusted life years; a measure of disease burden combining both the quantity and quality of life lived with a health condition.
HLS	Health and Lifestyles Survey
IDT	Institute of Drugs and Drug Addiction
IHME	Institute of Health Metrics and Evaluation
Illicit whites	Similar to contraband products, in most cases legally produced in a country, but with the sole intention of being smuggled into other markets. Illicit whites subsequently have limited or no legal distribution and are sold without the payment of tax.
ITTF	Illicit Tobacco Taskforce
kg	Kilogram
km	Kilometre
Loose tobacco	Loose-leaf, fine-cut tobacco sold in pouches, used for roll-your-own cigarettes which are consumed using rolling papers or tubes.
MoH	Ministry of Health
NZD	New Zealand Dollar
OECD	Organisation for Economic Co-operation and Development
QALY	Quality-adjusted life years; a type of HALY which uses a preference-based approach to value health states, instead of a person-centred approach used by HALYs. They assess the value of healthcare interventions, combining the quantity and quality of life gained from a particular treatment.
REEP	Research Unit on the Economics of Excisable Products
Regular smoker	A person who currently smokes cigarettes, cigars or pipes at least once a week, or who has smoked at least 100 cigarettes, 20 cigars or 100 pipefuls of tobacco in their lifetime.
RIS	Regulatory Impact Statement
SERPA	Smoke-free Environments and Regulated Products Act 1990
SHS	Second-hand smoke
Speakeasy	An illicit establishment selling alcoholic beverages.
Snus	A form of moist powdered tobacco product, typically placed between the upper lip and gum, it is a smokeless alternative to cigarettes.

Smokefree goal	The government's goal of reducing adult daily smoking prevalence to less than 5% across all population groups in New Zealand by 2025.
STA	The Smokefree Environments and Regulated Products (Smoked Tobacco) Amendment Act 2022
Supply-side	Referring to a policy approach that focuses on influencing factors affecting the production and supply of goods and services in an economy, as opposed to the "demand-side" which relates to consumer demand. This might include measures around regulation, tax and investment to inhibit business activity involved with tobacco.
tonnes	Thousand kilograms
USD	United States dollar
Vape	Battery-operated electronic device which produces a vapour typically containing nicotine, flavourings and other chemicals that is then inhaled by the user, they are also known as vaping products or e-cigarettes.
VSL	Value of statistical life
WHO	World Health Organisation

Summary

Introduction

TDB Advisory Ltd (TDB) has been commissioned by British American Tobacco, Imperial Brands and Japan Tobacco International to undertake a cost-effectiveness review of the Smokefree Environments and Regulated Products (Smoked Tobacco) Amendment Act 2022 (the STA or the Act). The legislation came into effect on January 1 2023, introducing three key changes to the Smokefree Environments and Regulated Products Act 1990:

- from July 1 2024, decreasing the numbers of retailers able to sell smoked tobacco products by over 90%;
- from April 1 2025, reducing the amount of nicotine allowed in smoked tobacco products from an average of 12mg/g to less than 0.8mg/g; and
- from January 1 2027, prohibiting the sale of smoked tobacco products to anyone born on or after January 1 2009.[1]

This report accepts fully the goals of the Smokefree 2025 Action plan and the health benefits of reducing smoking rates in New Zealand. The purpose of this report is to examine the extent to which the STA measures will be effective and efficient in achieving this goal.

Specifically, there are concerns around the potential behavioural responses from both consumers and producers to the policies, which may lead to unintended consequences. Additionally, the report highlights the need to consider the societal costs associated with the STA, which may have been given insufficient consideration in the policy design. Well-intentioned yet erroneously designed policy can risk failing to solve the problem at hand, whilst imposing economic and social burdens on the community.

In light of these concerns, this report seeks to undertake an evidence-based cost-effectiveness review of the STA, addressing:

- the estimated effectiveness of the STA in achieving the government's objectives and any potential unintended consequences that may arise;
- the estimated efficiency of the Bill, including an assessment of the costs it will impose and the expected magnitude of these costs; and
- an exploration of alternative, potentially more cost-effective ways of achieving the government's objectives, including the consideration of the status quo (pre the introduction of the Act).

Smoking in New Zealand

The latest available official data (the Ministry of Health's Health and Lifestyles Survey (HLS)) indicates that around 8% of New Zealand adults over age 15 smoked daily in 2021/22.

Smoking rates for all ethnic subgroups have declined consistently over the last two to three decades. While smoking rates amongst some groups remain high, there has been a large reduction in smoking amongst Māori, falling from 37.7% in 2011/12 to 19.9% in 2021/22. Historically, smoking amongst

[1] Smokefree.org.nz. (2023).

Māori women has been higher than for Māori men. However, the latest HLS report indicates a dramatic reduction in smoking rates for Māori women to 18.2%, a rate now lower than smoking rates for Māori men at 21.8%.

Youth smoking rates have fallen even more dramatically: amongst Year 10 students, current smoking rates have declined from 25% in 2002 to 3% in 2022.

However self-reported data such as that used by the HLS may underestimate true smoking rates. Our analysis of aggregate tobacco sales figures indicates tobacco sales may be around 23% higher than indicated by the self-reported consumption data. The extent of under-reporting may well be larger given the sales data does not include illicit market sales.

The emergence of electronic nicotine delivery systems (ENDS), such as e-cigarettes and vaping devices, is likely to have played a significant role in the decline in smoking rates in New Zealand. Other factors contributing to the decline in smoking are likely to be increasing awareness of the health risks of smoking, the increasing social unacceptability of smoking and the large increases in tobacco excise rates.

There has been rapid growth in vaping rates in recent years, with daily vape use increasing from around 2.5% to 8% of the adult population in the last four years. ASH estimates that daily vaping for Year 10 students was 10.1% in 2022.[2]

When both vaping and cigarette smoking are taken into account, around 18% of New Zealand adults exhibit some level of nicotine dependence. This suggests that the large decline in smoking since 2010 can largely be attributed to a shift in delivery device rather than an accelerated reduction in nicotine dependence. The decline in nicotine dependence from around 19.5% to 18% over the last decade implies an annual decline of 0.8% per year, a rate remarkably similar to that experienced in New Zealand during the 1990s.

While increasing excise taxes have contributed to a decline in smoking rates over recent years, they have also significantly increased incentives for participation in the illicit tobacco trade. Customs NZ data indicates that over the last four years total tobacco products seized increased dramatically, from around six million sticks in 2018/19 to almost 25 million sticks equivalent in 2021/22. According to Customs' most recent Annual Report:

> *"The largest source of revenue evasion (in revenue collected by Customs) is tobacco smuggling. Organised crime groups are attracted to tobacco smuggling because of the high prices and demand in New Zealand."* [3]

Estimates of the overall scale of the illicit tobacco market vary widely, from around 4% (ASH) to 12% (KPMG) of total consumption, with Customs NZ estimating the figure at around 6% to 7%. Illicit tobacco sales occur through various channels, including some dairies, Asian grocers and other small retailers; social media groups and other online platforms; and organised crime groups involved in illicit trade of various illegal substances.

The growing illicit market for tobacco products may well be contributing to increased crime rates through activities such as smuggling and counterfeiting, and the promotion of unregulated and potentially more hazardous tobacco products. The rising incidence of ram raids targeting tobacco has resulted in property damage and disruption to business operations. These crimes lead to financial losses, reduced productivity, and higher insurance premiums for affected businesses. Moreover, such incidents can have a traumatising effect on employees, leaving them feeling unsafe and insecure.

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[2] ASH (2022).

[3] New Zealand Customs Service (2022).

Framework used in this study

This report provides an assessment of the effectiveness and efficiency of the STA in achieving the government's goal of a smokefree New Zealand.

The effectiveness analysis assesses the expected effectiveness of the STA interventions in achieving the government's goal of a smokefree New Zealand, addressing two key questions:

- are the interventions likely to contribute to achieving the government's goals? and
- what unintended or perverse consequences might result?

The efficiency analysis estimates the costs likely to arise with the STA. The cost analysis in this report takes a national perspective: it is the costs to the nation as a whole that matters. Given the uncertainties surrounding the impacts of the policies, behavioural responses and overall effectiveness, we employ Monte Carlo analysis to conduct sensitivity tests of our cost estimates.

The effectiveness of the STA

The Regulatory Impact Statement (RIS)[4] underpinning the STA was based on modelling by Ouakrim et al. (2022). This modelling has major flaws, as highlighted by Bates et al. (2022).

Ouakrim et al. severely overestimated the problem the STA was intended to address by overstating the rate of smoking in the population. This overstatement is likely to have caused a false sense of urgency for the government to take action. Ouakrim et al. assumed the rate of smoking in 2022 was 15%, when in fact the Ministry's HLS indicates the rate was almost half that, at 8%.

The marked reduction in smoking rates that was set aside by Ouakrim et al. severely undermines the effectiveness of the STA as estimated in the RIS. Indeed, using the correct (HLS) smoking figures for 2022 of 8%, and assuming the trend of declining smoking rates seen in recent years continues as people continue to switch to vapes and other ENDS, New Zealand is likely to achieve the smokefree target of 5% by around 2026, even without the measures in the STA.

The modelling undertaken by Ouakrim et al. is also seriously deficient in that it relies on dubious input assumptions and coefficients that likely exaggerate cessation rates and the subsequent improvements in morbidity and mortality arising from the Act.

In our assessment the benefits arising from the Act are likely to be small and the Act is likely to make little in the way of a positive contribution to the government's smokefree goal:

- The RIS states that of the three policies in the STA, the largest effect (in terms of reducing smoking rates and HALYs gained) is likely to come from the nicotine reduction policy. However, the RIS overlooks the behavioural changes that may occur if only low-nicotine cigarettes are legally available. These changes in behaviour can manifest in many forms:
    - smokers may increase their cigarette consumption or inhale more deeply to obtain the same total amount of nicotine, undermining the effectiveness of the policy on health outcomes. Indeed it may lead to worse rather than better health outcomes as people consume more of the harmful product (smoking) to obtain their desired level of nicotine; and
    - people may also seek to put nicotine back into the low-nicotine cigarettes, such as through nicotine sprays or soaking tobacco in vape liquid.

[4] Ministry of Health, Regulatory Impact Statement (2021).

- The reduction in retail outlets may reduce smoking by raising travel costs for smokers. But it may also lead to more illicit trade and increased bulk buying and thus more smoking.
- Additionally, it is important to consider that Māori individuals are more concentrated in rural areas compared to the general population, suggesting longer travel distances to tobacco outlets (and vape stores). They may also have closer proximity to the illicit tobacco market. These factors raise concerns about the effectiveness of the policy in reducing health inequities.
- The availability of vaping has contributed to a steep decline in youth smoking rates (only 1.1% of year 10 students smoked daily in 2022). With a diminishing rate of new entry into smoking, the tobacco age-sales ban, (which targets new entrants) is likely to be largely redundant.

The residual effectiveness of the age-sales ban is further compromised by an implicit and unsubstantiated assumption in the RIS that, in the future, say 2050, tobacco sellers will indeed differentiate (when asking for identification) between a person aged 42 and a person aged 41 – a nonsensical situation. The former buying cigarettes for the latter would make them a criminal. Such rules can erode confidence in and respect for the law, and incline people to move more readily into illicit tobacco consumption. Over time, as the age-sales ban applies to a progressively larger share of the population, it is also likely to expand the potential size of the black market for tobacco.

It is important to note that certain population groups, such as Māori and Pasifika, may well face challenges in achieving the 5% goal, regardless of the implementation of the STA. If the objective is to reduce smoking rates in these specific population groups to below 5%, it is worth considering whether a blanket ban, such as the proposed one in the STA, is appropriate or whether more targeted approaches may have higher efficacy.

The costs arising from the STA

The STA is nevertheless likely to impose substantial costs on New Zealanders. The costs (all expressed in present value (PV) terms over a ten-year period) include:

1. Increased administration costs for the Government, including the costs associated with designing, monitoring and enforcing the regulations arising from the STA. The costs include additional resourcing at the Ministry of Health and at Customs to fund increased illicit tobacco enforcement at the border. We estimate these extra administration costs to sum to around $35 million.
2. The costs to the retail sector associated with complying with the STA and adapting to its changes, and the associated costs arising from unemployment and financial stress to store owners. These costs to the retail sector are estimated to total around $75 million.
3. The costs to the broader society resulting from inefficiencies and unintended consequences arising from the Act including:
    - increased travel costs as a result of the restrictions on the number of retail outlets, totalling an extra $545 million;
    - the costs of the increased crime from the increased illicit trade estimated at $265 million; and
    - the indirect impacts through a less efficient tax system of around $375 million.

In total the increased costs that are expected to arise from the STA that can be quantified sum to $1.3 billion in PV terms. The costs are summarised in Table 1 below.

Table 1: Estimates of the national wellbeing costs arising from the STA

Types of costs	Present value
Government	
Administration costs	35
Retail industry	
Application compliance cost	35
Involuntary unemployment	5
Financial stress	35
Society costs	
Increased travel cost	545
Illicit tobacco - cost of crime	265
Illicit tobacco - tax inefficiency	375
Total	**1,295**

The uncertainty around these estimates has been modelled using Monte Carlo analysis. This analysis indicates the 95% confidence interval for these cost estimates is from $0.5 billion to $2.6 billion. The Monte Carlo analysis indicates our central estimate of $1.3 billion is likely to be on the conservative side: that is, the costs could be considerably higher than our central estimate.

In addition to the quantified costs, there are a number of other costs to New Zealanders wellbeing that are likely to arise from the STA that we have not attempted to quantify. These non-quantified costs include:

- the mental health and other costs of unemployment that are not measured in financial terms;
- the net financial consequences of the disruptions to the retail sector;
- the health costs associated with expected increases in bulk buying of cigarettes;
- the impacts on social capital resulting from the retail sector disruptions;
- the indirect impacts of rising crime on society, such as discouragement to tourism; and
- the physical and mental health costs to individuals from quitting smoking (withdrawals) and the stigmatisation attached to those who continue to smoke.

A number of perverse or unintended consequences may arise as a result of the STA. If the illicit market expands in scale and accessibility, there is a risk that the price of illicit tobacco could drop below the current price of legal products, potentially leading to increased rather than decreased consumption. Additionally, other risks associated with the STA include the substitution of legal tobacco products with higher-harm alternatives or roll-your-own cigarettes, as well as individuals inhaling more deeply to obtain the same total amount of nicotine. Further, given the extremely low (1.1%) prevalence of new smokers, the age-sales ban, which targets new entrants, may be largely redundant. If anything, there is the possibility of a “forbidden-fruit” effect, whereby smoking may become more attractive to some youth once it is prohibited.

The experiences of other countries

Consistent with the evidence-based approach adopted in this report, we have examined the experiences of several other countries which have endeavoured to control tobacco or other addictive substances through direct supply-side restrictions. In every case we examined there was little or no reduction in consumption of the banned product, with users switching to the illicit market, crime increasing as a result and revenue being lost to the government.

Cases examined in this report include:

- Bhutan which in 2010 became the first country in the world to ban the cultivation, manufacture, supply and sale of all tobacco products. The ban saw illicit trade balloon, no material reduction in smoking rates and a loss in excise revenue. The ban was removed in 2021.
- South Africa which, as part of its national COVID-19 response, banned the sale of all tobacco and vaping products between 27 March and 17 August 2020. Supply shifted from legitimate retailers to illicit sources from spaza and house shops, friends and family, street vendors and social media groups and an estimated 93% of smokers continued to purchase cigarettes despite the ban.
- Canada which in 1984 pushed up federal tobacco taxes in Canada from 42 cents per pack to $1.93 CAD per pack by 1993. Cigarette smuggling from the US, especially by organised crime, soared. Violence increased, legitimate merchants suffered, and in one year alone, Canada and its provinces lost over $2 billion CAD in tax revenues to the black market. Federal and provincial tax rates were subsequently reduced in the mid 1990s and by the late 1990s the contraband market had receded.
- Massachusetts, USA which in 1999 became the first state in the US to ban the sale of all flavoured tobacco and nicotine products, including flavoured electronic cigarettes and menthol cigarettes. The reduction in legal sales was matched by a corresponding increase in sales in neighbouring states as smugglers imported product and there was a “blatant disregard for the regulations.”

The United States’ “war on drugs” from the 1970s on and experiences with alcohol prohibition in the 1920s are other examples discussed in the report where supply-side restrictions saw little or no reduction in demand, supply switched to the illegal market and crime increased as a result. The policies also led to various unforeseen consequences such as, in the case of alcohol prohibition, an increase in alcohol potency as people shifted from beer to hard spirits, often of unknown standards, and deaths from alcohol poisoning rose as a result.

New Zealand risks following Australia’s example where the black market for tobacco is highly organised and growing as a share of total tobacco consumption. In 2021, it is estimated that one in five cigarettes (2.2 million kg of tobacco) consumed in Australia were illicit, up from one in 12 in 2007. Trade in illicit tobacco is viewed by criminals as a low-risk, high reward activity and the profit is used to fund more serious criminal activity.

The above and other case studies are discussed in various Boxes and Annexes to this report. These cases illustrate both the responsiveness of the illicit market to the tax and regulatory environment and the willingness of consumers to purchase tobacco outside of the law. Likewise in the case of New Zealand’s STA, the policy combination will incentivise smokers who consider the policies unjust to disregard the rule of law.

Other ways the government could achieve its objectives

A range of policy options, other than supply-side bans, exist to reinforce the downward trend in smoking rates. These options include targeted policies aimed at specific groups where smoking prevalence remains high, improving access to alternative reduced harm products such as ENDS and snus, implementing earlier screening for smoking-related diseases, offering smoking cessation-support programs, and establishing a dedicated government fund to address legacy health costs.

Importantly, these policies prioritise promoting personal responsibility and enabling individuals to make informed choices, rather than relying on prohibitionist-based interventions.

Sweden is an example of a country where permitting reduced-harm products like snus (a smokeless tobacco product placed between the upper lip and gum that is banned in New Zealand) has been associated with lower smoking rates and better smoking-related health outcomes. With the adult smoking rate falling to 5.6%, Sweden is on track to become the first country in world to be defined as ‘smokefree'.

Conclusions

Overall, this report finds the STA is largely if not entirely redundant, with the smokefree target of 5% likely to be achieved by 2026 even without the STA. The Act is also highly costly, imposing costs on society of over $1 billion, costs that do not need to be incurred. In addition, in some respects, the package may in fact be counterproductive in terms of discouraging smoking, such as if the growth in the illicit market sees reduced price (tax-free) product being more available, if reduced nicotine levels lead people to smoke more low-nicotine cigarettes to satisfy their desired nicotine levels, or if the reduction in the number of retail outlets encourages people to bulk buy cigarettes.

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1.1 The context for this study

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The STA was the legislative result of the Smokefree Aotearoa 2025 Action Plan, established to pursue the Government's goal of reducing daily smoking rates to less than 5% across all adult population groups by 2025 (the smokefree goal).[6] In support of this goal, the STA seeks to achieve three main outcomes: a) eliminate inequities in smoking rates and smoking-related illnesses; b) increase the number of children and young people who remain smokefree; and c) increase the number of people who successfully quit smoking. In particular, the legislation seeks to reduce smoking amongst Māori, Pacific Islanders and those residing in socioeconomically disadvantaged areas, who face disproportionately higher smoking rates and associated harms.

[5] Smokefree.org.nz. (2023).

[6] Smokefree Environments and Regulated Products (Smoked Tobacco) Amendment Bill, Explanatory note.

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In light of these concerns, this report seeks to undertake an evidence-based cost-effectiveness review of the STA, addressing:

- the estimated effectiveness of the STA in achieving the government's objectives and the potential unintended consequences that may arise;
- the estimated efficiency of the Bill, including an assessment of the costs it will impose and the expected magnitude of these costs; and
- an exploration of alternative, potentially more cost-effective ways of achieving the government's objectives, including the consideration of retaining the status quo pre the STA and the potential cost-effectiveness of other strategies.

1.2 Background to the STA

The past few decades in New Zealand have seen a steady decline in overall smoking rates.[7] Between 1983 and 2022, smoking prevalence in New Zealand (measured as current smokers) fell from 32% to 9.2% of the population aged 15 or over.[8] The population describing themselves as a 'regular smoker' dropped from 20.7% in 2006 to 13.2% in 2018.[9]

However, smoking rates are disproportionately high amongst low socioeconomic groups. According to the New Zealand Health Survey, in 2021/22 around 19.9% of Māori adults and 18.2% of Pasifika adults smoked daily, but only 7.2% of the European/other adult population and 2.6% of Asian adults. Furthermore, young people who smoke are more prevalent in lower decile schools, while Māori and Pasifika students are five times more likely to have tried smoking than non-Māori, non-Pasifika students.[10]

Tobacco control policies have primarily focused on influencing individual behaviour to reduce demand for tobacco and denormalise smoking. Tobacco control initiatives (both regulatory and non-regulatory) have included prohibition on sales to individuals under 18, advertising prohibitions, smokefree areas and annual increases in tobacco excise tax by at least CPI+10% since January 2010.[11] While these policies have been successful to some extent, the significant price increase has led to both exacerbated inequities and growth in the illicit market (see Section 2.4 below).

Recognising the need for further action, the government has aimed to address the broader smoking environment at a population level, considering various aspects of the product and its distribution, including what is in it and where it is sold. This approach intends to make it easier for young New Zealanders to remain smokefree and support those who smoke in quitting. According to the Ministry of Health's Regulatory Impact Statement (RIS):

[7] All smoking rates in this report are based on "daily" smoking rates unless indicated otherwise.

[8] Ministry of Health, New Zealand Health Survey (2022).

[9] Stats NZ (2019).

[10] ASH (2022)

[11] Ministry of Health (2018).

> *Population-based measures can increase equity because they do not rely on people's capacity, including the resources available to them, to make changes in their lives, which their circumstances may make particularly difficult. Regulatory intervention is therefore an appropriate response, to reduce the availability of smoked tobacco products and the appeal that they have for people who smoke.*[12]

In pursuit of the Smokefree 2025 goal, the Ministry of Health stated that 'a comprehensive mutually reinforcing package of actions must be implemented at pace'.[13]

1.3 An overview of the STA

1.3.1 Goal of the Act

As noted in Section 1.1 above, the overarching goal of the Act is to reach the Smokefree 2025 goal, whereby adult daily smoking prevalence is less than 5% for all population groups in New Zealand. This goal is accompanied by three key objectives:

1. eliminate inequities in smoking rates and smoking-related illnesses;
2. create a smokefree generation by increasing the number of young people who remain smokefree; and
3. increase the number of people who successfully stop.

1.3.2 Elements of the Act

Aiming to make tobacco products less available, appealing and addictive, the STA amends the Smokefree Environments and Regulated Products Act 1990 by making three major changes:

1. reducing the number of retail outlets allowed to sell smoked tobacco products;
2. reducing the amount of nicotine allowed in smoked tobacco products; and
3. prohibiting the sale of tobacco products to anyone born on or after 1 January 2009.

The details of each of these major changes are discussed below.

Retail outlets

The first element introduces a limit on the number of retail premises where smoked tobacco products may be sold, set by the Director-General of Health at no more than 600. Currently, there are approximately 6,000 retailers in New Zealand and no restrictions on where smoked tobacco products are sold and who can sell them. Under the new proposals, the distribution of smoked tobacco retail premises will be based on defined areas of urban and rural settings, with separate maximums allocated to each rural or urban area. Additionally, retailers must apply to become a smoked tobacco retailer and meet minimum requirements related to security systems, training, sales and delivery systems. This restriction comes into force on July 1 2024.

Denicotisation

The second element regulates the composition of smoked tobacco products to make them less addictive and appealing. The Act proposes a maximum nicotine level of 0.8mg/g for smoked tobacco products and requires that regulations are made to determine whether the levels have been exceeded. Furthermore, nicotine may not be present in any other constituent of a smoked tobacco product. Proposals to reduce appeal include requiring that smoked tobacco products only smell of manufactured

[12] Ministry of Health, Regulatory Impact Statement [Para 15] (2021).

[13] Ibid [Para 17].

tobacco or menthol and updating packaging requirements to distinguish low-nicotine tobacco products. These restrictions come into force in April 2025.

Smokefree generation

The final element of the Act aims to create a 'Smokefree Generation,' preventing anyone born after January 1 2009 from purchasing cigarettes. This restriction comes into force on January 1 2027.

Key provisions

Key provisions of the STA include:

- prohibiting smoking and vaping in workplaces, certain enclosed public areas, registered schools, early childhood education and care centres, and vehicles carrying children;
- restricting the sale of smoked tobacco products to approved smoked tobacco retailers, who must apply to the Director-General of Health. Violators are subject to a maximum fine of $400,000;
    - in accordance with the principles of the Treaty of Waitangi, the Director-General of Health must consult with the Māori Health Authority, iwi-Māori partnership board or any affected Māori about approving smoked tobacco retailers in an area;
- specialist vape retailers must apply to the Director-General for approval;
- general vape retailers must inform the Director-General that they are selling vaping products;
- prohibiting the sale and delivery of smoked tobacco products to anyone born on or after 1 January 2009 (the "smokefree generation"). Violators are subject to a fine of up to $150,000;
- prohibiting the supply of smoked tobacco products to the "smokefree generation";
- requiring internet sites selling smoked tobacco products to display health and prohibition warnings;
- banning automatic vending machines selling smoked tobacco products from public spaces; and
- empowering the Minister of Health to prescribe the permissible nicotine levels in smoked tobacco products.

1.3.3 Timeline

In brief, the timeline for implementing the Act is:

July to October 2023: retailers can submit applications to become an 'Approved Smoked Tobacco Retailer' if they still wish to sell smoked tobacco products after 30 June 2024.

From 1 July 2024: legal smoked tobacco products only available from 'Approved Smoked Tobacco Retailer'.

From 1 November 2024: NZ manufacturers and importers must have new Customs CCA Licence/Import Permit to manufacture or import smoked tobacco products.

From 1 April 2025: Approved Smoked Tobacco Retailers must only sell approved smoked tobacco products (low nicotine products).

From 1 January 2027: consumers cannot legally be sold smoked tobacco products if born on or after 1 January 2009.

A full timeline presenting the dates for when various provisions come into force is presented in Annex 1.

1.4 Structure of this report

Following this introduction (Section 1), this report continues with the following structure:

- Section 2 provides an overview of the current state of smoking in New Zealand;
- Section 3 outlines the framework for this cost-effectiveness review;
- Section 4 presents our assessment of the effectiveness of the Act;
- Section 5 assesses the efficiency (costs) of the Act;
- Section 6 discusses other ways the Government could achieve its goals; and
- Section 7 provides the conclusions of this report.

Annexes to the report cover the STA timeline, an RIS review, the theory behind government intervention in tobacco, the black market in Australia, the Prohibition (1920s), the war on drugs, other case studies, the estimated costs of health consequences in smoking, drug liberalisation in Portugal, harm reduction in Sweden and the Action on Smoking and Health (ASH) report.

2 Smoking in New Zealand

- Around 8% of New Zealand adults over age 15 smoked daily in 2021/22.
- Smoking rates for all ethnic subgroups have declined consistently over the last two to three decades. While smoking rates amongst some groups remain high, there has been a large reduction in smoking amongst Māori, falling from 37.7% in 2011/12 to 19.9% in 2021/22.
- Youth smoking rates have fallen even more dramatically: amongst Year 10 students, smoking rates have declined from 25% in 2002 to 3% in 2022.
- The emergence of electronic nicotine delivery systems (ENDS), such as e-cigarettes and vaping devices, is likely to have played a significant role in the decline in smoking rates in New Zealand.
- Vaping rates have grown rapidly in recent years, with daily vape use increasing from around 2.5% to 8% of the adult population in the last four years. Vaping rates amongst youth may be higher – ASH estimates that daily vaping for Year 10 students was 10.1% in 2022.[1]
- When both vaping and cigarette smoking are taken into account, around 18% of New Zealand adults exhibit some level of nicotine dependence. This suggests that the large decline in smoking since 2010 can largely be attributed to a shift in delivery device rather than an accelerated reduction in nicotine dependence.
- Increasing excise taxes have contributed to a decline in smoking rates over recent years, but have also significantly increased incentives for participation in the illicit tobacco trade.
- Estimates of the overall scale of the illicit tobacco market vary widely, from around 4% (ASH) to 12% (KPMG) of total consumption, with Customs NZ estimating the figure at around 6% to 7%.
- The growing illicit market for tobacco products may well be contributing to increased crime rates through activities such as smuggling and counterfeiting, and the promotion of unregulated and potentially more hazardous tobacco products.

2.1 Introduction

This section provides an overview of the current state of smoking in New Zealand. The section covers:

- smoking prevalence;
- smoker demographics;
- vaping; and
- the illicit market.

2.2 Smoking prevalence

The latest data on smoking prevalence in New Zealand is from the Health and Lifestyles Survey (HLS), administered by the Ministry of Health. The most recently available (2021/22) survey found:

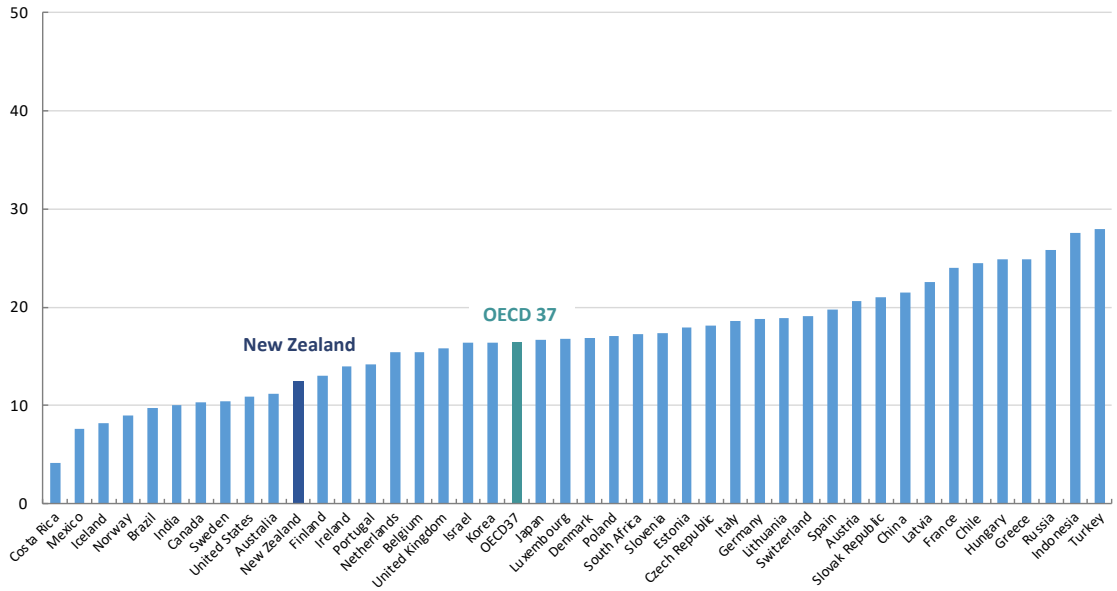
- 9.2% of adults (aged 15 or over) were current smokers;
- 8.0% of adults were daily smokers;
- 6.9% were heavy smokers (whereby heavy smokers are defined as individuals who smoke at least 21 cigarettes per day); and
- 26.8% were ex-smokers (individuals who have smoked more than 100 cigarettes in their lifetime but have quit and are not currently smoking).

In other words, around:

- 1 in 10 adults currently smoke (380,000 people);
- 1 in 12 adults smoke daily (331,000 people); and
- 1 in 15 adults are heavy smokers (253,000 people).

To provide context and an international perspective on New Zealand's smoking rates, Figure 1 below presents the percentages of adult populations in OECD countries who smoked daily in 2019 (slightly older data than the New Zealand HLS data mentioned above).

Figure 1: Population aged 15 and over smoking daily in OECD countries, 2019, %



Source: OECD.

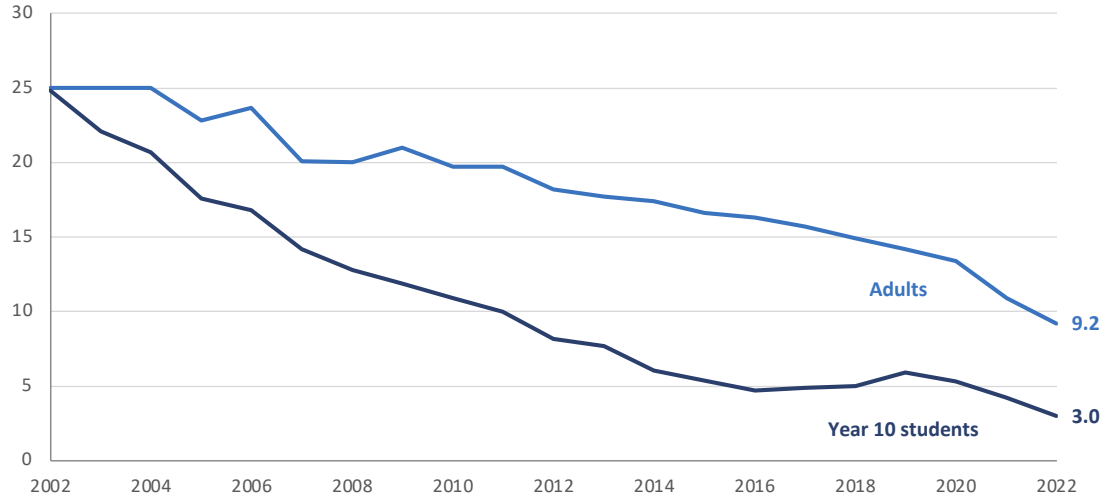
As Figure 1 shows, with a daily smoking rate of 12.5% in 2019,[14] New Zealand was below the OECD average of 16.5%. Australia has followed a similar plain packaging and excise tax hike regime as New Zealand and was below NZ at 11.2%. The below-OECD average smoking rates of Australia and New Zealand suggest some success in their respective tobacco control policies to date. Notably, the price

[14] As per the HLS survey data above, daily smoker prevalence has since reduced to 8%.

of a 20 pack of Marlboro cigarettes has reached the highest per packet prices globally, standing at $42.87 and $38.00 NZD, respectively.[15]

Over the past two to three decades, smoking rates in New Zealand have consistently declined. Figure 2 below illustrates this trend, graphing the proportion of current smokers in the adult and Year 10 population over time.

Figure 2: Prevalence of adult and Year 10 current smokers in New Zealand, 2002 to 2022, %



Sources: AC Neilson; Census, Statistics New Zealand; New Zealand Tobacco Use Survey, Ministry of Health; New Zealand Health Survey, Ministry of Health; Year 10 Snapshot Survey, Action on Smoking and Health.

As Figure 2 indicates, the period from 2002 to 2022 witnessed significant reductions in current smoking rates:[16]

- amongst Year 10 students, smoking rates dramatically declined from 25% to 3.0%; and
- amongst New Zealand adults, smoking rates more than halved, dropping from 24.8% to 9.2%.

Even lower rates are observed for daily smoking, with the HLS for 2021/22 reporting adult daily smoking rates at 8.0% and Year 10 students at 1.1%. Over the past four years, the annual rate of decline in adult smokers has averaged approximately -11.4%. As is discussed further in Section 6 below, if this trend in smoking cessation continues, overall smoking prevalence is projected to reach the smokefree target of 5% by around 2026.[17]

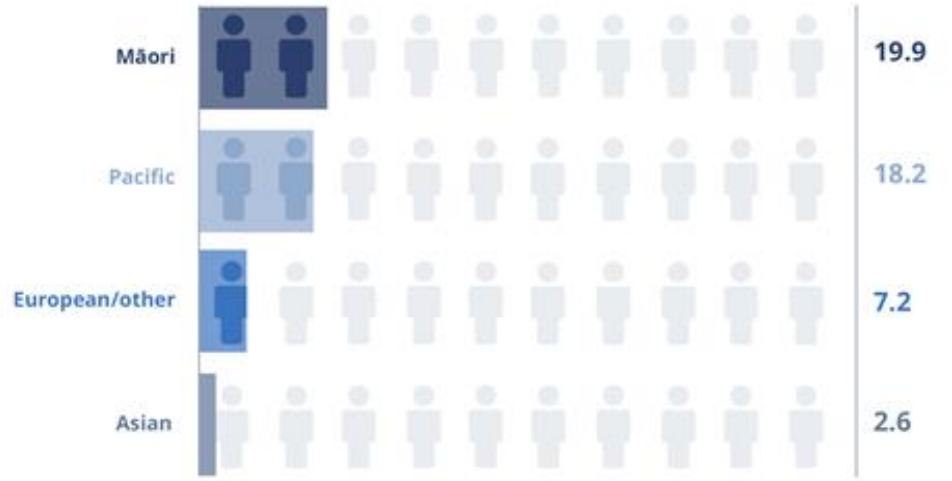
However, breaking down the smoking rates by population group reveals an uneven distribution of smokers amongst ethnicities, as presented in Figure 3 below.

[15] OECD (2021).

[16] Current smoking rates rather than daily smoking rates are used here because a long-term data series is available for current smoking rates.

[17] At the same time, as smoking rates decline, the proportion of heavy and lifetime smokers increases – a population who often either struggle to or do not choose to quit.

Figure 3: Daily smoking rates by population group, 2021/22, %



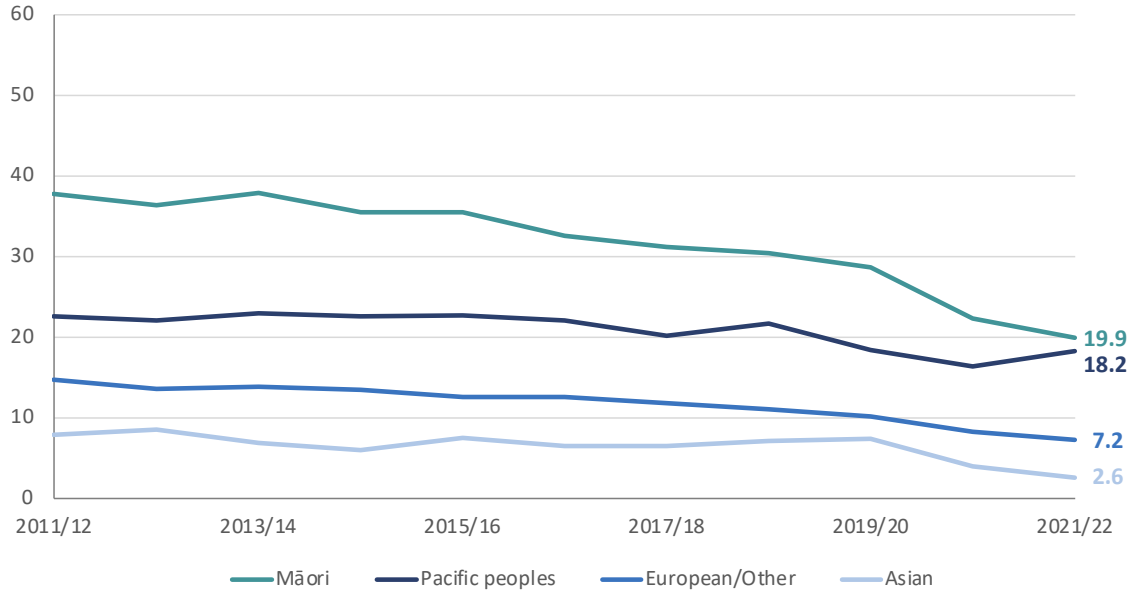
Source: Ministry of Health.

As Figure 3 highlights, based on the HLS:

- around 1 in 5 Māori individuals were daily smokers (around 121,000 people);
- around 1 in 5.5 Pasifika people were daily smokers (around 49,000 people);
- around 1 in 14 Europeans were daily smokers (around 226,000 people); and
- around 1 in 38 Asians were daily smokers (around 17,000 people).

As noted in Section 1, reducing disproportionately high smoking rates amongst Māori and Pasifika populations is one of the objectives of the Act (alongside increasing the number of children and young people who remain smokefree; and increasing the number of people who successfully quit smoking). Examining the changes in smoking rates per population group over the last ten years reveals some encouraging trends, as presented in Figure 4 below.

Figure 4: Daily smoking rates by population group, 2011/12 to 2021/22, %

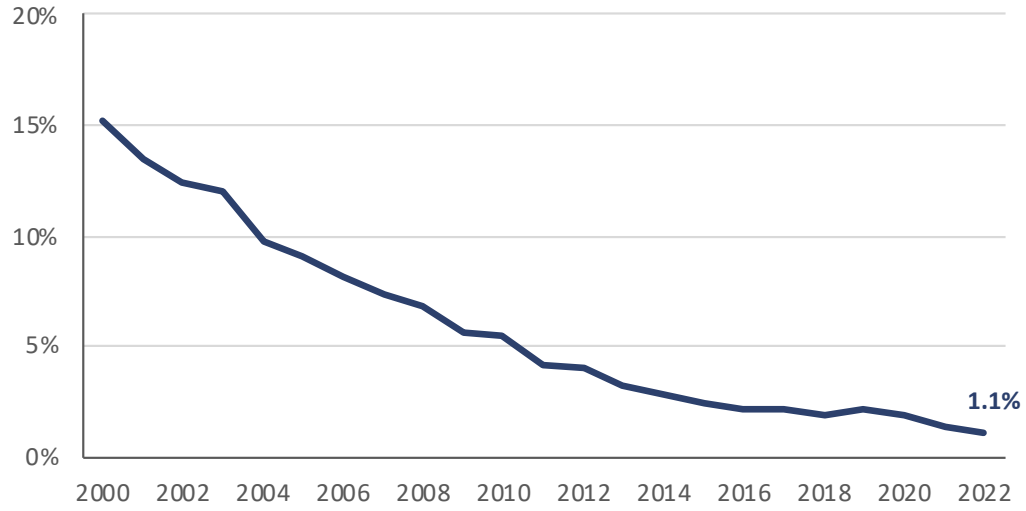


Smoking rates for all ethnic subgroups have declined over the last ten years – with a particularly large reduction in smoking amongst Māori, falling from 37.7% in 2011/12 to 19.9% in 2021/22. Historically, smoking amongst Māori women has been higher compared to Māori men. However, the latest HLS report indicates a drastic reduction in smoking rates for Māori women to 18.2%, now lower than smoking rates for Māori men at 21.8%.

In addition to ethnic disparities, certain population groups exhibit higher smoking rates compared to the general population. Disabled individuals, for instance, have a higher prevalence of smoking, with 14.1% being daily smokers compared to 7.4% amongst non-disabled individuals.[18] Likewise, those with mental health conditions and those who have been incarcerated are over-represented in the smoking population.

Amongst the younger population, there has been a significant decline in smoking rates. Figure 5 below illustrates the decreasing trend in daily smoking rates for Year 10 students, from around 15% in 2000 to 1.1% in 2022.

Figure 5: Daily smoking rates for Year 10 students, 2000 to 2022, %

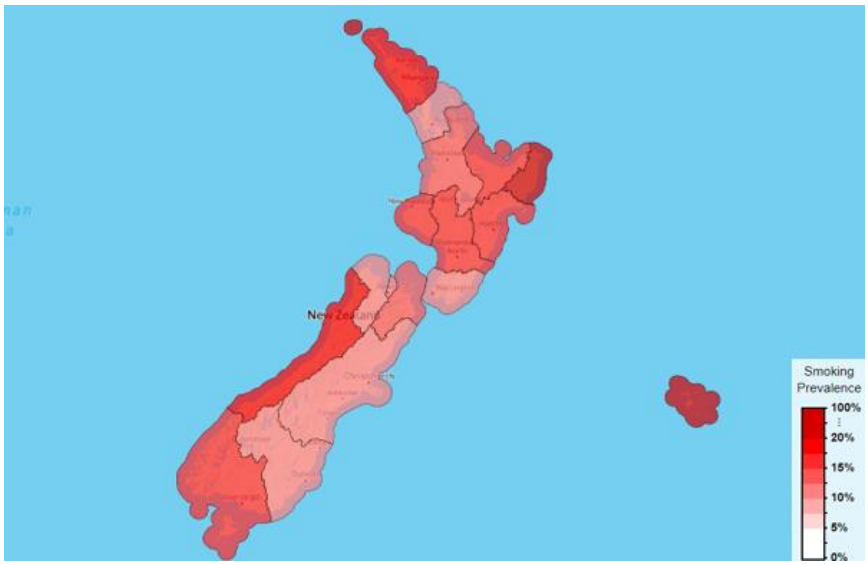


Source: ASH Year 10 Snapshot Survey 2022

Investigating the geographic distribution of regular smokers, Figure 6 below highlights the smoking rates by region in New Zealand based on 2018 census data. As indicated in the key, darker shades of red highlight higher smoking prevalence.

[18] Ministry of Health, Regulatory Impact Statement (2021) *op. cit*.

Figure 6: Heatmap of regular smokers in New Zealand, 2018, %



Source: Health Promotion Agency, Statistics New Zealand (2019)

As Figure 6 illustrates, areas with the highest smoking rates include Gisborne (22%), Northland (18%) and the West Coast (18%). These are also areas with a generally higher proportion of socioeconomic deprivation, highlighting the often-asserted link between poverty, unemployment and other forms of social disadvantage and likelihood of smoking.

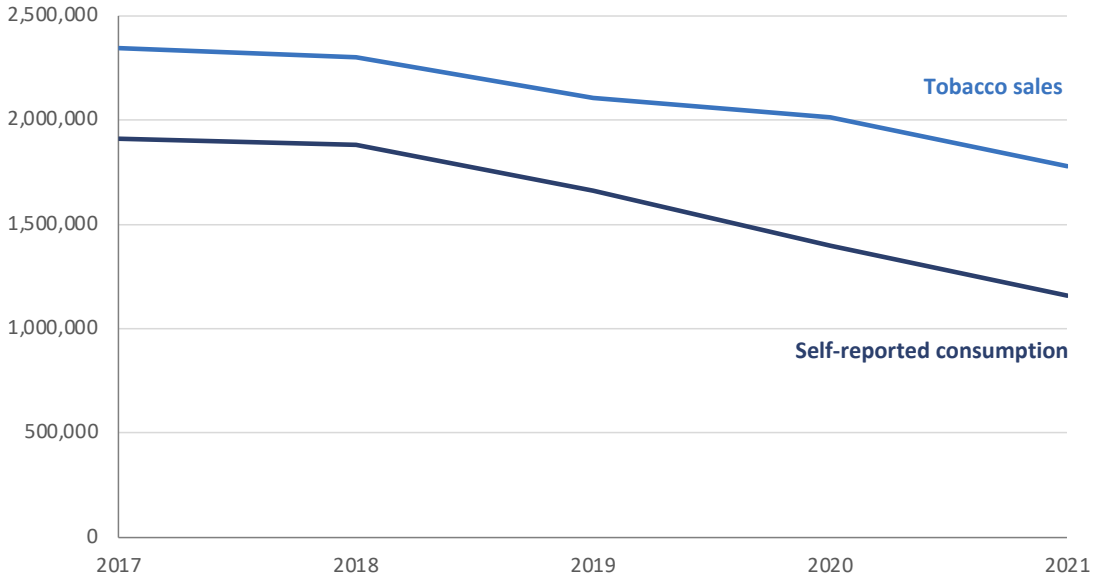
Finally, it is important to note that there may well be a degree of under-reporting evident in the self-reported data on smoking that underlies the HLS data. Figure 7 below compares the total cigarette sales volume for the four largest tobacco companies[19] (as reported publicly by each distributor in compliance with the Smokefree Environments and Regulated Products Act, 1990[20]) with the total consumption using smoking rates from the HLS.[21]

[19] BAT, Imperial, JTI and Philip Morris. Sales of cigarettes by these four companies are estimated to account for around 98% of legal sales in New Zealand.

[20] Ministry of Health, Tobacco annual returns (2022).

[21] Self-reported consumption is the self-reported number of daily smokers multiplied by the mean number of cigarettes smoked per day multiplied by 365 days (C = No. of daily smokers X mean of cigarettes smoked per day X 365 days).

Figure 7: Reported tobacco sales vs. self-reported consumption, 2017 to 2021, thousands of sticks



Source: Ministry of Health New Zealand, KPMG and TDB Analysis

Figure 7 indicates that according to sales data, actual smoking consumption may be around 23% higher than the self-reported rates suggest in 2021. This under-reporting could stem from factors such as:

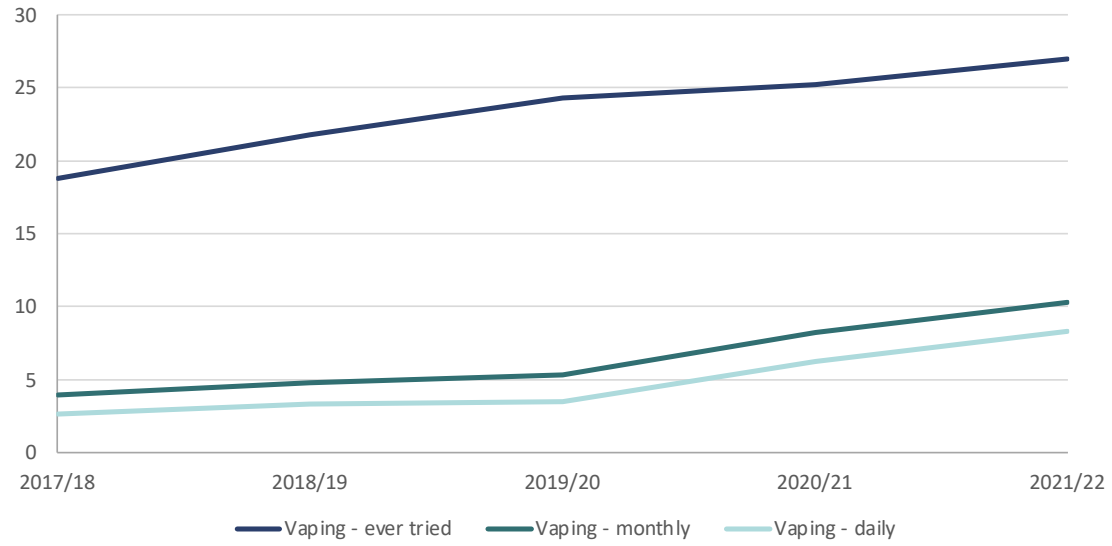
- a human tendency to avoid admitting to publicly unaccepted behaviours;
- an unwillingness to admit private information in a government survey; and
- feelings of shame or denial about smoking habits.

The extent of under-reporting may well be larger than indicated above given the above sales figures do not include the illicit market (refer Section 2.4 below).

2.3 Electronic Nicotine Delivery Systems (vapes)

Vapes, vaporizers, vape pens, hookah pens, electronic cigarettes (e-cigarettes or e-cigs), e-cigars, and e-pipes are some of the many tobacco-product terms used to describe electronic nicotine delivery systems (ENDS). Since first appearing on the market in the early 2010s, the use of vaping products has become increasingly prevalent in New Zealand and many other countries. This growth is evident in Figure 8 below, which presents vaping prevalence over the last four years.

Figure 8: Vaping prevalence, 2017/18 to 2021/22, % of adult population



Source: Ministry of Health New Zealand

Figure 8 highlights substantial growth in vaping rates over the last four years – with daily vape use increasing from around 2.5% to 8% of the adult population in four years. In 2021/22, around:

- 26% of the adult population had tried vaping;
- 10% were monthly vapers; and
- 8% vaped daily.

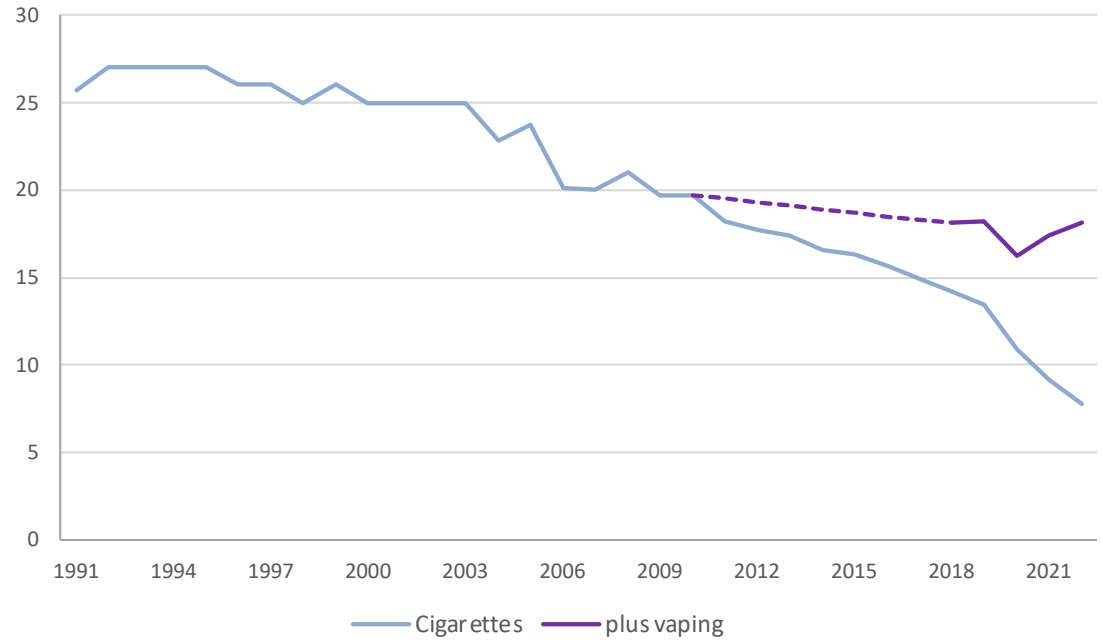
ASH estimates that daily vaping for Year 10 students was 10.1% in 2022.[22]

The emergence of ENDS, such as e-cigarettes and vaping devices, appears to have played a significant role in the decline in smoking rates in New Zealand. These products have become increasingly prevalent in the New Zealand nicotine market since around 2010.

When considering both vaping and cigarette smoking, it is estimated that around 18% of New Zealand adults exhibit some level of nicotine dependence. This suggests that the large decline in smoking since 2010 can be attributed to a shift in delivery device rather than an accelerated reduction in nicotine dependence. The decline in nicotine dependence from around 19.5% to 18% over the last decade implies an annual decline of 0.8% per year, a rate remarkably similar to that experienced in New Zealand during the 1990s.

[22] ASH (2022) *op.cit*.

Figure 9: Nicotine dependency rate, 1992 to 2022, % of adult population aged 15 and over



The shift from smoking to vaping is a welcome development from a health perspective. Existing data would suggest that vaping imposes a health risk that is estimated to be around one-hundredth that of smoking. While our understanding of the potential health risks associated with vaping is still evolving, it is important to note that vaping involves significantly fewer toxic chemicals than the tar present in cigarette smoke. Ongoing research will provide further insights into the health implications of vaping.

Considering that smoking is estimated to have caused around 5,300 premature deaths in 2019[23], a complete shift to vaping has the potential to reduce premature deaths by over 5,000 per year. Even if vaping were found to be 10 times more dangerous than current evidence suggests, it could still potentially prevent 4,000 premature deaths annually.

The majority of vape users are current or ex-smokers.[24] As a less harmful method of nicotine consumption and an increasingly prevalent quitting aid, the decline in smoking prevalence over the last 10 years is likely closely linked with the rise in vaping.[25] At the same time, the dual use of vapes and cigarettes is prevalent, particularly amongst adults aged 45 and over.[26]

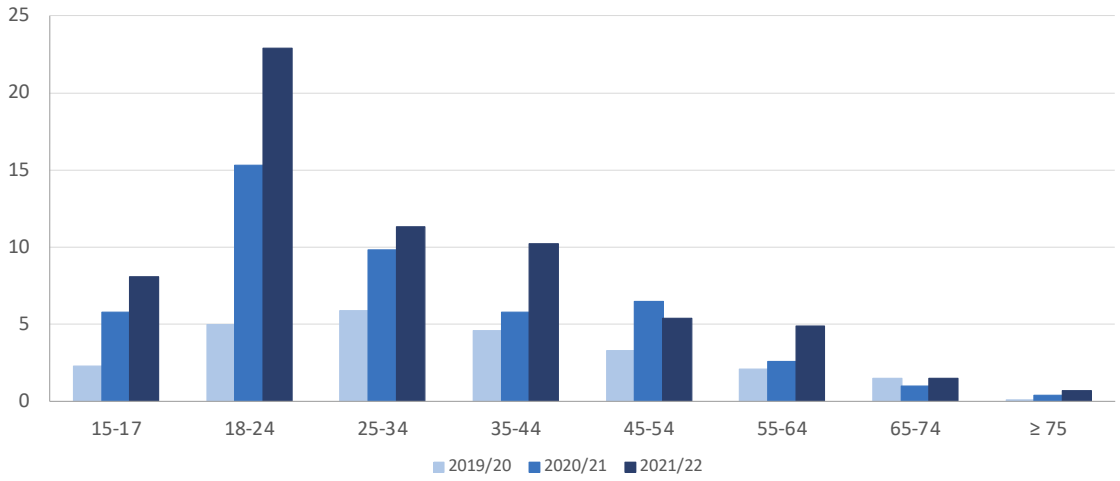
[23] Based on a risk of death estimate of 106.6 per 100,000 from smoking in New Zealand by the University of Washington's Institute of Health Metrics and Evaluation, see https://vizhub.healthdata.org/gbd-compare/ .

[24] Oakly & Martin (2019).

[25] ASH (2022) *op. cit.*

[26] Harding et al. (2021).

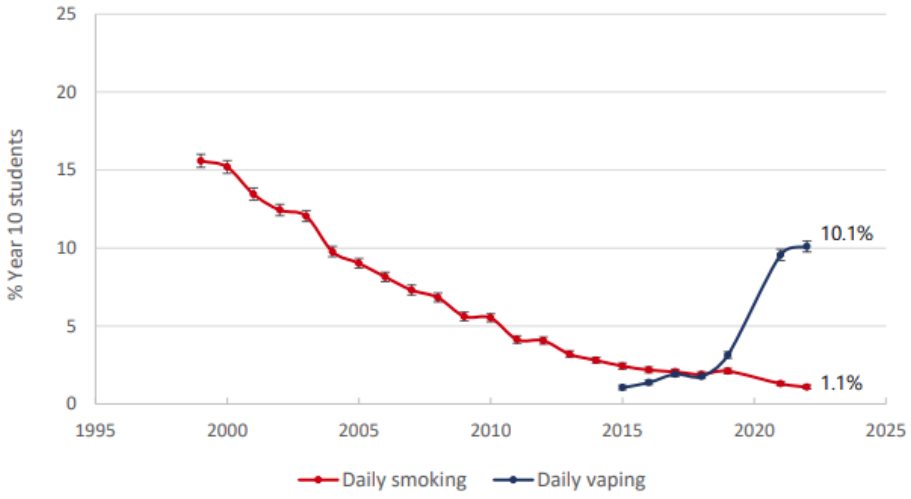
Figure 10: Daily vape use by age group, 2019 to 2022, %



Source: PHCC (2022)

The significant growth in vaping between 2019 and 2022 appears to have been mostly amongst the Under-25 category, progressively becoming less prevalent amongst people aged 25-44 and 45-64, and relatively rare amongst those aged 65+.

Figure 11: Youth daily smoking (1999 to 2022) and daily vaping prevalence (2015 to 2022), %,



Source: ASH Year 10 Snapshot Survey 2022

Daily smoking rates amongst Year 10 students in 2022 remain low, at 1.1%, continuing a longstanding downward trend, while vaping amongst this age group continues to increase since first measured in 2015. These contrasting trends suggest there may be a substitution of smoking with vaping.

The current vaping legislation in New Zealand focuses on regulating the sale, marketing and use of vaping products, with a particular emphasis on protecting young people. Policy largely mirrors the current restrictions on cigarettes, with additional laws pertaining to taxation, smoke-free areas, packaging and labelling requirements, and retail display restrictions, specifically targeting cigarettes.

The Smoke-free Environments and Regulated Products Act 1990 (SERPA) is the primary legislation regulating smoking and vaping in New Zealand. In 2020, SERPA was amended to establish a regulatory framework for vaping products, which includes requirements for product safety and labelling, restrictions on sales to minors, and restrictions on advertising and promotion.

2.4 Illicit market

While the Government's policy of excise tax hikes has contributed to a decline in smoking rates over recent years, it has also significantly increased incentives for participation in the illicit tobacco trade.

Illicit tobacco can be broken down into three main categories:

- **Counterfeit:** cigarettes that are illegally manufactured and carry the trademark and/or branding of a legally manufactured brand without the consent of the trademark owner. Counterfeit cigarettes are also known as fake cigarettes.
- **Contraband tobacco products:** legitimately manufactured cigarettes that are illegally smuggled into the market without paying the required excise tax.
- **Illicit whites:** cigarettes that are legally produced in one country but are intended for illegal distribution in another market. They are sold without the payment of tax and have limited or no legal distribution channels.

Although the true level of illicit tobacco market is difficult to determine, studies show that the market in New Zealand has been growing, particularly in recent years. Between 2010 and 2013, ASH estimated illicit tobacco consumption to represent between 1.8% and 3.9% of total national consumption. In 2022, KPMG's latest 'Illicit Tobacco in New Zealand Report' estimated that illicit tobacco accounted for around 12.1% of total consumption, corresponding to $247.8 million in unpaid excise taxes that year. However, Customs New Zealand in 2021 suggested that a more conservative estimate of 6% to 7% is likely more accurate.[27]

Illicit tobacco sales have reportedly been made through various channels, including:

- some dairies, Asian grocers and other small retailers;
- social media groups and other online platforms; and
- organised crime groups involved in illicit trade of various illegal substances.[28]

In a 2021 investigation, Stuff reported being sold a 20 pack of Chinese contraband "Double Happiness" cigarettes from a rubbish bag beneath the counter, at a price 23% lower than the cheapest legal packet. The article also highlights instances where groups involved in the illicit cigarette trade approach potential buyers outside of dairies, offering lower prices for direct sales.[29] The financial incentives for both retailers and consumers to participate in this market are clear. While the government's policy of excise tax hikes has contributed to a decline in smoking rates, they have also significantly increased incentives for engaging in a lucrative illicit market. Combined with a common perception amongst suppliers that "it's just tobacco," this lesser-evilism attitude and an increasingly expensive legal market further encourages participation in the illicit market.

Similar responses of growing black markets in tobacco products have been observed in other countries in response to government policies aimed at discouraging smoking. Examples include Bhutan, which banned tobacco between 2004 and 2022, and South Africa, which placed a ban on all tobacco and vaping products during the COVID-19 pandemic. A summary of these two cases is presented in Case studies 1 and 2 below (with further details in Annex 7).

[27] Block, G. (2021).

[28] Imperial NZ (2023).

[29] Block, G. *op. cit.*

Case study 1: Tobacco prohibition in Bhutan, 2004–2021

- In 2004, Bhutan instituted a national ban on tobacco sales and in 2010, became the first country in the world to ban the cultivation, manufacture, supply and sale of all tobacco products. The ban remained in effect for more than a decade until it was lifted through the passage of the Tobacco Control (Amendment) Bill in 2021.
- Momentum for the ban began in the 1990s in Bumthang, the religious heartland of Bhutan. Tobacco consumption was considered incompatible with Buddhist practices and detrimental to health.
- The illicit market responded rapidly to the bans. A new market was created for tobacco smugglers, including both opportunistic individuals and organised groups, at the Indian border. The value of seized smuggled tobacco increased from $1.5 million in 2005 to 2006 to $7.9 million in 2007, and further rose to $17 million in 2008.
- Despite the prohibition, the intended decline in smoking rates did not materialise as the supply persisted. The 2006 Youth Tobacco Survey conducted by the Ministry of Health found that 23.7 percent of students aged 13 to 15 had used tobacco products in the last 30 days, indicating that smoking rates remained unchanged.
- According to the World Health Organisation (WHO) survey data, despite the ban, tobacco use prevalence in Bhutan was 24.8% in 2014, only declining marginally to 23.9% in 2019.
- Tobacco smugglers were willing to meet the demand in the Bhutanese market. However, the COVID-19 pandemic brought about an immediate health threat – the spread of the virus.
- In response to rising public concern regarding smuggler-related COVID-19 risks, the government amended the 2010 Act in July 2021, lifting the decade-long ban on tobacco sales and permitting the sale of tobacco products in grocery and pan shops.
- Overall, despite the ban, there was no major reduction in smoking, and consequently, there was no major reduction in the negative health effects associated with smoking. Instead, the ban resulted in an increase in black market activity and a loss of government excise revenue.

For further details on the Bhutan experience with tobacco prohibition see Annex 7.

Case study 2: South African tobacco ban during COVID-19 lockdown, 2020

- Between 27 March 2020 and 17 August 2020, as part of its national COVID-19 response, the South African government banned the sale of all tobacco and vaping products.
- The rationale behind the prohibition was twofold: a) tobacco was deemed a non-essential product, and b) smokers were believed to be at higher risk of developing severe illnesses, thus straining the health system.
- The well-established illicit tobacco market responded promptly, shifting supply from legitimate retailers to spaza and house shops, friends and family, street vendors and social media groups.

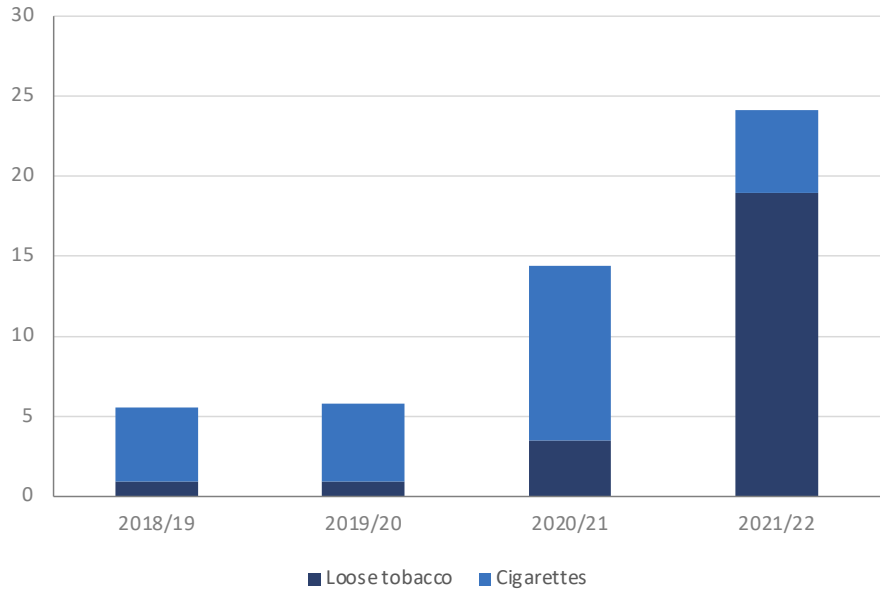
- A study conducted by the Research Unit on the Economics of Excisable Products found during the five-month ban:
    - about 9% of pre-lockdown smokers successfully quit smoking; and
    - 93% of smokers continued to purchase cigarettes despite the sales ban.
- During the ban, the average price of cigarettes surged by 250%, with some price variation between provinces and higher prices in more remote provinces.
- The ban was also associated with various shifts in buyer behaviour, including a significant increase in the purchase of single cigarettes (321%) and cartons (192%)
- During the 20-week period that the sales ban was in place, an estimated R5.8 billion (approximately $315 million USD) in excise tax went uncollected.

For further details on the South African experience with the COVID-19 tobacco ban see Annex 7.

In both Bhutan and South Africa, illicit tobacco markets responded rapidly to the ban and supplied the market. As such, both policies lacked efficacy in reducing smoking and negative health outcomes.

Each year, the New Zealand Customs Service (Customs) intercepts a substantial amount of smuggled tobacco at the border. Figure 12 below depicts the number of sticks of illicit tobacco products seized from 2018/19 to 2021/22.

Figure 12: Seized tobacco products in NZ, 2018/19 to 2021/22, millions of sticks equivalent



Note: Loose tobacco is measured in millions of sticks equivalent.
Source: New Zealand Customs Service Annual Reports.

As the graph illustrates, over the last four years for which data is available:

- loose tobacco products seized increased substantially from around one million to approximately 19 million stick equivalents;
- illicit cigarettes seized reached 11 million sticks in 2020/21, then declined to around five million sticks in 2021/22; and
- overall, total tobacco products seized increased dramatically from around six million sticks in 2018/19 to almost 25 million sticks equivalent in 2021/22.

While the number of seized illicit cigarettes has not increased markedly over the four-year period, this may be due to loose tobacco being the more preferred illicit tobacco product. Customs acknowledge a decrease in interceptions of loose tobacco products in 2021/22, but the total quantity of seized tobacco products has risen substantially. This aligns with a growing and increasingly organised crime-led illicit tobacco trade.

According to Customs' most recent Annual Report:

> *"The largest source of revenue evasion (in revenue collected by Customs) is tobacco smuggling. Organised crime groups are attracted to tobacco smuggling because of the high prices and demand in New Zealand."*[30]

However, actual seizures of tobacco likely only represent a fraction of the total tobacco illegally crossing the border.

The illicit tobacco market has several negative impacts on public health, the economy and society as a whole. The availability of untaxed tobacco products at lower prices than legal products can contribute to increased tobacco consumption. In 2022, an investigation by Newshub highlighted the sale of illicit tobacco online, where a 30g pack of roll-your-own tobacco was sold for $10,[31] substantially below the cheapest legal price at the time of $53.50 per pack.[32]

By its nature, illicit tobacco evades taxes, resulting in a loss of excise revenue as the market expands. In January 2022, a businesswoman was sentenced to three years' imprisonment for her involvement in one of New Zealand's largest cases of cigarettes smuggling and tax evasion. Nearly 20 million cigarettes were smuggled into the country concealed inside steel office cabinets, amounting to $18.7 million in excise tax evasion. [33]

The illicit market can also contribute to increased crime rates through activities such as smuggling and counterfeiting, and the promotion of unregulated and potentially hazardous tobacco products. While the black market and organised crime scene in New Zealand primarily revolve around methamphetamine and illicit drugs, tobacco is viewed as a secondary source of income for gangs.

Illicit tobacco is often considered a low-risk, high-return product. However, the rising incidence of ram raids targeting tobacco has resulted in significant property damage and disruption to business operations. These crimes lead to financial losses, reduced productivity, and higher insurance premiums for affected businesses. Moreover, such incidents can have a traumatising effect on employees, leaving them feeling unsafe and insecure.[34]

Australia's illicit tobacco market is highly organised and is growing as a share of total tobacco consumption. In 2021, one in five cigarettes (2.2 million kg of tobacco) consumed in Australia were estimated to be illicit, up from one in 12 in 2007.[35] Estimates for the scale of illicit tobacco in New Zealand indicate around one in ten cigarettes consumed being illicit, according to KPMG. This suggests the current illicit market in New Zealand may be comparable to Australia's market around a decade ago. Sections 4 and 5 of this report discuss the implications of the STA reforms on the illicit market in New Zealand, while Annex 4 provides insights into the Australian illicit market and its relevance to the New Zealand context.

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[30] New Zealand Customs Service (2022).

[31] Morrah. M. (2022).

[32] Gattey, M. (2018).

[33] Pearse, A. (2022).

[34] Ham, K. (2023).

[35] KPMG (2022) *op. cit*.

3 Framework

- This report provides an assessment of the effectiveness and efficiency of the STA in achieving the government's goal of a smokefree New Zealand.
- The effectiveness analysis assesses the expected effectiveness of the STA interventions in achieving the government's goal of a smokefree New Zealand, addressing two key questions:
    1. are the interventions likely to contribute to achieving the government's goals? and
    2. what unintended or perverse consequences might result?
- The efficiency analysis estimates the costs likely to arise with the STA. The cost analysis in this report takes a national perspective: it is the costs to the nation as a whole that matters. Given the uncertainties surrounding the impacts of the policies, behavioural responses and overall effectiveness, we employ Monte Carlo analysis to conduct sensitivity tests of our cost estimates.

3.1 Introduction

Sections 1 and 2 of this report provide an overview of the background and current state of smoking in New Zealand. In this section, we outline the framework used to assess the effectiveness and efficiency of the STA and establish our base-case assumptions.

As noted in Section 1, this report acknowledges the government's Smokefree 2025 goal as a given. Our objective is not to question this goal. Rather, our aim is to evaluate the potential effectiveness of the STA in achieving its desired outcomes and to assess the associated costs for New Zealanders.

Our analysis of the interventions and their likely consequences is based on orthodox economics and the observed market and behavioural responses to similar polices in New Zealand and other countries. The framework for analysis for each section is presented below. The market and behavioural responses observed in other countries are detailed in the Boxes and Annexes to this report.

3.2 Effectiveness analysis

The following section, Section 4, focuses on assessing the expected effectiveness of the STA interventions, addressing two key questions:

- are the interventions likely to achieve the government's goals? and
- what unintended or perverse consequences might result?

The section begins with a review of the effectiveness assumptions presented in the Regulatory Impact Statement (RIS)[36] underpinning the STA. The RIS was based on modelling by Ouakrim et al. (2022).

Subsequently, our analysis examines the effectiveness of the three main interventions in the STA: the age-sales ban, lower nicotine content and outlet reduction. By assessing their effectiveness and

[36] Ministry of Health, Regulatory Impact Statement (2021) *op. cit*.

potential unintended consequences, we can determine the extent to which the STA is likely to contribute positively to the government's Smokefree 2025 goal and its objectives, which include:

a) eliminating inequities in smoking rates and smoking-related illnesses;

b) increasing the number of children and young people who remain smokefree; and

c) increasing the number of people who successfully quit smoking.

Even if the STA is found to contribute positively to the government's objectives, it may not necessarily be the most cost-effective approach to achieve those objectives. The costs – both quantifiable and non-quantifiable – associated with the Act must also be considered and compared with the costs likely to arise from alternative policy approaches. This cost-effectiveness or efficiency analysis is discussed in Sections 5 and 6 of this report.

3.3 Efficiency analysis

Section 5 of this report presents a cost-effectiveness analysis of the STA.

The primary focus of cost-effectiveness analysis is to estimate the costs associated with a proposal and compare them amongst different competing proposals aimed at achieving the same objective. It is important to note that cost-effectiveness differs from cost-benefit analysis, as it does not attempt to compare the overall costs and benefits or attempt to quantify the specific benefits generated by the proposals.

The logic underpinning cost-effectiveness analysis is based on the understanding that while it may be difficult to precisely identify and quantify the expected benefits of a proposal, assessing the costs allows us to consider the opportunity costs associated with it. In other words, allocating resources to one policy objective limits the resources available for addressing other societal issues. For example, if funds are allocated to road safety initiatives, there will be fewer resources available for other pressing issues such as cancer treatment, hip replacements, training GPs, and so on. The implication is that it is not just the purpose of a policy that matters, but also its effectiveness in delivering the desired outcomes in a cost-effective manner. Wasteful expenditure in one area can limit opportunities and resources for other critical areas.

It is worth noting that the cost analysis in this report takes a national perspective; it is the costs to the nation as a whole that matters. All costs presented are in 2023 New Zealand dollars (2023 NZD) and the discount rate used is the standard current Treasury discount rate of 5%. Costs have been evaluated over a 10-year period. Periods are in calendar years from January 1 to December 31. The Monte Carlo risk analysis, explained in detail below, accounts for variations in the discount rate ranging from 2% to 8%.

3.3.1 Monte Carlo analysis

Given the uncertainties surrounding the impacts of the policies, behavioural responses and overall effectiveness, we employ Monte Carlo analysis to conduct sensitivity tests on our cost estimates.

Monte Carlo simulation techniques provide a method for investigating the interactions between multiple areas of uncertainty. A Monte Carlo simulation is a computer-based technique that uses statistical sampling and probability distributions to simulate the effects of uncertain variables on model outcomes. It provides a systematic assessment of the combined effects of multiple sources of risk.

The approach adopted here simulates 20,000 observations for each varied component assuming random inputs into a Beta distribution.[37] The assumed distribution takes into account prior information about the potential distribution and ensures the distribution remains within realistic bounds, avoiding impossible outcomes, like negative costs.

The strength of the Monte Carlo simulation lies in its ability to explore a wide range of combinations between the different components. For instance, one simulation could effectively assume that some costs are low, but others are high. We found that 20,000 simulations was sufficient to obtain stable results across different samples.

A key implication of undertaking Monte Carlo analysis is that it allows us to present the distribution of cost estimates graphically, in the form of a histogram. Additionally, it enables us to provide 95% confidence intervals for the cost estimates.

3.4 The counterfactual

In cost-effectiveness analysis, all costs associated with a policy or activity are measured relative to a counterfactual (i.e., what would happen if the project or policy being assessed did not occur). If, for example, the costs and benefits of building a bridge over a gulley are being assessed, the counterfactual would be a situation where the bridge is not built.

In this case, our assessment needs to be measured against the counterfactual of the likely smoking prevalence that would occur without the implementation of the STA. This counterfactual does not refer to the current number of smokers (approximately 340,000), but rather the projected number of smokers over the next 10 years without the STA. By evaluating the impact of the reforms against the counterfactual, we can isolate the marginal impacts of the STA and avoid attributing underlying changes in smoking patterns solely to the reforms.

To estimate what would happen without the reforms, first we examine the historical trends in smoking rates. According to Smokefree New Zealand, the current smoking rate amongst adults in New Zealand has declined from 27% of the population aged 15 and over in the 1990s to below 10% in the 2020s[38]. Further, there has been an acceleration in the pace of this reduction in smoking. During the 1990s, the smoking rate declined by an average of 0.4% per annum. In the first decade of the 21st century, the decline increased to an average of 2.7% per annum and then to 3.8% per annum in the second decade. Since 2020, the annual rate of reduction has been approximately 17.1%.

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[37] A Beta distribution was selected as it provides scope to constrain the distribution outcomes within plausible bounds (established by the A and B terms) and to allow skewed distributions (established by the relative size of the α and β terms).

In practice each alpha term has been set to 1 and then the beta value adjusted (which sets the distribution skewness) to ensure that the resulting distribution mean matches the values used in the central calculations. The resulting distributions are bounded by plausible constraints but also utilise available information about the likely distribution.

For example, if the average price of a milkshake is $10, prices below zero and over $50 may be excluded as impossible or implausible. But as the average price is $10, observations of $8-$12 would be expected to be more likely than observations of $38-$42. So, in this example, A would be set to 0, B to 50, and with α set to 1, a value of 5 would be chosen for β, as this is the value that will generate a sample average of 10.

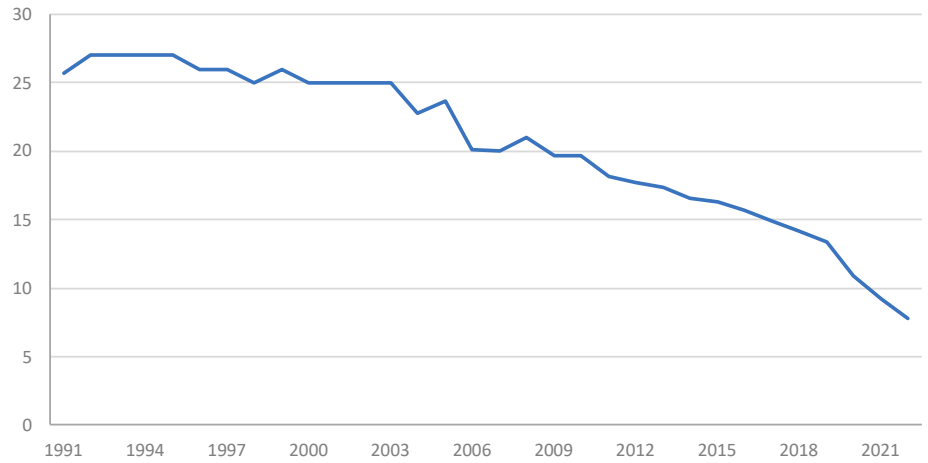
For the Monte Carlo analysis of the cost estimates, the following assumptions have been made:

- $\alpha = 1$
- β = adjusted to ensure that the distribution average equals the central estimate
- A = lower bound of distribution (if not constrained by a zero lower bound, assumed to be lower than the low sensitivity test value by a proportion that is 25% of the gap between the sensitivity low value and the central estimate)
- B = upper bound (typically assumed to be greater than the high sensitivity test value by a proportion that is 25% of the gap between the sensitivity high value and the central estimate).

[38] Smokefree.org.nz. (2023) *op. cit*.

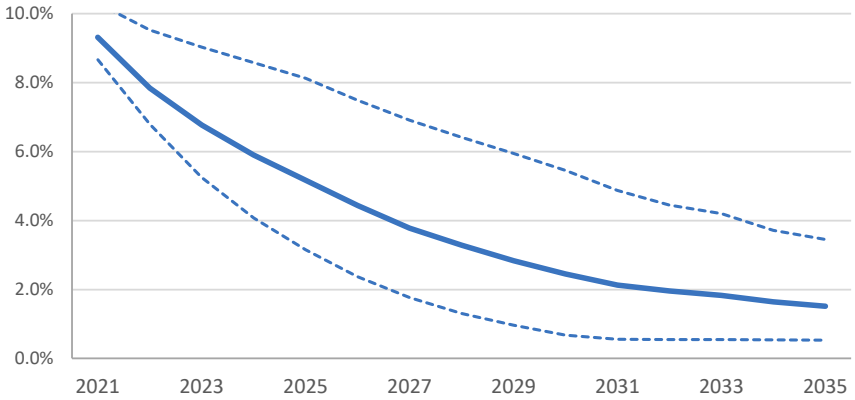
As a result of these declines, the current smoking rate amongst New Zealand adults has more than halved over the past 20 years, decreasing from 25% in 2002 to 8% in 2022.

Figure 13: Current smoking rates, 1992 to 2022, % of population aged 15 and over



Based on the historical trends described above, we observe that a rapid reduction in smoking rates is already underway. If this trend continues, our assessment indicates that the adult smoking rate in New Zealand would reach approximately 2% (equivalent to around 100,000 smokers) by 2033, even without the STA. This projection of the counterfactual base scenario is illustrated in Figure 14 below.

Figure 14: Smoking rate base scenario without STA, % of adult population 15 years and over



Projecting a continuation of recent trends also suggests that the cigarette smoking rate in New Zealand will likely be at or under 5% of the total adult population by around 2026, and under 2% in the 2030s, regardless of any of the STA initiatives. Therefore, for the STA initiatives to be justified, they must surpass this existing rate of decline and demonstrate their ability to outweigh the ancillary costs they are likely to incur.

3.5 Case studies

This report draws on the experiences of various other countries to provide evidence-based analysis. These case studies investigate the outcomes of tobacco, drug and alcohol prohibition policies implemented elsewhere. By examining the experiences of these policies in different contexts, we can gain insights to inform the likely effectiveness and efficiency of the measures proposed in the STA. This evidence-based approach allows us to make informed assessments and recommendations based on real-world examples.

3.6 Potentially better ways

Finally, based on our analysis of the efficiency and effectiveness of the STA, Section 6 of this report considers whether there may be better ways to achieve the government's smokefree goals.

4 Effectiveness

- The modelling underpinning the STA has major flaws, as highlighted by Bates et al. (2022).
- The modelling severely overestimated the problem the STA was intended to address by overstating the rate of smoking in the population. This overstatement is likely to have caused a false sense of urgency for the government to take action.
- Using the accurate (HLS) smoking figures for 2022 of 8%, and assuming the trend of declining smoking rates seen in recent years continues, New Zealand is likely to achieve the smokefree target of 5% by around 2026, even without the measures in the STA.
- The modelling underlying the STA is also seriously deficient in that it relies on dubious input assumptions and coefficients that likely exaggerate cessation rates and the subsequent improvements in morbidity and mortality arising from the Act.
- In our assessment the benefits arising from the Act are likely to be small and the Act is likely to make little in the way of a positive contribution to the government's smokefree goal.
- The RIS overlooks the behavioural changes that may occur if only low-nicotine cigarettes are legally available as, for example smokers increase their cigarette consumption or inhale more deeply to obtain the same total amount of nicotine, or seek to put nicotine back into the low-nicotine cigarettes, such as through nicotine sprays or soaking tobacco in vape liquid.
- The reduction in retail outlets may reduce smoking by raising travel costs for smokers, but it may also lead to more illicit trade and increased bulk buying and thus more smoking.
- The availability of vaping has contributed to a steep decline in youth smoking rates (only 1.1% of year 10 students smoked daily in 2022). With a diminishing rate of new entry into smoking, the tobacco age-sales ban, (which targets new entrants) is likely to be largely redundant.
- Certain population groups, such as Māori and Pasifika, may well face challenges in achieving the 5% goal, regardless of the implementation of the STA. If the objective is to reduce smoking rates in these specific population groups to below 5%, it is worth considering whether a blanket ban, such as the proposed one in the STA, is appropriate or whether more targeted approaches may have higher efficacy.

4.1 Introduction

In this section of the report, we assess the anticipated effectiveness of the interventions outlined in the STA. We aim to determine whether these interventions have the potential to achieve, or at least contribute positively to, the government's goals. This section begins by assessing the government's own estimates of the STA's effectiveness. Subsequently, we provide our own assessment of the likely effects of the interventions, analysing each of the three elements of the STA individually. We conclude by assessing the overall effectiveness of the STA in delivering the government's objectives.

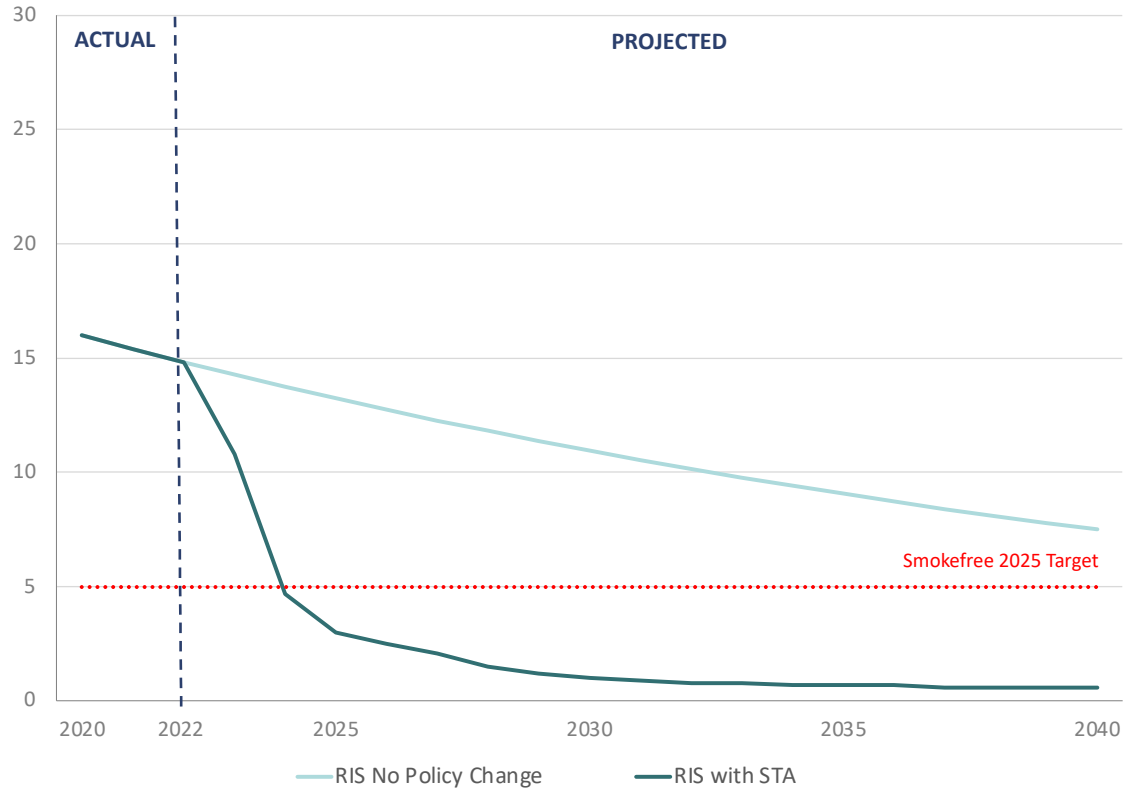
As noted above, the government's intention with the STA is to establish a 'smokefree' New Zealand, defined as a daily smoking prevalence of less than 5% amongst the adult population and sub-populations.

4.2 The Government's estimates of the effectiveness of the STA

The effectiveness of the package of policy measures in the STA was estimated by the Ministry of Health in the Regulatory Impact Statement (RIS) using modelling by Ouakrim et al. (2022). The Ouakrim et al. model uses Markov chains and transition probabilities to simulate future transitions in smoking status, such as quitting, relapsing, shifting to vaping and so on. By comparing a 'Business as Usual' (BAU) scenario without the STA to a scenario with the STA, the model estimates the impact on morbidity and mortality using life tables.

The results of the Ouakrim et al. modelling can be found in the RIS of the STA and supplementary material to the paper by Ouakrim.[39] According to the modelling, the smoking rate amongst all adults is projected to decline from 13.2% in 2025 under BAU parameters to 3.3% with the STA package for that year (refer to Figure 15 below). For Māori males and females, the projected rates are expected to decline from 24.9% and 32.3% under BAU to 6.3% and 8.2% respectively by 2025. However, we find these policy impact projections to be overly optimistic. As discussed further below, the modelling on which the projections are based is fundamentally flawed.

Figure 15: RIS projected impacts of STA on smoking rates, 2020 to 2040, %



As discussed in depth by Bates et al. (2022) for ASH, the modelling by Ouakrim et al.:

- makes ill-founded assumptions based on misinterpretations of smoking trial data;
- does not reflect real world dynamics;
- fails to consider illicit trade in regular tobacco and other "workarounds"; and
- requires greater transparency of assumptions, sensitivity testing and scenario analysis.

[39] Ouakrim et al. (2023).

For a detailed examination of these concerns, the full paper by Bates et al. is provided in Annex 10 of this report.

The flawed analysis underlying the government's projected outcomes, as demonstrated by Bates et al. indicates the actual effectiveness of the STA is likely to be lower than estimated. In the subsections below, we present our analysis of the flaws in the modelling underlying the STA. This analysis is further supported by Annex 2, which presents a comprehensive review of the RIS.

4.2.1 Exaggerated benefits

As detailed in Annex 10, the BAU smoking rates in the modelling of Ouakrim et al. are outdated. In fact, some smoking rates for 2022 are already lower than the Ouakrim et al. BAU forecasts for 2025. Ouakrim et al decided not to use actual data for 2020–22, believing it to be distorted by the COVID-19 pandemic (although not explaining why), and also claiming that if it the data is accurate it is partly caused by the anticipatory effects of the STA. However, if anything one would expect anticipatory effects to be in the opposite direction.

Neglecting the more recent data meant that Ouakrim et al. extrapolated the trends observed between 2013/14 and 2019/20 to estimate artificial BAU smoking rates for 2022. This led to their using much higher rates for 2022 than was actually the case: Ouakrim et al. assumed the rate of smoking in 2022 was 15%, when in fact the Ministry's HLS indicates the rate in 2022 was almost half that, at 8%. This huge overstatement of the problem by Ouakrim et al. that policy makers needed to address is likely to have caused a false sense of urgency in the government to do something.

Furthermore, there is compelling evidence that even if the BAU rates were accurate, the modelling of Ouakrim et al. overestimates the effectiveness of the package. In particular:

- the smoking cessation rates (transition probabilities) assumed in the model to result from the STA are too high. This means that the model assumes a higher rate of successful quitting than what is likely to be achieved in reality; and
- the health benefits from smoking cessation are overstated in the model. This implies that the projected improvements in health outcomes resulting from quitting smoking may be exaggerated compared to the actual impact.

4.2.2 Cessation rates

As reported in Bates et al. (2022),[40] the Ouakrim et al. modelling is based on a gross misapplication of a randomised control experiment. The methodological flaws in the Ouakrim et al. modelling include:

- serious selection bias in the sample – containing only people who wanted to quit smoking, yet applying the results to people who do not have the intention to quit;
- applying the gross quit rate from the entire sample, instead of considering the difference in quit rates between those who were offered low nicotine products and those who were not;
- the low nicotine products in the sample were provided at no cost, which does not reflect the real-world scenario where individuals would have to purchase these products; and
- extrapolation of results derived over a six-month period to many years, an assumption that may not capture the long-term dynamics of smoking cessation.

These assumptions in the modelling result in an overestimation of the smoking cessation rates likely to result from the STA.

[40] Bates et al. (2022).

Ouakrim et al. dispute the degree to which their analysis is based on that experiment,[41] noting that more weight is attached to 'expert knowledge elicitation,' which involves averaging the subjective opinions of a group of 'experts.' This approach raises concerns about the lack of quantitative forecasting techniques and the potential biases introduced by relying on subjective judgments.

4.2.3 Overstated health benefits

A discussed in DeCicca et al. (2022), most of the public health literature on smoking overstates the negative effects on mortality and morbidity, as the estimates are corrupted by one or multiple of the following problems:

- unobserved heterogeneity;
- endogeneity; and
- dose-response measurement.

Each of these problems is discussed in turn below.

Heterogeneity

The findings from Darden et al. (2018)[42] and other studies[43] suggest that failing to account for unobserved heterogeneity when estimating the difference in mean life expectancy between smokers and non-smokers can lead to an overestimation of the impact of smoking on mortality. In their analysis of 46 years of data in the Framingham Heart Study,[44] Darden et al. found that the estimated difference in mean life expectancy between smokers and non-smokers was 9.3 years when unobserved heterogeneity was not considered.

However, when allowing for unobserved heterogeneity, which captures innate and generally unobservable differences between smokers and non-smokers, the estimated difference in mean life expectancy reduced to 4.3 years. These differences could include variations in addition propensity, time preferences and risk preferences. Even without smoking, these characteristics can contribute to smokers being less healthy than non-smokers. Therefore, the negative health impacts associated with smoking could be compounded by other lifestyle choices, such as unhealthy eating, lack of exercise, substance use, risky behaviours and so on. All of these factors contribute to the risks of premature death and poor health.

As a result, preventing individuals who would otherwise smoke from taking up smoking does not imply that they would have the same life expectancy or morbidity status as non-smokers. Consequently, the purported health effects and improvements in health-adjusted life years (HALY) resulting from blunt anti-smoking interventions, such as those in the STA, are likely to be inflated.

Endogeneity

Even studies that examine general or average relationships over time are not immune to estimation problems. One such problem arises when tobacco taxes are implemented or increased concurrently with an increasing anti-smoking sentiment in the population due to evidence of serious health risks associated with smoking. In this scenario, the measured effects of the taxes may be overstated due to an upward bias. It is possible that the taxes are actually an endogenous reaction by authorities to the prevailing public sentiment.

In the modelling by Ouakrim et al., the estimated quit rates heavily rely on analyses of historical changes in tobacco taxes. This poses a significant issue because the steady decline in youth initiation

[41] Public Health Association of New Zealand. (2022).

[42] Darden et al. (2018).

[43] Woloshin et al. (2008).

[44] National Institutes of Health. (2018).

of smoking has contributed significantly to the overall reduction in smoking rates over time. While efforts to discourage youth from taking up smoking are critical components of tobacco control measures, their actual impact may be overstated if the current smoking rates amongst individuals aged 35 are more heavily influenced by the policies and social norms of 20 years ago than by current policy settings.

Dose response

There is also the presumption of direct causation of policy impacts on health, but accurately measuring this relationship is challenging. DeCicca et al. highlight the difficulties in measure the relationship accurately due to the timing of the dose-response relationship and the various types of tobacco products consumed. Smokers tend to change their consumption habits over time, including when they smoke, how much they smoke and the specific products they use. These individual variations and idiosyncratic factors make it challenging to isolate the effects of anti-smoking policies and accurately measure their impact on health.

To illustrate this, we can consider the analogy of the dose-response relationship between sun exposure and skin cancer. The general link is clear, but the magnitude of the effect is uncertain and highly variable.

Table 2 summarises the problems with the modelling by Ouakrim et al. and how it exaggerates the effectiveness of the package. In summary, the modelled cessation rates are affected by outdated assumptions due to the BAU scenario, the invalid extrapolation of cessation rates from a specific experiment and subjective opinion, and the inadequate treatment of endogeneity in historical studies. These factors also affect the estimated HALYs savings, which are further influenced by the heterogeneity between smokers and non-smokers and uncertainty surrounding the dose response relationship. Any overstatement of quit rates automatically leads to an exaggeration of the HALY benefits as well.

Table 2: Summary of limitations of Ouakrim et al. modelling

	Overstates cessation rate	Overstates HALYs
BAU outdated	✓	✓
Extrapolated cessation rates	✓	✓
Endogeneity	✓	✓
Heterogeneity		✓
Dose-response		✓

4.3 Our assessment of the likely effectiveness of the STA

This section looks at how the limitations of the modelling discussed above affect each of the main components of the STA: the age-sales ban, the very low nicotine requirement and the reduction in the number of outlets.

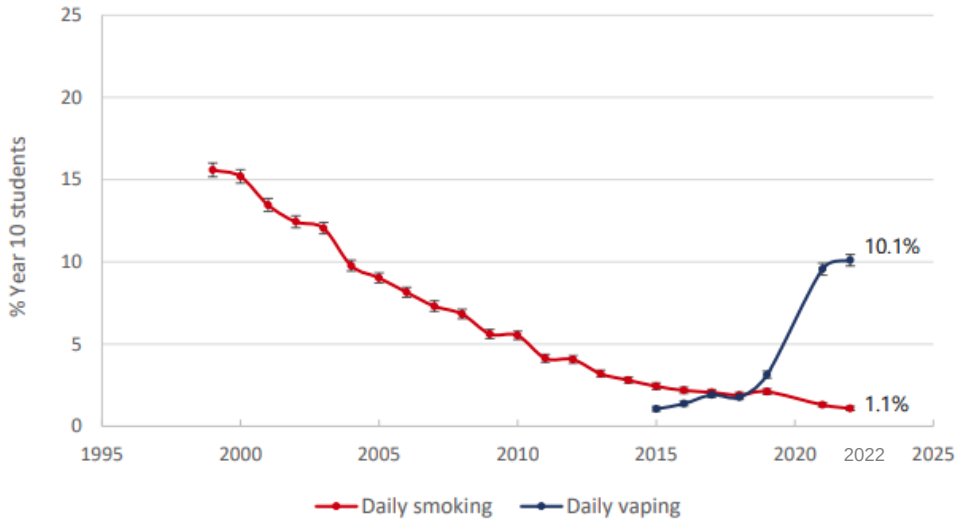
4.3.1 The age-sales ban

Figure 16 below presents the trends in youth smoking rates since 1999 and in daily vaping rates since 2015. Youth smoking rates declined steadily from 1999 until around 2016, but the rate of decline flattened between 2017 and 2019. However, after 2019, there was a significant decline in smoking rates alongside an increase in vaping rates. By 2022, only 1.1% of Year 10 students reported smoking

daily, while 10.1% reportedly vaping daily. The availability of vaping is recognised in the RIS but given little further attention.

Due to the considerable number of existing smokers compared to the rate of new entrants and exits, consequential changes in the overall prevalence of smoking are expected to be slow. However, the decline in new entrants suggests that the age-sales ban, which targets new entrants, may be largely redundant. In other words, the age-sales ban's expected effectiveness is exaggerated due to the increasing popularity of vaping as an alternative to smoking.

Figure 16: Youth daily smoking (1999-2022) and daily vaping rates, %, 2015-2022



Source: ASH Year 10 Snapshot Survey 2022.

The residual effectiveness of the age-sales ban is further compromised by an implicit and unsubstantiated assumption that, in the future, say 2050, tobacco sellers will indeed differentiate (when asking for identification) between a person aged 42 and a person aged 41 – a nonsensical situation. The former buying cigarettes for the latter would make them a criminal. Such rules can erode confidence in and respect for the law, and incline people to move more readily into illicit tobacco consumption. Over time, as the age-sales ban applies to a progressively larger share of the population, it is likely to thereby expand the potential size of the black market for tobacco.

In Canada during the 1990s, an environment of this nature was created, when aggressive tobacco tax hikes led to a booming market for smuggled tobacco. Case study 3, summarised below, illustrates how the normalisation of illicit tobacco sales saw a breakdown in respect for Canadian law, eventually prompting the reversal of tobacco tax hikes in order to neutralise the incentives for both engaging with and supplying the illicit market.

Case study 3: Tobacco smuggling boom in Canada, 1990's

- A series of tobacco tax hikes beginning in 1984 pushed up federal tobacco taxes in Canada from 42 cents per pack to $1.93 CAD per pack in 1993. Provincial cigarette taxes also increased dramatically over the same period.
- Cigarette smuggling from the United States soared. Bootleg cigarettes were smuggled into Canada by truck and ferry across from New York State, as well as from other foreign sources using smaller boats loaded from ships waiting in international waters.
- Large-scale smuggling between the United States and Canada was conducted almost entirely by organised crime. Violence increased, legitimate merchants suffered, and in

one year alone, Canada and its provinces lost over $2 billion CAD in tax revenues to the black market.

- By 1993, illicit tobacco had gained a major share of the market – estimated at around 60% in Quebec and 15% to 40% in other provinces.
- The Canadian solicitor general concluded that "organised crime has become a major player in the contraband cigarette market. What we are seeing is a frightening growth in criminal activity. We are seeing a breakdown in respect for Canadian law. Canadian society is the victim."
- In 1994, the federal government, unable to obstruct the black-market trade, resolved to reduce tobacco excise taxes to weaken incentives to smuggle and distribute contraband cigarettes. Provincial governments followed suit, with federal and provincial taxes in Ontario, for example, reduced by $1.92 CAD per pack.
- By the late 90s the contraband market had receded substantially, with illicit tobacco falling to approximately 10% of the total market.

Further details on the Canadian experience with its tobacco smuggling boom in the 1999s are presented in Annex 7.

A similar black-market response occurred in Massachusetts in 2019 when a state ban was imposed on all flavoured tobacco and nicotine products. The case is presented in full in Annex 7 and summarised in Case study 4 below.

Case study 4: Flavoured tobacco ban in Massachusetts, 2019

- In November 2019, Massachusetts became the first state in the US to ban the sale of all flavoured tobacco and nicotine products, including flavoured electronic cigarettes and menthol cigarettes. The policy goal was to prevent youth and other demographics considered particularly drawn to flavoured nicotine products from starting or continuing use.
- The legislation created a new illicit market opportunity for smugglers to import the banned products from states without bans and with lower taxes and sell them in-state.
- A study of tobacco sales in Massachusetts and surrounding states following the flavour ban found that while 30 million fewer cigarette packs were sold in Massachusetts in the 12-month period after the ban, approximately 33 million additional packs were sold in neighbouring states in the same period – ultimately brought across the border and consumed in Massachusetts.
- In 2022, the Department of Revenue undertook 4,264 tobacco inspections (up 43% from two years prior), undertaking 326 seizures (up from ten seizures two years prior). Many of these seizures involved substantial amounts of products, smuggled across state borders or illegally produced by organised crime groups and petty smugglers.
- Berkshire County Tobacco Awareness Program director James Wilusz expressed surprise at the level of egregious, black-market sales, "we're seeing a blatant disregard for the regulations."

The Canadian and Massachusetts cases illustrate both the responsiveness of the illicit market to the tax and regulatory environment and the willingness of consumers to purchase tobacco outside of the

law. Likewise in the case of New Zealand's STA, the policy combination will incentivise smokers who consider the policies unjust to disregard the rule of law.

4.3.2 Lower nicotine

The RIS states that of the three policies in the STA, the largest effect (in terms of reducing smoking rates and HALYs gained) is likely to come from the nicotine reduction policy. The logic here is that lower nicotine means lower addiction, which means less smoking. However, it overlooks the potential behavioural changes that may occur if only low-nicotine cigarettes are legally available. These changes in behaviour can manifest in many forms:

- smokers may increase their cigarette consumption or inhale more deeply to obtain the same total amount of nicotine, undermining the effectiveness of the policy on health outcomes. Indeed it may lead to worse rather than better health outcomes as people consume more of the harmful product (smoking) to obtain their desired level of nicotine; and
- people may also seek to put nicotine back into the low-nicotine cigarettes, such as through nicotine sprays or soaking tobacco in vape liquid.

While it can be assumed that buying more cigarettes would involve higher financial costs and therefore be less common, the key issue, as highlighted by Bates et al. (op. cit.), is that the quit rates modelled by Ouakrim at al. are not soundly based on empirical evidence, with some coefficients relying solely on expert opinion.

The RIS modelling does not account for the possibility of increased consumption of illicit higher-nicotine tobacco or cigarettes. Further, it does not consider the challenges associated with producing very low nicotine cigarettes (not exceeding 0.8mg/g).

4.3.3 Outlet reduction

As is discussed in Section 1, reducing the number of tobacco outlets by over 90% will have implications for smokers in terms of increased time and travel costs, resulting in a loss in welfare. The policy effectively functions as a price increase, to which a price elasticity of demand can be applied to estimate the quantity response. Such a calculation needs to consider two factors:

1. As discussed in DeCicca et al. (2022) the price elasticity of demand, when properly estimated, is smaller than the consensus range of −0.20 to −0.35.[45]
2. By 2025, those who still smoke will likely be even less responsive to changes in price than those who have already ceased, and thus more willing to travel to buy tobacco (if not buying on the black market).[46]

In previous study by Blakely et al. (2016)[47], the price elasticity of demand for smoking ranges widely from -0.35 to -0.10 for non-Māori, with 20% higher values for Māori. This suggests that the quit rate resulting from the policy may be over-estimated to some extent, with many people prepared to incur the higher travel costs associated with the retail outlet restrictions.

Graham-DeMello and Hoek (2023)[48] conducted interviews with 24 individuals and found that most participants expected to cope with fewer tobacco outlets, notably by buying cigarettes at the same time as other items. However, the researchers assumed that supermarkets would be the approved retailers, as the government had not made a definitive decision at the time of the research. Given the

[45] Some estimates are even higher. See for example https://www.tobaccoinaustralia.org.au/chapter-13-taxation/13-1-price-elasticity-of-demand-for-tobacco-produc .

[46] In that connection see Annex 4 on how the black market in tobacco has developed in Australia.

[47] Blakely et al. (2016).

[48] Graham-DeMello & Hoek (2023).

government's aim to denormalise smoking, supermarkets may not be prioritised on the approved retailer list.

Other results from the survey were very mixed, with some interviewees expecting a reduction in smoking, some anticipating more bulk buying (and thus more smoking), while others expressed concerns about the additional cost and its impact on household budgets.

Additionally, it is important to consider that Māori individuals are more concentrated in rural areas compared to the general population,[49] suggesting longer travel distances to tobacco outlets (and vape stores). They may also have closer proximity to the illicit tobacco market. These factors raise concerns about the effectiveness of the policy in reducing health inequities.

Any offsetting behaviour such as bulk buying or purchasing on the black market can impede the effectiveness of the STA. However, the reduction in the number of outlets can be expected to have other deleterious effects, notably:

- adverse impacts on the health and wellbeing of small business owners who are effectively forced to close their businesses; and
- increased criminal activity, as the remaining legitimate outlets will need to carry larger stocks of tobacco, making them targets for robbery.

While these considerations do not directly interfere with the effectiveness of the STA, they do affect its efficiency, as discussed in Section 5 below.

4.4 Summary

The marked reduction in smoking rates since the analysis by Ouakrim et al. severely undermines the effectiveness of the STA as estimated in the RIS. The modelling undertaken by Ouakrim et al. also relies on dubious input assumptions and coefficients that likely exaggerate cessation rates and the subsequent improvements in morbidity and mortality.

The recent declines in smoking rates can be attributed to past interventions such as taxes and marketing regulations, as well as the widespread awareness of the adverse health effects of smoking and the availability of vaping. The accessibility of vaping products makes it easier for individuals to quit smoking or avoid starting in the first place. Marti et al. (2019)[50] find that health concerns are more influential than smoking bans or prices in determining vaping choices. This is a significant finding as it implies that the policies in the package may be misguided.

Overall, this section highlights the weaknesses in the modelling underlying the STA, weaknesses that imply the effectiveness of the package is exaggerated. Moreover, the high uptake of vaping indicates that smoking rates will decline despite the package, rather than because of it. Therefore, the STA is largely if not entirely redundant. In some respects, the package may even be counterproductive, such as if the reduced nicotine levels lead people to smoke more low-nicotine cigarettes to satisfy their desired nicotine levels, or if the reduction in the number of retail outlets encourages bulk buying.

That leads us to the next section of the report on the efficiency of the STA package.

[49] 19% of Māori live in rural area compared to 13% for the whole population. (Source: Stats NZ Census 2018).

[50] Marti et al. (2019).

5 Efficiency

- The STA is likely to impose substantial costs on New Zealanders. The costs (all expressed in present value (PV) terms over a ten-year period) include:
    - Increased administration costs for the Government, including the costs associated with designing, monitoring and enforcing the regulations arising from the STA, totalling around $35 million.
    - The costs to the retail sector associated with complying with the STA and adapting to its changes, alongside the associated costs arising from unemployment and financial stress to store owners. These costs to the retail sector are estimated to total around $75 million.
    - The costs to the broader society resulting from inefficiencies and unintended consequences arising from the Act including increased travel costs totalling an extra $545 million; the costs of the increased crime from the increased illicit trade estimated at $265 million; and the indirect impacts through a less efficient tax system of around $375 million.
- The increased costs that are expected to arise from the STA that can be quantified sum to $1.3 billion in PV terms.
- The uncertainty around these estimates has been modelled using Monte Carlo analysis. This analysis indicates the 95% confidence interval for these cost estimates is from $0.5 billion to $2.6 billion. The Monte Carlo analysis indicates our central estimate of $1.3 billion is likely to be on the conservative side.
- In addition to the quantified costs, there are a number of other costs to New Zealanders wellbeing that are likely to arise from the STA that we have not attempted to quantify. These non-quantified costs include the:
    - mental health and other costs of unemployment not measured in financial terms;
    - net financial consequences of the disruptions to the retail sector;
    - the health costs associated with expected increases in bulk buying of cigarettes;
    - impacts on social capital resulting from the retail sector disruptions;
    - indirect impacts of rising crime on society, such as discouragement to tourism; and
    - physical and mental health costs to individuals from quitting smoking (withdrawals) and the stigmatisation attached to those who continue to smoke.
- A number of perverse or unintended consequences may arise as a result of the STA:
    - If the illicit market expands in scale and accessibility, there is a risk that the price of illicit tobacco could drop below the current price of legal products, potentially leading to increased rather than decreased consumption.
    - Additionally, other risks associated with the STA include the substitution of legal tobacco products with higher-harm alternatives or roll-your-own cigarettes, as well as individuals inhaling more deeply to obtain the same total amount of nicotine.
    - Further, given the extremely low (1.1%) prevalence of new smokers, the age-sales ban, which targets new entrants, may be largely redundant. If anything, there is the possibility of a “forbidden-fruit” effect, whereby smoking may become more attractive to some youth once it is prohibited.

5.1 Introduction

Having analysed the likely effectiveness of the STA, this section focuses on efficiency – seeking to address the following questions: what costs will the reform impose, and what is the likely magnitude of these costs?

As detailed in the Framework section above, this analysis adopts a cost-effectiveness methodology, which is a limited version of a cost-benefit analysis. The primary objective is to estimate the extent of costs associated with implementing the proposed measures. The approach does not endeavour to assign or quantify the magnitude and nature of the benefits that the proposals will generate. Instead, the approach attempts to measure, by implication, the magnitude of benefits required from the proposals in order to justify the expenses and social costs imposed by their implementation.

Ideally, proponents of new policies should demonstrate that the planned policy is expected to generate benefits that significantly outweigh the anticipated costs. As mentioned in the previous section, there are several concerns regarding the effectiveness of the Act in delivering intended benefits. The cost-effectiveness estimates presented here provide our assessment of the minimum level of national benefit required to justify the costs likely to be imposed by the Act.

The costs are investigated under three areas:

1. **Administration costs for Government –** costs associated with designing, monitoring and enforcing these regulations. This specifically includes additional resourcing at the Ministry of Health and Customs to fund increased illicit tobacco enforcement at the border;
2. **Costs to the retail industry** – costs associated with both complying with the STA and adapting to its changes, and also, the costs arising from unemployment and financial stress; and
3. **Costs to society –** costs resulting from inefficiencies and unintended consequences arising from the Act including:
    a) increase in consumer travel costs;
    b) direct impacts of the STA on the costs of crime; and
    c) indirect impacts through a less efficient tax system.

As demonstrated in Section 4, the majority of the societal costs imposed by the Act are likely to transpire indirectly and may be disguised or attributed to general societal issues.

It is important to acknowledge the considerable uncertainty surrounding the estimates presented here. To manage this uncertainty, we have adopted several strategies:

- we offer a clear explanation of the estimation methods and the assumptions underpinning the calculations;
- the central estimates are based on conservative assumptions; and
- Monte Carlo simulations are utilised to generate uncertainty bounds around the estimates, as explained in further detail in Section 5.2.1 below.

Generally, the central estimates align more closely with the lower-end estimates produced by the Monte Carlo analysis, with a wider disparity from the higher-end estimates. This outcome reflects the conservative approach used in setting the central assumptions. It also highlights the inherent upward risk associated with cost estimations. When estimating costs, there is typically a greater likelihood of higher costs than lower costs (as costs cannot fall below zero but can exceed multiple times the central estimate).

Many potential cost factors have not been quantified, which reflects our conservative approach. This approach aims to avoid double counting overlaps between two approaches used to measure a particular phenomenon. Implicitly, factors not explicitly measured underpin the larger upside risk in the Monte Carlo analysis.

In addition to the quantifiable costs, each subsection concludes with a qualitative discussion of other non-quantifiable costs. These include:

- private sector costs associated with commenting and making submissions through the legislative phase;
- the non-financial wellbeing costs of unemployment;
- the net financial consequences of disruptions to the retail sector;
- the impact on social capital resulting from the retail sector disruptions;
- the health costs associated with expected increases in bulk buying of cigarettes;
- indirect impacts of rising crime on society, such as discouragement to tourism; and
- physical and mental health detriment costs to individuals from quitting (withdrawals) and stigmatisation.

5.2 Administration costs for the government

Administration costs account for publicly funded activities associated with the design, monitoring and enforcement of government legislation and regulations. In this analysis, administration costs encompass policy work conducted within the Ministry of Health, as well as the need for additional Customs officers to address the anticipated increase in illicit tobacco activities. Typically, enforcement costs are included within administration costs. However, in this case, the potential costs associated with criminal activity that might arise due to the Act are separately accounted for under Society costs. These costs of crime implicitly include enforcement costs. Therefore, enforcement costs have not been included under administration costs to ensure that there is no double counting of these enforcement costs.

5.2.1 Quantification of costs

The cost of public sector time is benchmarked on a comprehensive investigation conducted in 2015, examining the cost of policy advice in New Zealand. The figures have been adjusted for inflation to 2022 prices, taking into account subsequent increases in public sector wages (The Treasury, 2015). The approach involves considering frontline policy or analytical full-time equivalent (FTE) labour inputs and pricing these costs while considering all overhead costs. This includes management overheads and support staff engaged in ancillary activities such as accounting, IT support and HR. Therefore, although staff directly involved in the specific activities of interest may earn less than the numbers used in the tables and graphs below, the calculations account for the higher comprehensive cost to society represented by these higher cost figures.

The original study conducted by the Treasury presented a range of estimates that varied across departments. The range of these estimates serve as the foundation for the values used in our analysis. The central, low and high figures reflect the range of Treasury estimates for 2014, adjusted to 2022 prices using the changes in ordinary time average hourly movements for the Public Administration and Safety industry from the Quarterly Employment Survey.

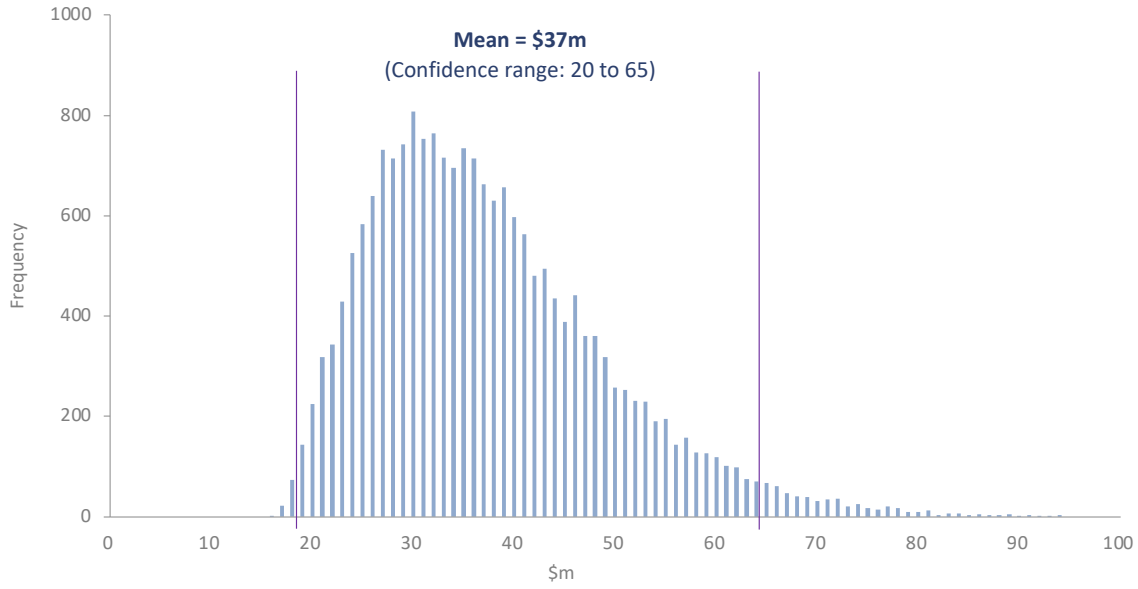
Table 3: Administration cost input assumptions

Assumption	Central	Low	High
Full time equivalent staff requirements	20	15	30
Annual value per FTE ($)	$236,900	$189,600	$339,700

The central estimate assumes that the Act requires a one-off, but sustained, increase in labour requirements equivalent to 20 frontline FTEs (such as policy analysts, Customs officers, and regulation enforcement and monitoring officers). These estimates are informed by the recent funding increase of $2.5 million per year allocated to Vote Customs in the 2022 Budget to address the additional challenges posed by illicit tobacco activities. The low assumption scenario (15 FTE staff at $189,600 per year) would primarily cover a similar increase in Customs spending, with limited allocation for other administration costs.

The outcome of this analysis is presented in Figure 17 below.

Figure 17: Distribution of ten-year present value of administration costs, $ millions**,** frequency



We find a central estimate of $4.7 million per year, with a 2024-33 ten-year present value of $37 million. Monte Carlo analysis indicates a 95% confidence range from $20 million to $65 million for the present value estimate.

5.2.2 Non-quantified costs

As is standard in cost-effectiveness and cost-benefit analysis, the analysis has a forward-looking perspective, treating all past government costs associated with the development and enactment of the STA as sunk costs.

5.3 Costs faced by the retail industry

Three types of costs are allowed for with respect to impacts on retail businesses and their workers:

1. the cost of applying and complying with tobacco sales licences;
2. the cost of one-off spells of involuntary unemployment for a portion of individuals currently employed in the retail industry; and

3. the mental health cost to retail proprietors who face the risk of closing their business due to not attaining a tobacco sales licence.

Precise data on the number of retail outlets selling tobacco products in New Zealand is not available. However, a 2013 study estimated that there were 5,008 tobacco retailers in New Zealand in 2012.[51] Our low estimates use this 2012 figure. The central estimate of 7,100 is benchmarked on this 2012 estimate, but adjusted for the growth in fuel retailing, supermarket and specialised food retailing outlets identified by Statistics New Zealand's Business Directory from 2012 to 2022. The high-end assumption of 8,700 is based on the total count of these store types in the 2022 Business Directory.

5.3.1 Application compliance costs

The application compliance costs involve the costs to retail operations applying for tobacco retail licences and then, for the successful applicants, the costs of complying with licence requirements and other associated costs.

Quantification of costs

The central assumption is that 600 retail licences will be awarded in the 2023/24 fiscal year, with the new regulatory regime taking effect in July 2024. The low-end assumption is for only 450 licences to be awarded, perhaps due to a lack of applications or applicants facing challenges in meeting licence requirements. The high-end assumption of 630 licences presumes that slightly more licences are granted, perhaps due to specific location factors.

Our calculations allow for an oversubscription for licences, ranging from 600 to 2,400 applications, with a central assumption of 1,200 applications. Assuming a licence application fee of $2,000, the application costs for applicants are estimated to range from $3,000 to $10,000, depending on the time and resources invested in preparing the application. The central assumption is an average application cost of $5,000 per application. It is assumed that application fees and preparation costs apply on a per-site basis, even if chains apply for multiple site licences.

For successful applicants, the estimation of licence compliance costs (such as refits, security measures, etc.) is based on feedback from retail industry organisations, indicating that stores are likely to spend approximately $50,000 each. The risk analysis assumption is that there is a higher likelihood of upside risk than downside risk to these cost estimates. The central number of licences granted is based on Ministry of Health indicative location maps (597). While there may be minor scope for more licences to be granted (we have allowed for up to 630), there is likely a greater scope for fewer licences being granted, hence our low assumption of 450 licences.

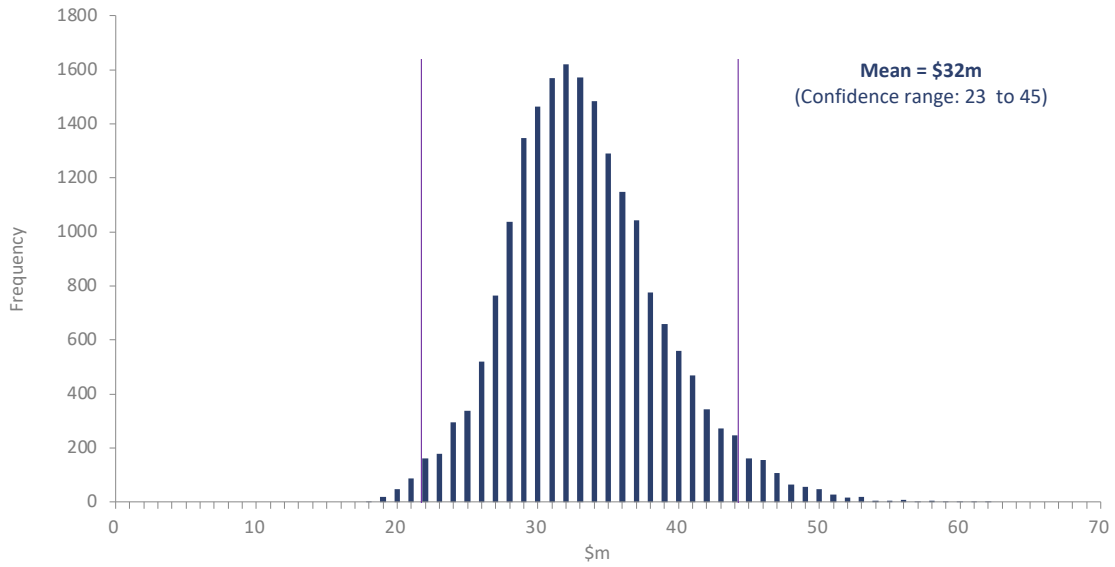
Table 4: Application cost input assumptions

Assumption	Central	Low	High
Stores applying for tobacco licence	1,200	600	2,400
Tobacco licence application fee ($)	$5,000	$3,000	$10,000
Number of licences granted	600	450	630
Per licence refit and preparation costs ($)	$50,000	$45,000	$100,000

The outcome of this calculation is presented in Figure 18 below.

[51] Marsh et al. (2013).

Figure 18: Distribution of ten-year present value of application compliance costs, $ millions**,** frequency



The calculations assume that licence application costs occur in 2024, with an industry cost of $6 million (95% confidence range: $2 million to $15 million). Licence compliance costs are estimated to sum to $30 million and are assumed to occur in 2025 (range: $21 million to $40 million). The ten-year present value of these combined application and compliance cost estimates is $32 million (range: $23 million to $45 million).

Non-quantified costs

No allowance has been made for private sector costs incurred by non-retail organisations that may need to investigate and adapt to the potential consequences of the legislation, such as changes in transport and wholesale activities.

5.3.2 Involuntary unemployment costs

The requirement for tobacco retailers to be licenced and the limitation of licences to around 600 may impose significant financial pressures on thousands of retail outlets. For many of these stores, tobacco sales contribute significantly to their viability, with industry representatives indicating that tobacco sales can represent 25% of store profits for small operations.

The loss of such a vital revenue source is likely to result in a substantial number of store closures, resulting in employment disruptions for many retail workers. Although it can be expected that these workers will eventually find new employment opportunities, labour market frictions imply a temporary increase in unemployment due to the expected disruptions. As these periods of unemployment will be involuntary, they impose a cost on those impacted.

Quantification of costs

To value the wellbeing costs of involuntary unemployment, we utilise the method proposed by Patterson et al. (2019).[52] The cost of unemployment for the average individual is calculated as the difference between the unemployment benefit and the minimum wage, representing the minimum foregone income resulting from the inability to work. The underlying assumptions include a 37.5 hour working week for an average of 52.14 weeks per year. Consequently, the wellbeing cost of a full year of involuntary unemployment for an individual can be calculated as follows:

[52] Patterson et al. (2019).

$$CU_{annual} = (MW_{hour} - UB_{week}/37.5) \cdot 37.5 \cdot 52.14$$

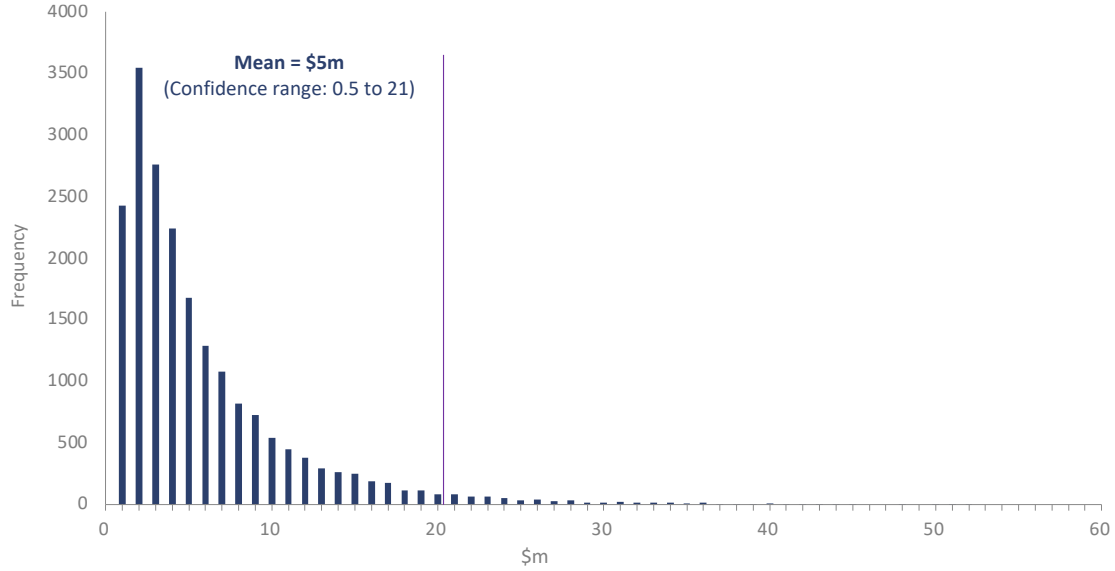
Using the adult minimum wage of $22.70 per hour[53] and the jobseeker weekly benefit for a single person aged 20 to 24 in 2023 of $294.18[54] this formula implies a wellbeing cost of $29,046 for an individual experiencing a full year of involuntary unemployment. Our central estimates assume that one person from 12.5% of the current retail stores selling tobacco will face a three-month period of involuntary unemployment during 2025 as a result of tobacco sales restrictions. This is assumed to be a one-off event with transient impacts on a small subset of affected workers.

Table 5: Involuntary unemployment input assumptions

Assumption	Central	Low	High
Store count	7100	5000	8700
Stores closures (% of store count)	12.5%	5.0%	25.0%
Employees with spell of unemployment (per store)	1	1	2
Average period of unemployment (months)	3	1	6

The outcome of this calculation is presented in Figure 19 below.

Figure 19: Distribution of ten-year present value of involuntary unemployment, $ millions**,** frequency



Our estimate is that the costs of involuntary unemployment in 2025 will amount to $6 million (with a present value of $5 million). Monte Carlo analysis indicates a 95% range for these present values, ranging from $0.5 million to $21 million.

Non-quantified costs

While we have estimated the financial costs associated with a temporary spell of unemployment, it is important to note that for some individuals, the period of unemployment could end up extending over a significant duration for various reasons. For these individuals, the costs of unemployment could be considerably greater than just the loss of wages. Lengthy periods of unemployment are known to be

[53] Employment New Zealand (2022).

[54] Work and Income (2022).

associated with physical and mental health issues, leading to a decline in their subjective perspective of their wellbeing.

The measurements of the costs of unemployment presented here do not make any allowance for the potential long-lasting and non-financial wellbeing costs that could impact some current retail workers.

5.3.3 Financial stress for retailers

The introduction of retail licencing will place financial pressure on the retail outlets no longer able to sell tobacco products, leading to a risk of closure and associated financial stress. Assessing the overall impact on the economy due to this declining profitability for retail outlets is challenging. While there will be some wealth redistribution as small retailers close and shoppers use larger, but less conveniently located, stores. The churn of this redistribution will likely have some economic cost, but the overall impact is difficult to determine. In this analysis, we focus on the mental health consequences for proprietors, which will unequivocally impose costs on society beyond any actual financial implications.

As with involuntary unemployment costs, the central assumption is that 12.5% of 7,100 existing retail stores will face severe financial impacts as a result of tobacco retail licencing. The risk of closure and the associated financial stress will potentially have mental health consequences for proprietors – over and above any actual financial implications.

To estimate the potential mental health consequences, we assume that heightened anxiety levels are significant enough to induce clinical depression amongst a portion of retail proprietors, with a central assumption that this impacts one member of the owning family in 12.5% of the stores currently selling tobacco products. We assume that this depression responds to treatment and that affected individuals, on average, fully recover within six months. Clinical information from the Institute for Clinical Research and Health Policy Studies at Tufts Medical Center[55] suggests depression that is responsive to treatment has an average detrimental impact of 28% on peoples' health. We valued this impact using estimates of the value of a statistical life year based on the current assumptions of the Treasury's CBAx model. As with involuntary unemployment, mental health issues related to financial stress are modelled as one-off transitory impacts during 2025.

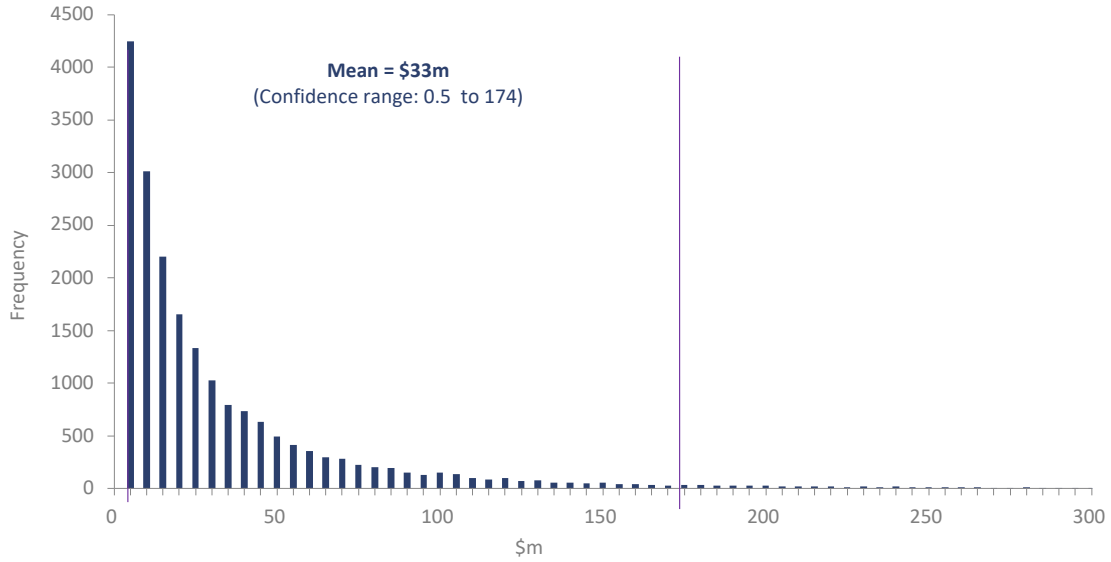
Table 6: Financial stress input assumptions

Assumption	Central	Low	High
Store count	7100	5000	8700
Stores closures (% of store count)	12.5%	5.0%	25.0%
Number of propietors stressed (per store)	1	0.5	2
Health impact of financial stress (DALY)	0.28	0.1	0.64
Average period of depression (months)	6	1	12
Value of statistical life year ($m)	0.315	0.182	0.472

The outcome of this calculation is presented in Figure 20 below.

[55] The general link should be http://ghcearegistry.org/ghcearegistry/ with the specific data used available from their DALY calculator found at: https://cevr.shinyapps.io/DALYcalculation/

Figure 20: Distribution of ten-year present value of financial stress social costs, $ millions**,** frequency



The central estimate is for financial stress to impose health costs on retail proprietors equivalent to a present value of $33 million, with a 95% confidence range from $0.5 million to $174 million.

Non-quantified costs

These estimates make no judgement or measurement of the financial consequences of falling retail profits and the resulting potential turnover in business ownership. Additionally, they do not account for the social capital impacts.

Dairies can be central focal points for communities, demonstrating their value in intangible ways. For example, the community role of dairies may only become obvious in extraordinary circumstances such as natural disasters. Dairies also provide a mechanism for integrating and valuing ethnic minorities, who often dominate dairy ownership. As dairy owners, these families hold prominent positions and are valued by their communities. The erosion of such social capital could occur with a reduction in the number of dairies and the shift towards larger scale tobacco outlets.

5.4 Societal costs

The estimates of the costs to society aim to capture some of the consequences that the regulatory changes embodied in the STA are likely to impose on the general population. These estimates account for three types of impacts:

- inefficiencies resulting from the regulatory limitations on retail outlets permitted to sell tobacco products, specifically the increased travel costs incurred by consumers;
- the social costs associated with potential increases in crime rates, both due to the concentration of tobacco outlets and as a result of the virtual prohibition of tobacco products when very low nicotine cigarette regulations are introduced; and
- the costs of economic inefficiencies that are expected to arise from a potential expansion in illicit tobacco activities, particularly due to an increase in the deadweight cost of taxation. This is because the funding of the social costs of smoking would shift from targeted excise taxes paid by smokers to the general tax system primarily paid by non-smokers.

Each of these areas of social costs is discussed in turn below.

5.4.1 Increased travel costs

The planned introduction of retail licencing and the restriction of these licences to just 597 throughout New Zealand is likely to give rise to market inefficiencies that will impose economic costs on the country. Regardless of the health implications and the influence of excise taxes on the cost of cigarettes and other tobacco products, the location of retail outlets selling tobacco products has traditionally been determined by market forces. One would expect that the number and location of retail outlets reflects a careful balance between the supply considerations of retailers and the convenience considerations of smokers. However, the fact that regulation, rather than market forces, is driving the expected concentration of retail outlets suggests that the regulations are either restricting access to business opportunities or increasing the inconvenience for smokers.

Quantification of costs

The costs associated with the introduced inefficiencies into tobacco retailing through licencing are estimated by assessing the increased travel costs for consumers, as they will likely have to travel greater distances to access tobacco products. Currently, according to Statistics New Zealand's Business Directory there are 6,645 business units involved in fuel retailing, supermarkets and groceries, and specialised foods (typically selling tobacco products) in the 21 council areas considered urban. Given the land area of these areas being 19,295 km^2, on average, there is approximately one such store per 2.9 km^2. Consequently, within urban areas in New Zealand, each store is, on average, just under 2 km from another. 56By implication, this suggests that, in urban settings, people are typically within 1 km of a tobacco store (within a 2 km round trip). However, this analysis does not account for the actual distribution of stores and people; smokers could often be closer to stores than this analysis suggests. The crucial question is what will happen after retail licencing is introduced.

According to the Ministry of Health's January 2023 Indicative Allocation of Stores Across New Zealand (Maps)[57], just 250 of the 597 licences are currently designated for the urban areas analysed above. This implies a reduction in stores from 6,645 within 19,295 km^2 to 250, resulting in an increase in the average catchment area from 2.9 km^2 to 77.2 km^2, and the average distance between stores to 9.9 km. The average round trip increases from approximately 2 km to 10 km.[58] Consequently, this represents an increase in the average one-way travel time from an eight-minute walk or three-minute drive to a one-hour walk, a 15-minute drive or a 30-minute bus ride.

Walking is no longer a viable option due to the increased travel distances resulting from the introduction of retail licensing. Taking into account people's leisure time valued at $32 per hour (based on Treasury CBAx) and considering the alternative modes of transport, our central travel calculations are based on driving 10 km rather than walking 2 km. The lower cost estimate is associated with driving a further distance; the higher cost estimate is based on using public transport rather than walking.

To mitigate the impact of increased travel costs, individuals have the option to reduce the number of trips and purchase tobacco products in bulk. Our calculations indicate that smokers can offset the increased travel cost by tripling their average cigarette purchases. Although we expect that reducing the number of shopping trips will be the predominant behaviour, our calculations allow for the possibility that increased travel costs may significantly affect a small fraction of trips, approximately 10% (with a range of 5% to 20%).

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[56] This distance calculation assumes circular areas and is based on the familiar formula for the area of a circle, $A = \pi r^2$ which can be rearranged so that one can estimate the diameter from the area as $D = 2(A/\pi)^{\wedge 0.5}$. Applying this formula to an area of 2.9km^2 implies an average diameter of 1.92km.

[57] Ministry of Health, Indicative Allocation of Stores Across New Zealand (2023).

[58] The formula for the average direct distance within a circle to its locus is $8.r/3.\pi$. For a circle with a radius of 1 km, the average distance then is 0.85 km; for a 5 km radius the average distance is 4.24 km. As direct line travel is typically uncommon in urban centres (due to towns being made up of blocks) we have assumed slightly higher average one direction distances of 1 and 5 km respectively. This adjustment retains the 5:1 ratio in average distances.

Table 7: Increased travel costs input assumptions

Assumption	Central	Low	High
Increase in cost per trip	$17.47	$12.80	$28.47
Pre-reform number of packs purchased per trip	1.5	1	3
Reduction in trips made due to increased costs	90.0%	95.0%	80.0%

The calculation of increased travel costs is as follows:

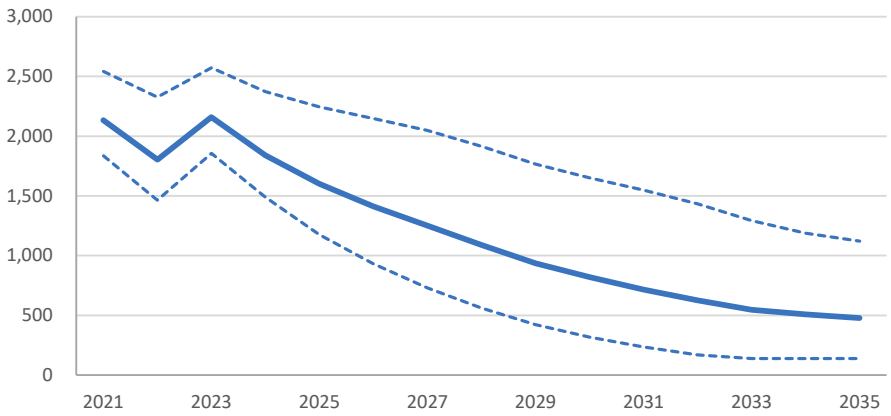
> The number of packets purchased divided by the pre-reform number of trips per packs multiplied by the increase in cost per trip multiplied by one minus the reduction in trips due to increased travel costs.

To illustrate, let's consider an individual who purchases 150 packs of cigarettes per year. Using the central assumptions for this individual, the associated increase in travel costs would be:

150/1.5 x (1 – 0.9) x $17.47 = $174.70.

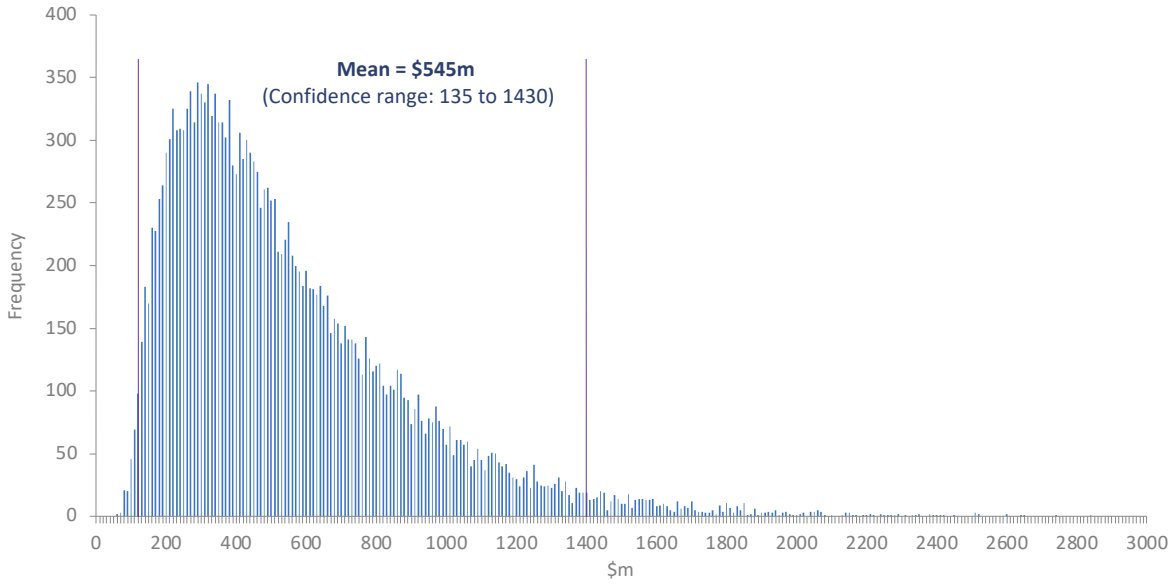
The actual estimate of travel costs will vary depending on the number of cigarettes smoked. Considering the expected decline in smoking rates, the assumption is that cigarette consumption will decline in line with the numbers presented in Figure 21 below (as per Section 3, Framework).

Figure 21: Base case estimate of cigarette consumption million sticks, projections with 95% CI



The outcome of this calculation is presented in Figure 22 below.

Figure 22: Distribution of ten-year present value of additional travel costs, $ millions**,** frequency



Non-quantified costs

It is assumed that all inefficiencies introduced by retail regulations have been captured by increases in smoker travel costs. However, it is important to note that no consideration has been given to other potential costs, such as the impact of dairy closures on the convenience of non-smoking consumers due to the loss of tobacco revenue.

Furthermore, our analysis does not factor in any potential adverse health impacts that could arise from increased smoking behaviour from bulk buying of cigarettes. It is crucial to acknowledge that changes in purchasing patterns and increased smoking may have implications for public health that have not been accounted for in this analysis.

5.4.2 Illicit tobacco – tax inefficiency

The implementation of reforms that inadvertently create financial opportunities for illegal operations have the potential of perverse unintended consequences. The combination of high excise taxes, the introduction of very low nicotine cigarettes (effectively rendering standard cigarettes prohibited), and the elimination of a significant income source for local stores seems to provide ideal conditions for the growth of the illicit tobacco market. This creates profit incentives for suppliers, a ready-made demand and a latent distribution system open for exploitation and manipulation.

Our cost estimates are based on the assumption that within five years, the illicit market will expand to around 10% of the current size of the tobacco market in 2023. The range of our assumptions for this expansion varies from a low of 5% and high of 20%.

Concerns about illicit tobacco primarily revolve around the following aspects:

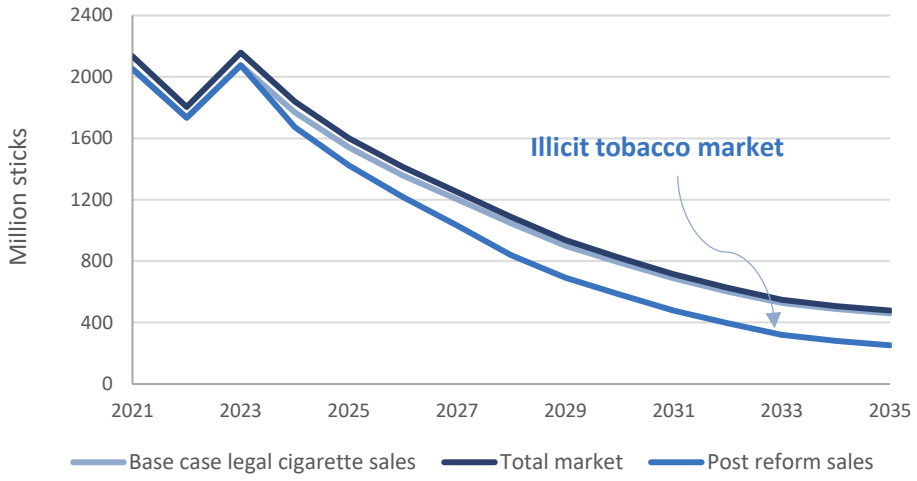
- Illicit tobacco enables smokers to obtain tobacco products at cheaper rates than legal products, diminishing the price incentives for them to give up smoking;
- The presence of an illicit tobacco market provides profit opportunities for criminal activities, undermining social capital and increasing the costs associated with crime;
- Illicit tobacco reduces the tax revenue generated by smokers without necessarily reducing the costs they impose on society, such as healthcare costs. Consequently, these public costs still need to be funded, shifting the burden onto non-smoking taxpayers and necessitating funding from the general tax pool. As no tax system is perfect and tends to encourage actions that reduce economic efficiency, economists consider the inefficiency of general tax funding by accounting for the deadweight costs of taxes. Treasury cost-benefit analysis guidelines are

that a 20% additional cost allowance should be made for policies that result in increased general tax liabilities (The Treasury, 2015).

- The availability of illicit tobacco undermines the efficacy of the STA mechanisms in achieving their goals of reducing inequalities in smoking, creating a smokefree youth and supporting cessation.

The development of an illicit market has the potential to quickly become entrenched, transforming from a minor component of the market to a significant segment of the overall market. This growth may mask policy failure as apparent success. The expansion of an illicit market could contribute to the accelerated decline in legitimate cigarette sales, as illustrated in Figure 23. However, it may not necessarily result in smoking levels that are any different from what would have naturally occurred. The key distinction lies in the financial activities of smokers moving underground while the entrenched social and health consequences persist, necessitating ongoing tax funding from sources beyond the tobacco market.

Figure 23: The potential mirage of policy success, cigarette market declines replaced by vaping and illicit tobacco.



By its very nature, the illicit tobacco market is characterised by secrecy and illegality, lead to considerable uncertainty regarding its size and. The official evidence available is based on Customs seizures (as noted in Section 2.4). The Customs 2022 Annual Report indicates an increase in large-scale tobacco seizures since 2018, with a notable shift from manufactured cigarettes to loose tobacco ('New Zealand Customs Service Annual Report 2022', 2022).

Observing the illicit market is analogous to marine biology, where one can only observe what surfaces or is brought to the surface, and is left extrapolating about what else lies beneath. Using this analogy, the Customs Service seizures represent what is visible on the surface, accounting for approximately 0.55% of the legitimate tobacco market in 2022. KPMG, which regularly reports on the size of illicit tobacco markets, estimates that illicit tobacco represented 12.1% of tobacco consumption in 2022.[59] This is generally regarded as a high-end estimate.

In our calculations, we consider the Customs seizure rate as the low-end and the KPMG as the high-end estimate. Our central estimate uses a marine biology rule of thumb, suggesting that for each dolphin seen on the surface there are another seven underwater. Applying this 7:1 rule to the Customs seizure data would suggest illicit products make up approximately 4.5% of tobacco consumption.

[59] KPMG (2023).

Quantification of costs

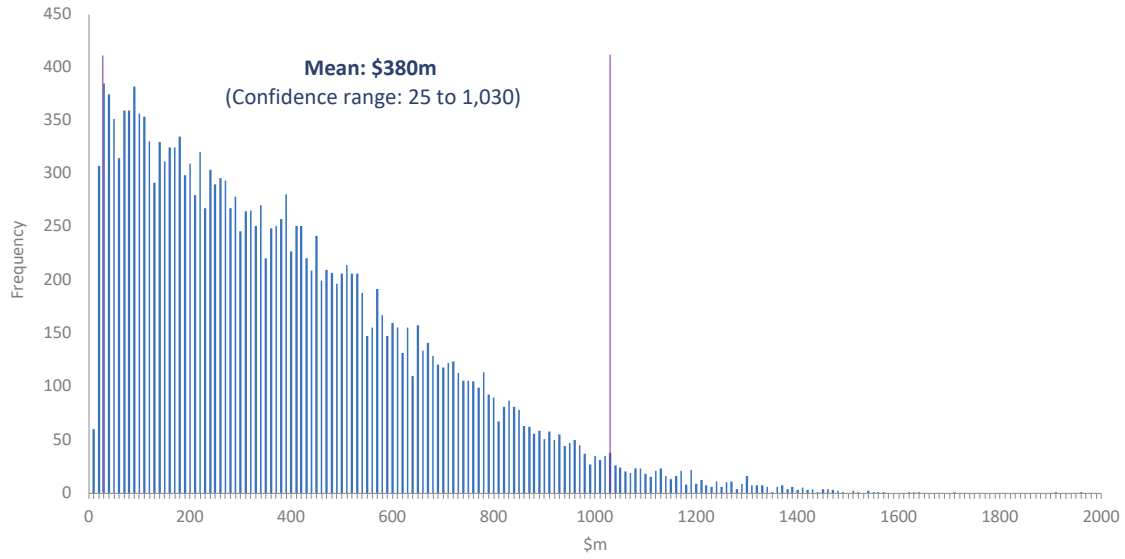
Our cost estimates include the potential costs associated with an expanded illicit tobacco market by calculating the deadweight cost of the foregone excise and GST revenue "lost" due to the expanded illicit market. Of course, the actual excise revenue is not necessarily actually lost, as the expectation is that tobacco excise tax revenue would naturally decrease due to lower smoking rates. However, as mentioned earlier, if the decline in excise tax revenue outpaces the decline in actual smoking rates, it would necessitate higher general tax rates than would have otherwise been required. These higher general tax rates impose deadweight tax costs on society.

Our central estimate suggests that these deadweight costs could have a present value of $380 million over the ten-year period until 2033. Monte Carlo analysis, utilising the assumptions presented in Table 8, indicates a 95% confidence range from $25 million to $1,030 million for these costs.

Table 8: Deadweight cost of tax assumptions

Assumption	Central	Low	High
Size of illicit market by 2028 (million sticks)	210	80	410
Dead weight cost of tax	20%	0%	40%

Figure 24: Distribution of ten-year present value of tax inefficiency costs, $ millions**,** frequency



5.4.3 Increases in the cost of crime

As discussed in Section 2, the tobacco control reforms proposed in the STA are likely to increase the risks of crime, which will result in associated costs for society. The concentration of tobacco retailing has the potential to enhance the incentives for individual store robberies. Furthermore, the introduction of very low nicotine cigarettes as a form of prohibition is likely to stimulate the expansion of illicit tobacco activities. This, in turn, has the potential to criminalise the actions of otherwise law-abiding citizens who may become involved in activities such as importing, growing, distributing, and purchasing tobacco products outside the legal framework.

Historically, increases in criminality have been observed as a common outcome of prohibition policies. Case study 5 below provides an overview of the outcomes of the most notable prohibition policy to date – the US Prohibition. A full description of the case is presented in Annex 5.

Case study 5: The Prohibition, 1920s

- Between 1920 and 1933, the United States implemented a ban on the manufacture, sale and transport of alcohol.
- The aim of the prohibition policy was to reduce crime, alleviate the burden on the prison system, reduce domestic violence; improve public health; and encourage higher household savings and spending on other goods and services.
- The majority of the anticipated benefits of the prohibition were based on the assumption that it would significantly reduce alcohol consumption. However, research finds that:
    - in the short-term, consumption reduced to approximately 30% of pre-prohibition levels; and
    - in subsequent years, as the illicit market grew, consumption returned to levels equal to or approximately 10–20% below pre-prohibition levels.
- The most significant unintended consequence of the prohibition was the emergence of a thriving black market for alcohol that was more organised and well-functioning than anticipated.
- Legal alcohol supply shifted to underground channels, with bootlegging and speakeasies becoming prominent within organised crime networks.
- Asbury (2016) found that organised crime in Chicago tripled during the prohibition era, with criminal organisations and gangs previously engaged in prostitution, gambling, and theft turning to organised bootlegging and operating speakeasies. Furthermore, the number of federal convicts and the federal prison population increased significantly between 1914 and 1932, rising by 561% and 366% respectively.
- Alcohol potency reportedly rose due to a shift from beer to wine and hard liquor as well as a lack of standardisation, regulation and proper practice in the illicit alcohol market. Consequently, the death toll from poisoned liquor rose dramatically, reaching 4,154 nationally in 1925 compared to 1,064 in 1920.
- The prohibition policy incurred significant fiscal cost for the US, through both enforcement costs and lost excise tax. The initial budget for the Bureau of Prohibition, the administrative body overseeing the prohibition, was $4.4 million. By 1933, to cope with the illicit market, the bureau's budget had increased by over 500%. The total enforcement cost over the 13-year prohibition period is estimated at around $300 million.

Full case study available in Annex 5.

As with alcohol, the 'war on drugs' approach to drug enforcement in the 1970s has also demonstrated a positive correlation between prohibition and crime. As presented in Case study 6 below (and in full in Annex 6), the experience with the war on drugs also illustrates the ineffectiveness of command-and-control supply-side policies in a market driven by demand.

Case study 6: The war on drugs, 1970s onwards

- In response to the rising recreational drug use in the US during the 1960s, President Nixon formally launched the 'war on drugs' in 1971.
- War on drugs policies involve aggressively targeting the supply side of drugs through measures such as law enforcement, surveillance, arrests, prosecution of drug offenders, and domestic and international action against drug-trafficking networks.
- The underlying philosophy of the 'war on drugs' approach shares similarities with that of prohibition, as both view drug production and consumption as major contributors to social problems, including crime, domestic violence and negative health outcomes.
- In theory, increased law enforcement efforts and the threat of punishment should raise supplier costs and drive low-margin suppliers out of the market, thereby decreasing drug supply and increasing prices.
- However, this expected outcome has not been observed. Instead, the illicit drug market has become increasingly organised, efficient and adaptable to enforcement measures over time.
- Trends in drug consumption indicate that drug use has actually increased despite the implementation of war on drugs policies, while prices for most drugs have decreased. For example, between 1990 and 2007:
    - the average price of heroin decreased by 81% and purity increased by 60%;
    - the price of cocaine decreased by 80% and purity increased by 60%; and
    - the price of cannabis decreased by 86% and purity increased by 161%.
- As with alcohol, the increasing potency of drugs over time has increased the risk of overdose for users. The US has seen a steep rise in overdose-related deaths, from 2.2 people per 100,000 in 1980 to 12 per 100 by 2008.
- While it is hard to establish a direct correlation between violence and war on drugs policies, there is a growing consensus amongst researchers that the majority of violence in drug markets stems from the institutional context of prohibition rather than drug use itself.
- Prohibition lowers the costs and increases the benefits of using violence by denying suppliers the option to resolve conflicts through legal means and by forcing drug supply into the hands of violent criminal organisations.
- Given that drug consumption has not decreased, health improvements to the general population due to the war on drugs policies have not been evident.
- The US has spent over $1 trillion on drug control efforts since the 1970s. At a federal level, this includes law enforcement, interdiction, international programs and drug treatment and prevention, amounting to an annual cost of approximately $35 billion.

Full case study available in Annex 6

Alongside evidencing a clear link between crime and prohibition policy, both the Prohibition and the war on drugs serve as examples of well-intended policy that have resulted in net costs to society. These prohibitionist policies share several outcomes:

- they created an environment conducive to organised crime's involvement in supplying an illicit market;
- they did not significantly increase prices or decrease consumption, and in the case of the war on drugs, may have contributed to increased consumption;
- they led to an increase in the potency of the prohibited substances;
- they did not improve overall health outcomes; and
- they came at a significant fiscal cost.

Quantification of costs

Although an effective prohibition on cigarettes is expected to lead to an increase in criminality, it is unlikely to reach the same level as the alcohol prohibition in the US during the 1920s (where crime rates are estimated to have increased by 5% to 10% and then rapidly declined upon repeal in 1933) or even the level associated with drugs (where drug crimes in New Zealand consistently account for around 5% of reported crimes). One key difference is that cigarette smoking is far less prevalent than drinking. Currently, approximately 80% of the adult population in New Zealand consume alcohol to some degree, whereas the proportion of smokers is only around 8%, which is roughly one-tenth of the drinking population. As a result, a proportional increase in crime due to tobacco prohibition would be a 1% increase in criminal activity. Our estimates are based on a more conservative central assumption that criminality will increase by 0.5%. To put this into perspective, with a current crime rate of around eight criminal incidents per 100 people each year, a 0.5% increase would increase this rate to 8.04%. Therefore, while the projected increase in crime would have meaningful costs for New Zealand, the assumptions do not indicate a major surge in lawlessness.

Our estimates of the cost of individual crimes are based on current costs in the Treasury CBAx model, which is derived by inflating original estimates from Roper and Thompson (2006) into current prices. The method used by Roper and Thompson includes the following costs of crime (p6):

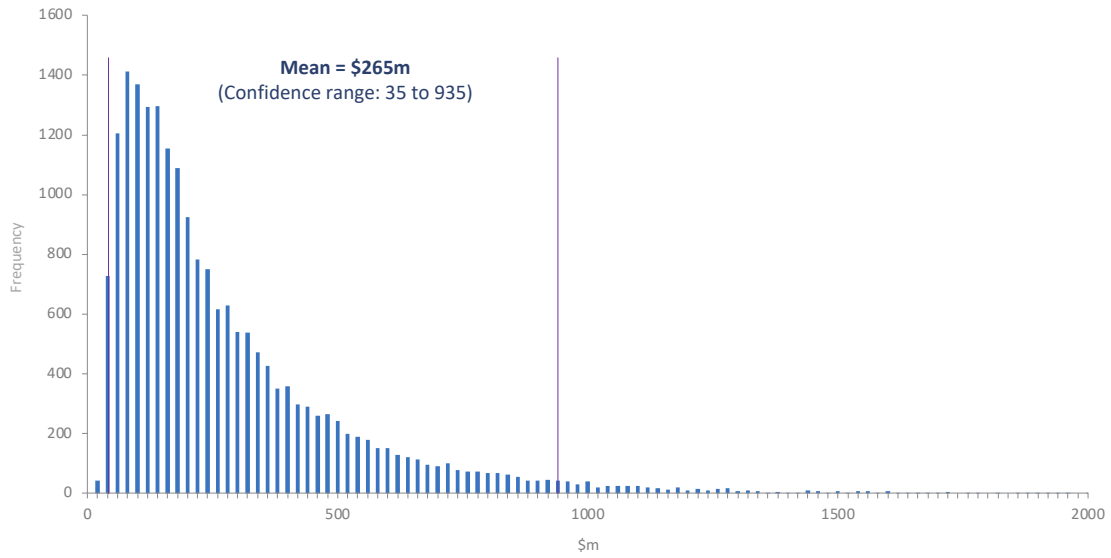
- fiscal costs incurred by public sector agencies directly involved in preventing, detecting, resolving and redressing crime (core justice sector agencies);
- fiscal costs incurred by other public sector agencies as a consequence of crime (such as healthcare costs and benefit fraud); and
- direct economic and social costs borne by the private sector (individuals, households, businesses and institutions) as victims or potential victims. These costs include preventative measures, intangible costs, lost property and the opportunity cost of lost output. We have also included local authorities in this sector.

The central assumption, $15,934 per crime, is based on the average cost of crime across all crimes. The high-end assumption, $67,605, represents the cost of robberies, while the low-end assumption, $6,556, reflects the low-end "other" crime category.

Table 9: Increase in costs of crime input assumptions

Assumption	Central	Low	High
Base crime rate (incidents per population %)	8.0%	7.4%	9.5%
increase in crime rate (% change)	0.5%	0.2%	1.0%
Cost of crime ($ per incident)	$15,934	$6,556	$67,605

Figure 25: Distribution of ten-year present value of social costs of increased crime, $ millions**,** frequency



With expected additions of around $35 million to the annual costs of crime, the central estimate of the present value of increased crime costs in the ten-year period until 2033 is $265 million. Monte Carlo analysis indicates a 95% confidence range, based on the assumptions above, of $35 million to $935 million.

Non-quantified costs

As noted in Roper and Thompson (2006) the costs of crime do not include "the indirect or second-order costs of crime (such as negative impacts on New Zealand's tourism from theft, or on trust and confidence in financial institutions from electronic crime)".

Finally, the implementation of the STA is expected to impose costs on the individuals who continue smoking despite the reform. These costs may manifest in different ways, including health detriments from quitting abruptly (withdrawal symptoms) and stigmatisation.

There is emerging concern amongst some researchers regarding the potential contribution of strict tobacco control policies to the stigmatisation of smokers, which may have adverse effects on their wellbeing, particularly amongst socially disadvantaged populations who are more likely to be smokers. These populations already face an increased risk of stigmatisation due to factors such as poverty and other associated "marks of stigma" including mental illness or belonging to a minority race or ethnicity. Stigmatisation can be construed in terms of perceived experiences of stigma, which may involve:

- encounters in which smokers feel disrespected;
- major incidents of discrimination in areas such as housing or the workplace;
- objective measures of stigmatisation;
- negative attitudes and stereotypes held by non-smokers; and
- internalisation of those negative attitudes by smokers.

It is important to distinguish stigmatisation from denormalisation. While denormalisation aims to portray smoking as a negative behaviour, stigmatisation involves a more visceral form of social control in which

the stigmatised individuals are devalued, subjected to discrimination, and viewed as “blemished” and different from “normals.”[60]

Māori individuals are 3.06 times more likely than non-Māori individuals to be daily smokers and 2.94 times more likely to be current smokers. Consequently, the proposed legislation would have a disproportionate impact on Māori communities.[61] Moreover, this legislation has the potential to unnecessarily stoke the perception amongst Māori that they are being targeted, which further contributes to their existing mistrust of law enforcement. Research indicates that Māori communities experience institutional racism in their daily lives, including perceptions of unwarranted surveillance by the police.[62]

5.5 Summing the cost estimates

In total, the STA initiatives are projected to impose a social cost over the ten-year period from 2024 to 2033, with a present value of $1.3 billion (see Table 10). Monte Carlo risk analysis suggest a 95% confidence range for these estimates from $0.5 billion to $2.6 billion (see Figure 26 below).

Figure 26: Distribution of ten-year present value of total quantified costs, $ millions, 2023

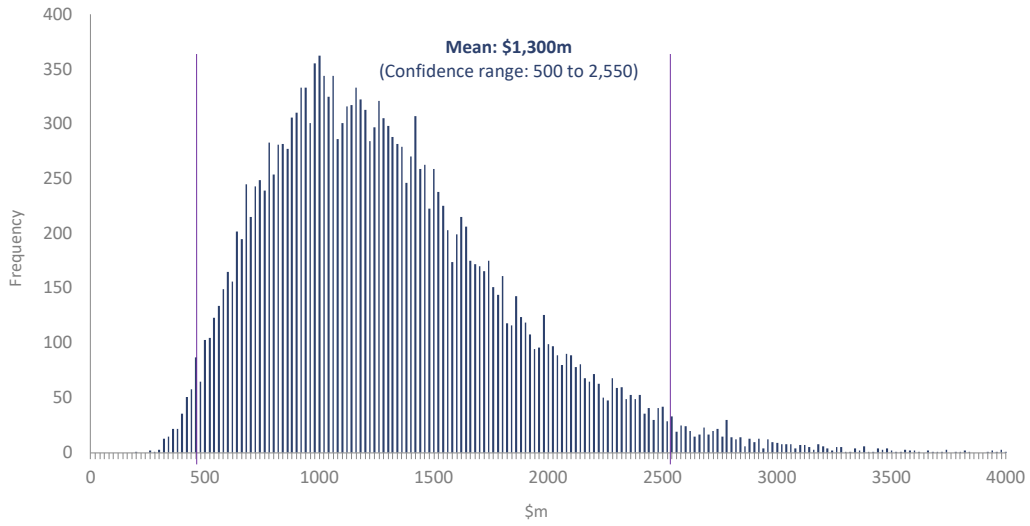


Table 10: Estimates of national costs arising from the STA

Types of costs	Present value
Government	
Administration costs	35
Retail industry	
Application compliance cost	35
Involuntary unemployment	5
Financial stress	35
Society costs	
Increased travel cost	545
Illicit tobacco - cost of crime	265
Illicit tobacco - tax inefficiency	375
Total	**1,295**

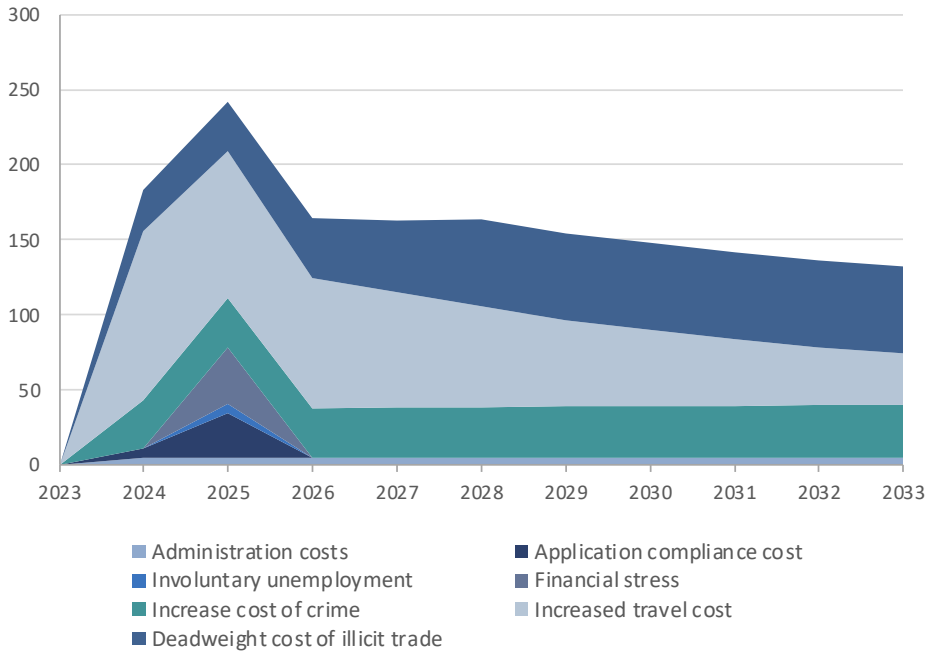
[60] Bayer (2008).

[61] Smokefree.org.nz (2023).

[62] Houkamau et al. (2017).

These totals are presented visually on Figure 26 (the distribution of total quantified costs) and Figure 27 (the composition of the estimated costs over the next ten years).

Figure 27: Contributions to estimated costs of STA, $ millions, 2023 to 2033



In addition, there are likely to be various non-quantifiable costs arising from the STA. These costs include:

- private sector costs related to participating in the legislative process and making submissions during the implementation phase;
- the non-financial wellbeing costs of unemployment;
- the net financial consequences stemming from disruptions to the retail sector;
- the social capital consequences of retail sector disruptions;
- the health costs associated with expected increases in bulk buying of cigarettes;
- indirect impacts that an increase in crime might have on society, such as discouraging tourism; and
- physical and mental health detriments to individuals due to quitting (withdrawal symptoms) and stigmatisation.

The question arises as to whether such costs are justified. It is hard to see how they could be given New Zealand is on track to achieve the national smokefree target by around 2026 anyway (i.e., without the STA). Moreover, there are likely to be other, less costly ways of reducing smoking as is discussed in Section 6 below.

6 Better ways of achieving the government's goals

- A range of policy options, other than supply-side bans, exist to reinforce the downward trend in smoking rates. These options include:
    - targeted policies aimed at specific groups where smoking prevalence remains high;
    - improving access to alternative reduced harm products such as ENDS and snus;
    - implementing earlier screening for smoking-related diseases;
    - offering smoking cessation-support programs; and
    - establishing a dedicated government fund to address legacy health costs.
- Importantly, these policies prioritise promoting personal responsibility and enabling individuals to make informed choices, rather than relying on prohibitionist-based interventions.
- Sweden is an example of a country where permitting reduced-harm products like snus (a smokeless tobacco product placed between the upper lip and gum that is banned in New Zealand) has been associated with lower smoking rates and better smoking-related health outcomes. With the adult smoking rate falling to 5.6%, Sweden is on track to become the first country in world to be defined as 'smokefree'.

6.1 Introduction

Having reviewed the effectiveness and efficiency of the STA, this section of the report considers:

- to what extent the STA is likely to achieve its goals? and
- whether there could be better ways to achieve the government's goals?

6.2 To what extent will the STA achieve its goals?

Based on our analysis of the efficiency and effectiveness of the STA, as well as the case studies of overseas experiences, we can assess the STA's contribution to achieving the Smokefree 2025 goal and the three underlying objectives: eliminating inequities in smoking outcomes, creating a smokefree generation and increasing cessation.

6.2.1 The Smokefree 2025 goal

As noted in Section 2, New Zealand is already making progress towards achieving the Smokefree goal at a population level, with the target expected to be reached by around 2026. This raises questions about the necessity of further government action. However, it is important to note that certain population groups, such as Māori and Pasifika, may face challenges in meeting this goal, regardless of the implementation of the STA.

If the objective is to reduce smoking rates in these specific population groups to below 5%, it is worth considering whether a blanket ban, such as the proposed one in the STA, is the most effective approach. Considering the quantifiable costs associated with the STA, totalling $1.3 billion, and the potential unintended effects like the illicit market growth, it is reasonable to question the optimality of the STA.

In the following discussion, we outline alternative approaches that should be considered to more effectively or efficiently achieve the government's tobacco policy objectives.

6.2.2 Eliminate inequities in smoking rates and smoking-related diseases

There is no simple solution to completely eliminate disparities in smoking rates and smoking-related diseases amongst different population groups. Implementing a broad prohibitionist approach that effectively bans smoking for all groups is likely to be a costly strategy with limited effectiveness, as demonstrated by the fiscal costs associated with prohibitionist policies examined in this report, such as the war on drugs and bans in Bhutan and South Africa. These case studies indicate that blanket bans often result in minimal health improvements due to the availability and promotion of illicit products.

The STA will likely see New Zealand tobacco follows the same track. Given the current state of the illicit market in New Zealand and its potential for growth (similar to Australia), it is likely that the illicit market will partially, or quite possibly, significantly undermine the STA's effect on reduced smoking rates and related diseases.

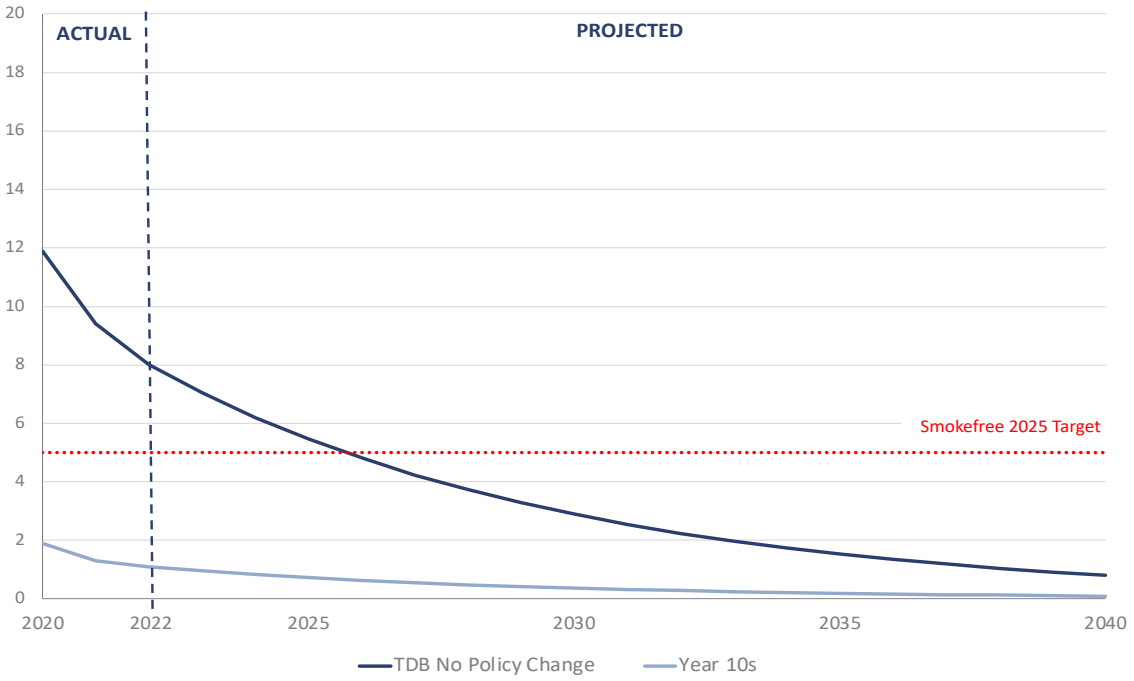
If the illicit market expands in scale and accessibility, there is a risk that the price of illicit tobacco could drop below the current price of legal products, potentially leading to increased rather than decreased consumption. Additionally, other risks associated with the STA include bulk buying leading to increased rather than reduced consumption; the substitution of legal tobacco products with higher-harm alternatives or roll-your-own cigarettes; as well as individuals responding to the reduced nicotine levels by smoking more or inhaling more deeply to obtain the same total amount of nicotine.

6.2.3 Increasing the number of young people who remain smokefree

Evidence from the Ministry of Health's National Health Survey, specifically the Year 10 smoking rates, clearly indicates a significant decline in the number of young people smoking. In 2022, only 1.1% of Year 10 students smoked daily. Moreover, considering the availability of ENDS, this rate is expected to continue to fall regardless of the STA.

Given the extremely low prevalence of new smokers, the age-sales ban, which targets new entrants, may be largely redundant. If anything, there is the possibility of a "forbidden-fruit" effect, as was witnessed during the Prohibition era in the US, whereby smoking may become more attractive to some youth once it is prohibited.

Figure 28: Actual and projected smoking rates for Year 10s and adult population, 2015 to 2040, %



6.2.4 Increasing the number of people who successfully quit smoking

The Ouakrim et al. modelling, as discussed in Section 4.2, reveals several flaws such as extrapolated cessation rates, endogeneity, heterogeneity, and dose-response issues. These flaws suggest that the effectiveness of the supply bans in the STA may be significantly lower than what is indicated by the modelling used to support the STA. A relevant example from Annex 7 illustrates this point, where 93% of smokers in South Africa continued to smoke despite the tobacco ban.

For an addictive product like tobacco, focusing on reducing demand by providing smokers with support and a range of quitting methods to reduce demand is likely to be more effective than solely cutting off the supply. Portugal's drug policy provides a successful case study (refer to Annex 8), where enforcement policies aimed at combatting drug supply and punishing drug consumption were replaced in 2001 with a policy of decriminalisation of all illicit drugs. The Portuguese approach centres around drug prevention and education, harm reduction, and broadening and improving treatment programmes for drug-dependent individuals. It also emphasises activities that assist at-risk groups and current drug users in reintegrating into family, work and society. This policy has resulted in a decline in drug consumption, particularly amongst youth, while generating significantly lower costs compared to enforcement-based alternatives that primarily target the drug supply.

6.3 Potentially better ways

A range of policy options, other than supply-side bans, exist to reinforce the downward trend in smoking rates. These options include targeted policies aimed at specific groups where smoking prevalence remains high, improving access to alternative reduced harm products such as ENDS and snus, implementing earlier screening for smoking-related diseases, offering smoking cessation-support programs, and establishing a dedicated government fund to address legacy health costs. Each of these alternative approaches are discussed in further detail below. Importantly, these policies prioritise promoting personal responsibility and enabling individuals to make informed choices, rather than relying solely on prohibitionist-based interventions.

6.3.1 Targeted policies

In order to effectively address the persistently high smoking rates amongst certain population groups, it is crucial to implement targeted policies tailored to their specific circumstances and needs, rather than implementing blanket measures. Given the higher smoking rates amongst Māori and Pacific Islanders, it would be appropriate to engage in meaningful consultation with these communities and collaborate with them to design targeted solutions. Te Aka Whai Ora, the Māori Health Authority, would have a particular role to play here.

6.3.2 Vaping (ENDS), snus and nicotine pouch accessibility

Greater access to reduced-harm products such as ENDS, nicotine pouches (pouches that contain nicotine and other ingredients but no tobacco) and snus is expected to help reduce the demand for smoked-tobacco products. To maximise their effectiveness, more information about reduced-harm products would need to be supported as well as easier availability of the products, such as by loosening restrictions on the sale of e-liquids and permitting the sale of snus, a low-harm alternative originating from Sweden, of smokeless tobacco placed between the upper lip and gum. As discussed in the box below and in more detail in Annex 9, smoking rates in Sweden are about to fall below 5%; with wide availability of these smoke-free alternative products being a major contributor to Sweden's success in reducing smoking.

Case study 7: Harm reduction in Sweden

- Sweden's success in reducing smoking rates to almost 5% can largely be attributed to the widespread promotion and use of smoke-free alternatives, particularly snus, which has a strong cultural acceptance and a long-standing history in the country.
- Snus is a smokeless tobacco product placed between the upper lip and gum, widely accepted as a viable alternative to smoking and considered less harmful than cigarettes. Around 18.5% of Swedish men and 4.2% of women use snus.
- The decline in smoking rates in Sweden aligns closely with the growth in smoke-free alternatives. Cigarette consumption has significantly decreased from around 500 million packs in the 1970s to approximately 125 million packs in 2019, while snus consumption has grown from around 75 million cans to nearly 325 million cans during the same period. The introduction of nicotine pouches in 2018, along with the increasing use of vaping (from 7% in 2015 to 12% in 2020), has further contributed to the decline in smoking rates in Sweden.
- Embracing smoke-free alternatives has played a pivotal role in positioning Sweden with the lowest rates of smoking-related illness and death in Europe, along with a reduced incidence of cancer compared to other EU countries.
- Sweden has also implemented comprehensive tobacco control measures, including taxes on tobacco products, restrictions on public smoking and a ban on tobacco advertising and sponsorship, mirroring many of the legislations around tobacco in New Zealand.
- The key contrast is the Swedish model combines tobacco control measures with acceptance of a range of smoke-free products as less harmful alternatives, while New Zealand bans the use of snus and nicotine pouches.
- The Swedish government has also financially incentivised a switch to smoke-free alternatives by basing its tobacco taxation strategy on risk level, whereas in New Zealand, all tobacco products are taxed uniformly.
- Public health organisations, such as the WHO and the Royal College of Physicians, recognise the potential of smoke-free alternatives as part of a harm-reduction strategy.

See full case study available in Annex 9.

In cases of severe addiction, there is an argument for providing free or subsidised access to vaping products. The United Kingdom recently introduced a policy where one million smokers are being provided with free vaping starter kits.[63] Nearly one in five smokers in England will receive a vape starter kit, along with behavioural support to help them quit. Local authorities will be invited to take part in the scheme later this year, allowing them to tailor the scheme to their specific needs and determine priority populations. As part of a targeted approach, pregnant women will also be offered financial incentives to help them stop smoking. This will involve offering vouchers, alongside behavioural support, to all pregnant women who smoke by the end of next year.

In contrast to the New Zealand's STA supply-side interventions, the UK Minister said:

> *Now of course some would go further to stop people to start smoking in the first place. The Khan Review last year advocated the New Zealand approach – a full phase out of smoking, with the age of sale increasing over time to cover all adults.*
>
> *This would be a major departure from the policy pursued over recent decades which has emphasised personal responsibility and help for people to quit. And it is the help for current smokers to quit that we want to focus on.*[64]

6.3.3 Screening

Although it may not directly prevent smoking, one approach to reducing the adverse health consequences of smoking is to implement early screening for diseases such as lung cancer, particularly amongst high-risk groups. While this may not significantly impact cessation rates, it can improve the HALY outcomes by detecting and treating diseases at an earlier stage.

6.3.4 Cessation support

In addition to early screening, providing effective cessation-support services is crucial. These services can include community outreach programmes led by ex-smokers, specifically targeting groups with higher smoking rates such as lower income areas, Māori and Pasifika communities. To address any uncertainties regarding their effectiveness, these programmes could be pilot tested in a specific region before nationwide implementation. Multiple programmes could be trialled simultaneously to explore various approaches.

6.3.5 Dedicated fund to cover legacy health costs

Irrespective of the effectiveness of the STA, it is important to acknowledge that there will likely be ongoing costs to society resulting from the legacy of past smoking habits. The health impacts of smoking can take many years to manifest, meaning that even as smoking rates approach zero, the consequences of previous smoking habits will continue to impose costs. While quitting smoking can lead to reasonably rapid reductions in some health risks, it does not eliminate all of them, as certain health risks accumulate over time due to smoking over many years. As a rule of thumb, quitting smoking can reduce health risks by as much as 50% within a year. However, health risks may persist, particularly for those who continued to smoke beyond the age of 30.

The reduction in smoking rates can create a funding challenge for the public sector, as the revenue generated from tobacco excise taxes decreases long before the smoking-related demand for public health services diminishes. This can lead to an intertemporal funding inequity, where future non-smoking taxpayers being burdened with funding health services for smokers who stopped contributing through tobacco excise taxes, potentially many years earlier.

One potential approach to address this issue is to establish a dedicated fund using current and past tobacco excise taxes in preparation of the anticipated future demand for health services related to smoking. By ring-fencing such a fund, it would be possible to allocate resources specifically for

[63] Seddon & Russel (2023), and Department of Health and Social Care & O'Brien (2023).

[64] Department of Health and Social Care & O'Brien (2023).

bespoke services for ex-smokers and reduce the reliance on future general taxes to fund these services. This would also mitigate the associated deadweight cost of taxation.

6.4 Relative efficiency of the above measures

It is beyond the scope of this report to conduct a comprehensive assessment of the costs associated with the above interventions. However, considering the costs of the STA measures outlined in this report, which amount to approximately $1.3 billion, it would be advisable for the government to explore whether allocating resources to the programmes mentioned would be more efficient and cost-effective.

As an indication, the UK's distribution of vaping kits to one million people, as mentioned earlier, is estimated to cost £45 million, equivalent to approximately $90 million New Zealand dollars. With an estimated 387,000 smokers in New Zealand, a similar programme here could cost around $35 million, which is less than 2% of the $1.8 billion revenue generated from tobacco customs and excise duty in calendar year 2022[65] and much smaller than the estimated costs of the STA.

[65] See https://www.treasury.govt.nz/publications/tax-outturn-data/tax-outturn-data-february-2023 .

7 Conclusions

- This report finds the STA is largely if not entirely redundant, with the smokefree target of 5% likely to be achieved by 2026 even without the STA.
- The Act is also highly costly, imposing costs on society of over $1 billion, costs that do not need to be incurred.
- In addition, in some respects, the package may in fact be counterproductive in terms of discouraging smoking, such as:
    - if the growth in the illicit market sees reduced price (tax-free) product being more available;
    - if reduced nicotine levels lead people to smoke more low-nicotine cigarettes to satisfy their desired nicotine levels; or
    - if the reduction in the number of retail outlets encourages people to bulk buy cigarettes.

This report presents an assessment of the cost-effectiveness and efficiency of the STA. The STA was introduced in pursuit of the Government's goal of reducing daily smoking rates to less than 5% across all adult population groups by 2025.[66] The objective of this report is not to question this goal. Rather, our aim is to evaluate the potential effectiveness of the STA in achieving its desired outcomes and to assess the associated costs for New Zealanders.

This report finds the government's projected impacts of the policies on smoking-rate reduction in the RIS to be fundamentally flawed. Major issues including significantly outdated business as usual smoking rates; ill-founded assumptions in interpreting smoking trial data resulting in an over-estimation of cessation rate; failure to consider illicit trade and other inevitable behavioural responses; and overstated health benefits stemming from problems of unobserved heterogeneity, endogeneity and dose-response measurement.

Table 11 below summarises our conclusions on the effectiveness of the three components of the STA: the age-sales ban, the low-nicotine requirement and the reduction in the number of outlets.

Table 11: Summary of effectiveness assessment

Policy	Assessment of effectiveness
Age sales ban	• The availability of vaping has contributed to a steep decline in youth smoking rates, whereby in 2022 only 1.1% of Year 10 students reported smoking daily, while 10.1% reportedly vaping daily. Due to the considerable number of existing smokers compared to the rate of new entrants and exits, consequential changes in the overall prevalence of smoking are expected to be slow. However, the decline in new entrants suggests that the age-sales ban, which targets new entrants, may be largely redundant.

[66] The legislation also seeks to achieve three key outcomes: a) eliminating inequities in smoking rates and smoking-related illnesses; b) increasing the number of children and young people who remain smokefree; and c) increasing the number of people who successfully quit smoking.

	• The residual effectiveness of the age-sales ban is further compromised by the unsubstantiated assumption that, in the future (say 2050) tobacco sellers will indeed differentiate between a person aged 42 and a person aged 41 – a nonsensical situation. The former buying cigarettes for the latter would make them a criminal. Such rules can erode confidence in and respect for the law, and incline people to move more readily into illicit tobacco consumption. • As was visible in Canada when tobacco smuggling boomed in the 1990s as well as Massachusetts which placed a ban on flavoured tobacco in 2019, the illicit market is highly responsive to incentives created by the tax and regulatory environment. Further, when penalties are low and the policies are considered unjust, consumers are strongly inclined to disregard the rule of law.

Lower nicotine	• The RIS overlooks likely behavioural changes from the nicotine reduction policy, including:
	  ○ the incentive for smokers to increase their cigarette consumption or inhale more deeply to obtain the same amount of nicotine; and
	  ○ people may also seek to put nicotine back into the low-nicotine cigarettes, such as through nicotine sprays or soaking tobacco in vape liquid.
	• The quit rates in the modelling are not soundly based on empirical evidence.
	• The effectiveness of lower-nicotine cigarettes will be comprised by any increase in illicit tobacco consumption.

Outlet reduction	• Given the low price elasticity of demand for smoking – estimated by Blakely et al. (2016) to ranges widely from -0.35 to -0.10 for non-Māori, with 20% higher values for Māori – a higher than modelled proportion of smokers are expected to continue purchasing cigarettes regardless of outlet reduction, accepting the higher travel costs.
	• Those located in rural areas who face higher travel costs will have increased incentives to purchase from the illicit tobacco market.
	• Any offsetting behaviour such as bulk buying or purchasing on the black market will impede the effectiveness of outlet reduction.
	• The reduction in the number of outlets can also be expected to have other deleterious effects, notably:
	  ○ adverse impacts on the health and wellbeing of small business owners who are effectively forced to close their businesses; and
	  ○ increased criminal activity, as the remaining legitimate outlets will need to carry larger stocks of tobacco, making them targets for robbery.

Overall, this assessment highlights the weaknesses in the modelling underlying the STA, weaknesses that imply the effectiveness of the package is exaggerated. Moreover, the high uptake of vaping indicates that smoking rates will decline despite the package, rather than because of it. In this sense, the STA is largely if not entirely redundant.

This report also quantifies where possible the many costs imposed by the STA on New Zealander's wellbeing. All costs are considered relative to a counterfactual in which the current decline in smoking rates continue and the adult smoking rate in New Zealand reaches approximately 2% (equivalent to around 100,000 smokers) by around 2033. Costs are investigated within the following three areas, and our estimates are presented in Table 11 below:

1. **Administration costs for Government –** costs associated with designing, monitoring and enforcing these regulations. This specifically includes additional resourcing at the Ministry of Health and Customs to fund increased illicit tobacco enforcement at the border;

2. **Costs to the retail industry** – costs associated with both complying with the STA and adapting to its changes, alongside costs arising from unemployment and financial stress; and

3. **Costs to society –** costs resulting from inefficiencies and unintended consequences arising from the Act including: increase in consumer travel costs; direct impacts of the STA on the costs of crime; and indirect impacts through a less efficient tax system.

Table 11: Estimates of national costs associated with implementing the STA

Types of costs	Present value
Government	
Administration costs	35
Retail industry	
Application compliance cost	35
Involuntary unemployment	5
Financial stress	35
Society costs	
Increased travel cost	545
Illicit tobacco - cost of crime	265
Illicit tobacco - tax inefficiency	375
Total	**1,295**

In total, the STA initiatives are projected to impose a social cost over the ten-year period from 2024 to 2033, with a present value of around $1.3 billion. Monte Carlo risk analysis suggest a 95% confidence range for these estimates from $0.5 billion to $2.6 billion.

Many potential other cost factors have not been able to be quantified. Non-quantified costs likely to arise from the STA are presented in the table below.

Table 12: Assessed non-quantifiable costs of the STA

Non-quantifiable cost	• Private-sector costs related to participating in the legislative process and making submissions during the implementation phase. • The non-financial wellbeing costs of unemployment. • The net financial consequences stemming from disruptions to the retail sector. • The social capital consequences of retail sector disruptions. • The health costs associated with expected increases in bulk buying of cigarettes. • Indirect impacts that an increase in crime might have on society, such as discouraging tourism. • Physical and mental health detriments to individuals due to quitting (withdrawal symptoms) and stigmatisation.

Our analysis indicates that the policies would need to facilitate an extra 800 to 1,000 smokers quitting smoking permanently each year to justify the potential costs outlined above. To achieve this, a total of 10,150 (with low/high estimates: 1,500/39,400) extra smokers would need to have permanently quit smoking by 2033 compared to the projected number without the STA.

New Zealand is already making progress towards achieving the Smokefree 2025 goal at a population level, with the target expected to be reached by around 2026. This raises questions about the necessity of further government action. As presented in Section 6 of this report, a range of policy options, beyond supply-side bans, exist to reinforce the downward trend in smoking rates. These options include:

- **targeted policies** aimed at specific groups where smoking prevalence remains high. Such policies would include meaningful consultation and collaboration with communities in solution design;

- **improving access to alternative reduced harm products** such as ENDS and snus. To maximise their effectiveness, more information about reduced-harm products would need to be supported as well as easier availability of the products, such as by loosening restrictions on the sale of e-liquids and permitting the sale of snus;
- **free or subsidised access to vaping products** in the case of severe addiction, as implemented in recent UK policy.
- **earlier screening** for smoking-related diseases to reducing the adverse health consequences of smoking;
- **offering smoking cessation-support programs**, including community outreach programmes led by ex-smokers, specifically targeting groups with higher smoking rates such as lower income areas; and
- **a dedicated government fund** to cover legacy health costs to address ongoing costs to society resulting from the legacy of past smoking habits.

It is beyond the scope of this report to conduct an assessment of the costs associated with the above interventions. However, considering the costs of the STA measures outlined in this report, which amount to approximately $1.3 billion, it would be advisable for the government to explore whether allocating resources to the programmes mentioned would be more efficient and cost-effective.

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Te Kāwanatanga o Aotearoa
New Zealand Government

VAPING REGULATORY AUTHORITY | TOBACCO REGULATORY AUTHORITY | MANATŪ HAUORA MINISTRY OF HEALTH

Smokefree Environments and Regulated Products Act Key Timeline

Purpose: Provide focus on the new rules coming into force that build upon the existing obligations from SERPA for Smoked Tobacco, Vaping, Herbal Smoking and Smokeless Tobacco Products.

Please refer to the Smokefree Environments and Regulated Products Act 1990 for further details

1 January 2023
SERPA provisions come into force

Retailers of Smoked Tobacco Products must no longer solely rely on statement (given oral or in written form) that a person is over 18 years old

Retailers of Regulated Products must keep accurate records relating to all their regulated products

Retailers of Notifiable Products Retail premises specified in A/P applications must be appropriate

Distributors of Regulated Products must keep accurate records relating to all their regulated products

NZ Manufacturers & Importers of Regulated Products must keep accurate records relating to all their regulated products

Exporters of Regulated Products must keep accurate records relating to all their regulated products

31 January 2023

Specialist Vape Retailers: must have submitted Annual Returns by 31 January 2023 for 2022

NZ Manufacturers & Importers of Notifiable Products must have submitted Annual Reports (if required) and Returns by 31 January 2023 for 2022

July 2023
(after 82A Regulations come into force)

Retailers can apply to be an Approved Smoked Tobacco Retailer

Retailers of Notifiable Products can notify that they sell notifiable products at retail

Distributors of Smoked Tobacco Products can notify that they sell smoked tobacco products at wholesale

Distributors of Notifiable Products can notify that they sell notifiable products at wholesale

1 October 2023
(9 months after Act commences)

Smoked Tobacco Retailers must have submitted application to be an Approved Smoked Tobacco Retailer (if they still wish to sell smoked tobacco products after 30 June 2024)

Retailers of Notified Products must have notified that they sell notifiable products at retail

Distributors of Smoked Tobacco Products must have notified that they sell smoked tobacco products at wholesale

Distributors of Notified Products must have notified that they sell notifiable products at wholesale

NZ Manufacturers & Importers of Notified Products must have notified all herbal smoking products (not just vaping & smokeless tobacco products)

After ASTR assessments are completed

Retailers informed **unsuccessful** in application to be Approved Smoked Tobacco Retailer in relation to specific retail premises

Approved Smoked Tobacco Retailers informed **successful** in application to be an Approved Smoked Tobacco Retailers in relation to specific approved tobacco premises

31 January 2024

Retailers of Notifiable Products must have submitted Annual Returns by 31 January 2024 for 2023

Specialist Vape Retailers: must have submitted Annual Returns by 31 January 2024 for 2023

NZ Manufacturers & Importers of Notifiable Products must have submitted Annual Reports (if required) and Returns by 31 January 2024 for 2023

1 July 2024
(18 months after Act commences)

Consumers Legal smoked tobacco products only available from Approved Smoked Tobacco Retailers

Retailers must not sell smoked tobacco products if not an Approved Smoked Tobacco Retailer

Approved Smoked Tobacco Retailers can sell smoked tobacco products

Distributors of Smoked Tobacco Products should only sell smoked tobacco products in NZ to ASTR or registered distributors

NZ Manufacturers & Importers can apply via Customs for new CCA Licence /Import Permit customer number to manufacture or import smoked tobacco products

1 November 2024
(22 months after Act commences)

NZ Manufacturers & Importers must have new Customs CCA Licence/ Import Permit to manufacture or import smoked tobacco products

NZ Manufacturers & Importers can submit application for smoked tobacco product approval (after 81(1)(20) Regs come into force)

1 April 2025
(27 months after Act commences)

Approved Smoked Tobacco Retailers must only sell approved smoked tobacco products

Distributors of Smoked Tobacco Products must only sell approved smoked tobacco products

NZ Manufacturers & Importers must only manufacturer/ import approved smoked tobacco products

31 January 2026

Approved Smoked Tobacco Retailers must have submitted Annual Reports and Returns for 2025 by 31 January 2026

1 January 2027

Consumers cannot legally be sold smoked tobacco products if born on or after 1 January 2009

Approved Smoked Tobacco Retailers must not sell products to anyone born on or after 1 January 2009

Notifiable Products: vaping, herbal smoking and smokeless tobacco products

Regulated Products: smoked tobacco, vaping, herbal smoking and smokeless tobacco products

March 2023 | HP8658

Annex 1: STA timeline

Annex 2: Regulatory Impact Statement review

Appraisal of the Regulatory Impact Statement for the Smokefree Aotearoa Action Plan

The Smokefree Aotearoa Action Plan consists of a package of interventions to achieve a 5% daily smoking rate across the population by 2025. The package includes:

- a markedly lower nicotine content in cigarettes;
- a ban on selling or supplying tobacco to anyone born after 1 January 2009; and
- reducing the number of retail outlets that can sell tobacco by over 90% to about 600.

Here we review the RIS for the package.

Base-year data

The RIS was written in November 2021 based on data that in most cases does not extend beyond 2020. With regard to smoking rates much has changed since then, as summarised in Table 13 below.

Table 13: historical and projected daily smoking rates, 2006/07 to 2025, %

	2006/07	2019/20	2020/21	2021/22	2025 BAU	2025 package
European & Other	17.0	10.1	8.3	7	8.0	?
Maori	39.2	28.7	22.3	20	20.0	?
Pacific	25	18	16	18	12	?
Youth 18-24	25.0	12.9	8.1	8		
Youth 15-17	14	3	1			
Year 10 students			1.3			
All Adults	18	12	9	8	?	?
Maori women		37.3	25.8			5.6

Source: Regulatory Impact Statement

The decline over 2019/20 to 2021/22 for the European and Other ethnic group unambiguously shows that the BAU 2025 projection (8.0%) as used in the modelling for the RIS, has already been overtaken. Indeed the trend implies that a prevalence rate of around 5% by 2026 under BAU is entirely plausible.

The rate of smoking amongst Māori also shows a sharp decline to 2021/22, just dipping below the projected BAU for 2025, although a fall to 5% by 2025 seems unlikely.

The rate of decline for Pasifika peoples is less pronounced and somewhat unstable, which does at least suggest that one-size-fits-all interventions could be very inefficient.

More significantly, if even the BAU projections are wrong, what faith can one have in the projected effects of a complex policy package? The exaggeration of projected smoking rates in the BAU means that the estimated benefits of the full package (580,000 HALYs for example – para 97) are too high, even if the policy modelling is faultless. Hence fewer or less stringent measures (or more targeted measures) would be required to the achieve the 5% smokefree objective. Indeed even without the problem with the BAU, there are other issues of concern as discussed below.

Lack of empirical evidence

The RIS is clear that most of the measures in the package have not been widely implemented internationally and some measures have not been implemented anywhere. Hence, as the RIS states, there is significant uncertainty in the outcomes. Not only is the BAU projection suspect, the incremental effect of the package is also in doubt.

Dubious modelling

Modelling of the package is partly based on a misapplication of a randomised control experiment. As noted by Bates et al. (2022), deficiencies of the modelling include:

- serious selection bias in the sample – being people who wanted to quit smoking, and assuming the results apply to all smokers including those who do not wish to quit;
- applying the gross quit rate from the whole sample instead of applying the difference in quit rates between those who were offered low nicotine products and those who were not;
- the low nicotine products were provided at no cost, as was behavioural support; and
- extrapolation of results derived over a six-month period to many years.

The model's quit rates are largely assumed from elicitation of experts' opinions.

Specific points

P2. Para 1. Stated that: "Given the harms caused by tobacco, regulation of its supply is appropriate." This is a non sequitur.

Para 5. While presenting a collection of correlations is all very well, it may give the reader the mistaken impression that reducing smoking rates amongst Māori would improve a range of socio-economic outcomes. Causation has not been established. Indeed, as discussed in Section 4, it is likely there are innate differences between smokers and non-smokers that lead to over-estimation of the health benefits of quitting.

Para 8-9. Inequities are more suggestive of targeted measures than blunt measures such as those in the package, which for some groups seem to be unnecessary to meet the 5% target. Contending (as in para 15) that population-based measures are preferable on equity grounds completely ignores efficiency. It may be the case that equity considerations outweigh efficiency, but this has not been demonstrated. That "regulatory intervention is therefore an appropriate response" is again a non sequitur.

There does seem to be some recognition of a role for targeting in para 119-126. One would expect the insights expressed there to be incorporated into the modelling.

Para 16. The availability of vaping is recognised but given little further attention. Given its dramatic effect on youth smoking rates (explored in Section 2.5) this is a serious shortcoming of the analysis.

Para 23, 32. The RIS ignores enforcement and compliance costs – again a serious shortcoming, as discussed in Section 5. In this connection one wonders what has been withheld in para 114-116?

Para 34. As noted above the modelled 550,000 HALYs from mandating low nicotine is likely an over-estimation.[67] In addition it is worth noting that nicotine is in the tobacco, so a new kind of tobacco plant may be required to substantially lessen its nicotine content. To our knowledge no such development is imminent. Thus, even if lower nicotine in cigarettes is an effective way to improve the health of smokers – which is not clear – the main component of the Smokefree package may not be realisable for some years.

Para 62. Even with the defects identified above, the modelled impact of the age-sales ban (no supply to anyone born after 1 January 2009) has only a modest impact (largely due to the stock-flow effect), so how strong is the benefit-cost equation for its inclusion?

Para 67. There is no recognition that increasing time and travel costs (as a result of the reduced number of outlets) generates a welfare loss to those concerned, let alone any quantification of that loss. That this intervention is likely to increase inequity is tacitly acknowledged in para 92 (and more openly on p30). This is rather incongruous given the concerns raised elsewhere about mitigating inequity.

Para 85. The estimated HALY benefit from the outlet restriction is 80,200 according to the modelling. As with the age-sales ban, is this intervention really net beneficial?

Summary

Overall, the questionable modelling of the effects of the package relative to a BAU, the outdated BAU to which the modelling is applied, an underestimate of the cost of enforcement and compliance, an underestimate of the costs of supporting the cessation programme if it is to be effective, a disregard of the social costs of the black market that is likely to develop and the lack of empirical evidence on the performance of the proposed interventions in other jurisdictions, undermine the estimated net benefits to such an extent that one can have little confidence in either the effectiveness or the efficiency of the package. We elaborate on both matters in other sections of the report.

If the effects of the age-sales ban and the outlet restriction measures are expected to be minor (and probably overstated and probably not cost efficient) and the main measure – low nicotine – may not be possible to implement within the desired time frame, one might reasonably expect a Ministry or Treasury to request a new analysis of a new package.

In MoH (2016, p10)[68] it is stated that if all smoking ceased in 2011 the total gain in QALYs would be 1,625,000 undiscounted and 464,700 discounted at 3% per annum. Yet in the RIS the effects of the Smokefree package – which does not lead to a total cessation of smoking – delivers a gain of 580,000 HALYs, discounted at 3% per annum.

Is this consistent? One might claim that a HALY is different from a QALY. The RIS does not define a HALY, nor do the supporting documents that we have seen, but Gold et al. (2002)[69] define it as a general term that covers QALYs and DALYs.[70] In an unrelated paper written by some of the same

[67] HALY, or Health-Adjusted Life Years, is a measure of disease burden combining both the quantity and quality of life lived with a health condition. Unlike QALYs, which use a preference-based approach to value health states, HALYs use a person-centred approach that takes into account the individual's own evaluation of their health status. HALYs are similar to DALYs in that they take into account both mortality and morbidity, but they differ in the way they incorporate the individual's subjective perception of their health.

[68] Appendix: Background Information New Zealand's Tobacco Control Programme. Ministry of Health 2016.

[69] Gold, M. R., Stevenson, D., & Fryback, D. G. (2002). HALYS and QALYS and DALYS, Oh My: similarities and differences in summary measures of population Health. *Annual review of public health*, *23*(1), 115-134.

[70] Health-adjusted life years, quality-adjusted life years and disability-adjusted life years.

authors who did the modelling for the RIS, Blakely et al. (2014)[71] use the terms HALY and QALY (actually $QALY^{DW}$ to denote disability weights) interchangeably. So presumably a HALY in the RIS is the same as a QALY in the 2011 paper. A more detailed explanation would be useful.

One might contend that the New Zealand population in 2011 was only about 4.4m compared to 5.1m in 2022, so an increase of 16%. There might also be a second order effect for increasing life expectancy, but not enough to account for the 25% increase from 464,700 to 580,000, even without considering that the latter is based on a less ambitious non-smoking scenario.

[71] Blakely, T., Kvizhinadze, G., Karvonen, T., Pearson, A. L., Smith, M., & Wilson, N. (2014). Cost-effectiveness and equity impacts of three HPV vaccination programmes for school-aged girls in New Zealand. *Vaccine*, *32*(22), 2645-2656, tables 3-4. https://www.otago.ac.nz/wellington/otago067498.pdf .

Annex 3: The economic theory behind Government intervention in the tobacco market

Governments around the world have intervened in the tobacco market for centuries. The initial reason for this was revenue. Because tobacco demand is relatively insensitive to changes in price (a low price elasticity of demand), taxing tobacco has been a relatively efficient way (in terms of economic distortion) for governments to raise revenue, especially if opportunities to avoid the tax are difficult or expensive.

Most developed countries now have comprehensive taxation systems, such that the fiscal need to tax tobacco is not what it was, albeit that governments are reluctant to part with the revenue. The main rationale for continuing with tobacco taxation is that it compensates the state for the costs imposed on it – notably on the health system – by smokers. However, in New Zealand the Treasury estimated in 2012 that revenue from the excise tax likely more than offset the costs of health care incurred by smokers.[72]

In a recent wide-ranging and comprehensive review of the economics of tobacco regulations DeCicca et al. (2022)[73] also find that in the USA the tax on tobacco is generally well above what is needed to offset the health costs from smoking. Indeed, DeCicca et al. note that the overall fiscal effect of smoking is not necessarily net negative as the shorter life expectancy of smokers can generate considerable savings in public pension payments.

The wider argument is that smoking creates externalities and internalities (defined below), justifying not only taxation, but a range of other interventions aimed at reducing tobacco consumption.

Externalities and internalities

Externalities: a cost imposed on another party that is not offset by compensation. In the case of smoking, exposure to smoke from someone else smoking (second-hand smoke – SHS) and fiscal costs are the main examples.

Internalities: imposing a cost on oneself which is not compatible with maximising life-time utility – a time-inconsistency problem whereby short-term benefits are inconsistent with long-term benefits.

DeCicca et al. ascertain that non-fiscal externalities associated with smoking are not large. Although there is usually a benefit to not being exposed to someone else's smoke at public venues such as restaurants, smokers may smoke more at other locations. In confined spaces such in cars or at home that would merely expose a different set people to more second-hand smoke. Thus, the net health effect of place-based smoking bans is possibly quite small.

By contrast, internalities may be more important. The issue of time-inconsistency is complicated by the neurology of nicotine addiction such that the oft heard 'if only I'd acted differently when I was younger' is more profound than simply being the result of people having a high discount rate – not placing much weight on their future wellbeing. Does that justify policy intervention?

[72] https://www.treasury.govt.nz/sites/default/files/2012-06/b12-2321488.pdf .

[73] DeCicca, P., Kenkel, D. and Lovenheim, M.F., 2022. The economics of tobacco regulation: a comprehensive review. *Journal of Economic Literature*, *60*(3), pp.883-970.

The literature[74] discusses the concept of rational addiction in the sense that one knows full well the long-term health consequences of smoking, in which case the case for intervention is flimsy. However, if addiction changes the mix of chemicals such as dopamine in the brain (analogous to drugs such as opioids) the concept of rationality is rather dubious.

To further complicate matters, withdrawal costs should also be considered. That is, interventions that lead people to quit smoking might benefit those people in the long run, but there is a shorter-term disbenefit in the form of unpleasant (or worse) withdrawal symptoms, an erosion of self-worth and a sense of guilt associated with failed attempt to quit (which are far more common than successful attempts).

The consensus view seems to be that negative internalities provide some basis for interventions targeted at reducing smoking. It is beyond the ambit of this report to determine the extent to which tobacco taxation matches the internalities and externalities of tobacco consumption. We are interested, however, in the effectiveness and efficiency (refer Sections 4 and 5) of the initiatives in the STA.

[74] See for example Becker, G. S., & Murphy, K. M. (1988).

Annex 4: The black market in tobacco in Australia

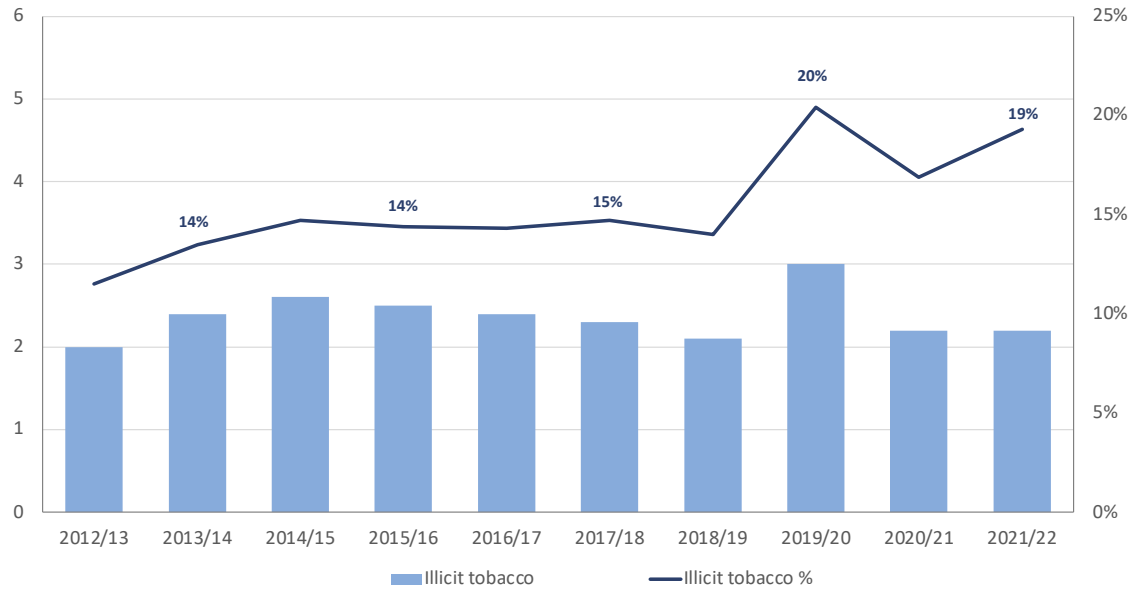
Introduction

Australia's market for illicit tobacco is highly organised and growing as a share of total tobacco consumption. In 2021, one in five cigarettes (2.2 million kg of tobacco) consumed in Australia were estimated to be illicit, up from one in 12 in 2007.[75] By way of comparison, estimates of illicit tobacco in New Zealand indicate around one in ten cigarettes consumed are currently illicit – indicating the illicit market in New Zealand at present could be comparable to Australia's around a decade ago.

Like New Zealand, Australia followed the WHO 2005 Framework Convention on Tobacco Control (FCTC), introducing plain packaging, restricting the availability of tobacco products and using price-based incentives to significantly lower the affordability of tobacco. Subject to a series of tax hikes, tobacco prices in Australia are now the highest in the Asia Pacific, with, for example, a 2021 price of $38.60 AUD for a 20 pack of Marlboro.[76,77.] While these policies have contributed to a decline in smoking rates, they have also significantly increased incentives for users to seek untaxed illicit tobacco and for organised crime groups to supply this market.

As noted above, in 2021, an estimated 2.2 million kg of illicit tobacco was consumed in Australia, accounting for around 19% of total tobacco consumption. Figure 29 below illustrates the estimated trends in the illicit tobacco market in Australia, measured in million kg of cigarettes consumed and as a percentage of total tobacco consumption.

Figure 29: Illicit tobacco consumption, 2012 to 2021, million kg (left axis), as a % of total tobacco consumption (right axis)



Source: KPMG, 2022.

[75] KPMG (2022) *op. cit*.

[76] Ibid.

[77] New Zealand ranks second highest at $35.10 AUD per pack.

Despite the increasing resources targeted at combatting the trade (discussed below), Figure 29 indicates a persistent and sizable illicit market. In terms of total kg consumed (blue bars), Figure 29 illustrates a generally stable trend over the past ten years, rising moderately from two million kg of tobacco consumed in 2012 to 2.2 million kg in 2021. The peak of 2.6 million kg in 2014 came directly after staged excise tax rises were introduced in December 2013,[78] while the 2019 peak reportedly relates to the cumulative effect of decreasing tobacco affordability and a rise in popularity of illegal homegrown tobacco. With total tobacco consumption falling over the period, illicit cigarettes have roughly doubled as a percentage of total consumption, with excise tax hikes and other measures contributing to reducing legitimate cigarette consumption over time.

Characteristics of the black market

There are two general types of illicit tobacco products available on the Australian market: loose tobacco (commonly known as chop chop) and pre-rolled cigarettes (including counterfeit, contraband tobacco and illicit whites). Loose tobacco products are either grown in Australia illegally or are grown abroad and smuggled into Australia. Unlike New Zealand, no tobacco is allowed to be grown in Australia, making all domestically grown tobacco illicit.

Illicit tobacco is reported to be widely accessible nationwide. According to investigations by the Department of Home Affairs, around 30% of illicit sales are through traditional tobacconists and tobacco retailers, who sell both duty-paid tobacco above counter and illicit tobacco below. These illicit products are reportedly usually concealed under the counter or in a paper bag, whereby retailers make a conscious choice to purchase and stock illicit tobacco and consumers make a similarly conscious choice to purchase illicit tobacco at a lower price than its legal counterpart. [79]

Other sources state that illicit tobacco is often sold in ‘pop-up gift stores’ and from carparks and markets, with common offenders tending to be standalone stores not associated with legal tobacco franchising. Online sales are also prevalent, generally through social media platforms such as Facebook, Discord and the Chinese platform WeChat.

Origins of illicit tobacco

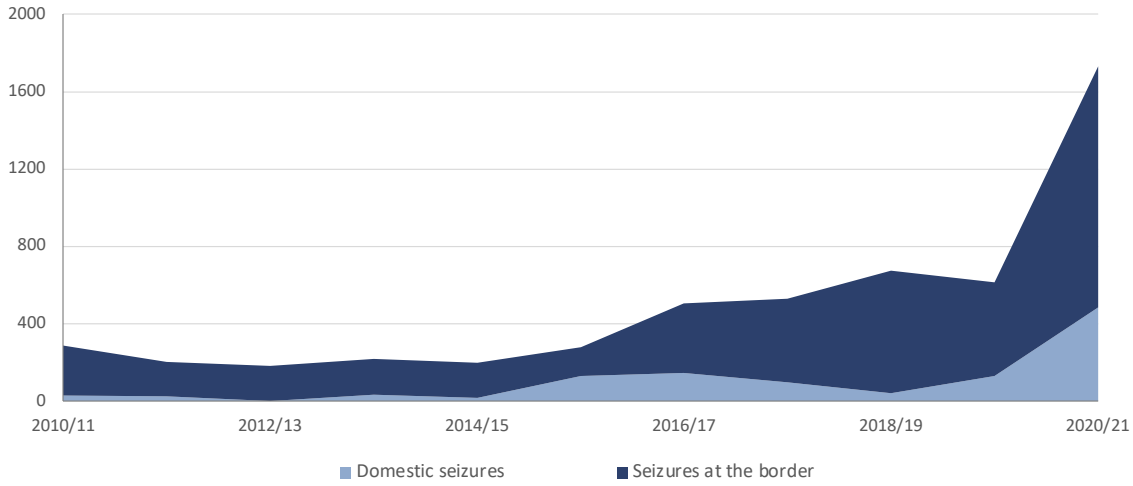
As noted above, home-grown tobacco makes up a portion of the illicit market in Australia, with the rest smuggled across the border. Figure 30 below presents trends in seizures of domestically grown tobacco and seizures at the border over the last ten years.[80]

[78] https://www1.health.gov.au/internet/publications/publishing.nsf/Content/tobacco-control-toc~excise#:~:text=The%20Government%20began%20implementing%20staged,%2C%202015%2C%202016%20and%202017.

[79] Parliamentary Joint Committee on Law Enforcement (2020).

[80] It should however be noted that seizure data cannot be used as a proxy for the size of an illicit market, as seizures in any given year are also a factor of a) enforcement resourcing and b) to some extent luck. Regardless, an increasing trend in seizures indicates a persistent and sizable market that enforcement is only mitigating to some degree.

Figure 30: Tobacco seizures, 2007/8 to 2018/9, tonnes



Source: ATO, Submission 177, p. 5, KPMG (2022).

Figure 30 above not only gives an indication of the relative size of domestic and border seizures but also highlights a dramatic growth trend in illicit tobacco seizures, particularly within the last five years. 2020/21 saw 1,248 tonnes of tobacco seized at the border, alongside 109 tonnes domestically, the highest seizure amounts to date.

According to the Australian Criminal Intelligence Commission (ACIC), almost all illicit tobacco entering Australia comes from Asia and the Middle East. The major source countries are China and the United Arab Emirates, with some tobacco also coming from Indonesia, Malaysia, Singapore and the Philippines. The majority of illicit tobacco enters Australia via sea cargo routes, although in recent years there has been a notable increase in tobacco consignments landing onshore through passenger, air cargo and international mail streams.[81]

There are reportedly three general types of traders in the illicit tobacco market:

- organised criminal groups that use established smuggling mechanisms to trade in a range of illicit commodities;
- commercial enterprises that engage specifically in the import and trade of illicit tobacco; and
- opportunists who smuggle tobacco primarily for personal use.

Organised crime

The ACIC reported that 'serious and organised crime remains entrenched in the illicit tobacco market, both through the illegal importation…and through the local production'.[82] These networks tend to operate similarly to those involved in the importation of other contraband such as narcotics, and often can be one in the same. Organised criminals in this market:

- access a global network of tobacco-smuggling facilitators who can arrange and tailor the placement of commercial quantities of tobacco to accommodate various smuggling methods, including free-trade zones;

[81] Australian Criminal Intelligence Commission (2016).

[82] https://www.acic.gov.au/sites/default/files/2020-08/oca_2017_230817_1830.pdf .

- actively seek to infiltrate and exploit members of the international supply chain, including customs brokers and freight forwarders in Australia; and
- engage in bribery and public-sector corruption.

According to the Customs and Industry Policy Division of the former DIBP, trade in illicit tobacco is viewed by criminals as a low-risk, high reward activity with serious criminal implications. There are clear links between tobacco smuggling and smuggling of other commodities. Trade in tobacco or illicit tobacco is used to launder money and tobacco smuggling funds more serious criminal activity.[83]

Organised criminal groups linked to Asia and the Middle East are the primary facilitators of the illicit tobacco trade in Australia. Outlaw motorcycle gangs also play a role in the market, though it is uncommon for the primary focus of these groups to be tobacco importation.[84]

The economics behind the trade

Illicit tobacco is widely considered by criminal organisations as a low-risk, high-return product. According to the ACIC, organised criminals can make substantial profits on just one container of cigarettes. This means that they can still make a profit if only one out of 30 containers get through Customs.[85] While the profits are not as much as illicit drugs, the penalties are a lot less and the risk-reward payoff is a lot more favourable to organised crime groups. The risk-reward payoff, alongside a common "it's just tobacco" lesser-evilism attitude amongst suppliers and an increasingly expensive legal market highly incentivises participation in the market.

Likewise, relative affordability of illicit tobacco provides high incentives for consumers. At current street prices, consumers can reportedly save $1000 AUD on a 1kg purchase of loose tobacco from an illicit vendor.[86]

Enforcement agencies

A variety of government agencies are involved in combatting the illicit tobacco market in Australia:

The Department of Health has lead policy responsibility for health-related aspects of tobacco control, including implementation of the FCTC. Operationally, the Department of Health does not directly regulate or undertake compliance activities relating to illicit tobacco.

The Australian Tax Office (ATO) is responsible for detecting and seizing tobacco illegally grown in Australia. As a member of the multi-agency Illicit Tobacco Taskforce, the ATO's role is to:

- support the removal of wealth from crime syndicates, including through tax audit and civil debt recovery;
- execute warrant powers on Illicit Tobacco Taskforce-endorsed operations in respect to organised crime syndicates' domestic crops, plant and machinery; and
- collect, analyse and disseminate illicit tobacco intelligence.

The Department of Home Affairs leads operational and regulatory initiatives to tackle the illicit tobacco trade, in partnership with ATO. Within Home Affairs, the **Australian Border Force (ABF)** has

[83] APO (2020).

[84] Mr Ian McCartney, Assistant Commissioner, Australian Federal Police, Committee Hansard, 23 November 2016, p. 11.

[85] https://www.acic.gov.au/media-centre/media-releases-and-statements/media-statement-illicit-tobacco .

[86] Imperial (2023).

primary responsibility for law enforcement efforts to tackle illicit tobacco at the border. The ABF leads the multi-agency Illicit Tobacco Taskforce (discussed below).

Australian Competition and Consumer Commission (ACCC) is responsible for enforcing three product safety-related tobacco regulations including tobacco health warnings, reduced fire risk cigarettes and the ban on smokeless tobacco products.

The Illicit Tobacco Task Force

In 2015, the Australian Border Force (ABF) made its largest ever seizure of illicit tobacco in a single operation, intercepting 71 tonnes of loose tobacco with a retail value of $90 million and a street value of $40 million. Signalling the size of the illicit tobacco problem and the extent of criminal organisation involved, the Australian government responded by setting up the ABF Tobacco Strike Team. The goal of the Tobacco Strike Team was collecting intelligence on and disrupting tobacco-related organised crime activities. [87]

Between 2015 and 2018, the Tobacco Strike Team seized almost 109 tonnes of smuggled tobacco and almost 248 million smuggled cigarettes, equivalent to $246 million in duty evaded.

In 2018 the Turnbull Government introduced new legislation and a wider framework to protect tobacco duty and allocate further resources to combat illegal domestic tobacco. [88] The Treasury Laws Amendment (Illicit Tobacco Offences) Act, 2018 was introduced, increasing penalties for illicit tobacco manufacturers or producers, now to face up to ten years imprisonment and heavy fines if caught.

The ABF Tobacco Strike Team was replaced by the Illicit Tobacco Taskforce (ITTF) in July 2018. While the Tobacco Strike Team was limited to operating within the border force, the multi-agency ITTF was established with broader powers to investigate and dismantle serious organised crime groups involved in illicit tobacco. The ITTF brings together the powers and expertise of various government organisations, including the ABF, the ACIC and the ATO, to enable collaborative efforts in protecting the border and excise revenue. It also enhances understanding of all aspects of the illicit tobacco market, including overseas sourcing, importation, distribution, manufacturing and domestic cultivation operations. Since its establishment, the ITTF has seized and destroyed around 264 tonnes of illicit tobacco (540 million cigarettes).

[87] https://parlinfo.aph.gov.au/parlInfo/search/display/display.w3p;query=Id%3A%22media%2Fpressrel%2F4137042%22;src1=sm1 .

[88] https://ministers.treasury.gov.au/ministers/kelly-odwyer-2016/media-releases/new-illicit-tobacco-taskforce-and-tobacco-duty-measures .

Annex 5: The Prohibition, 1920s

Policy overview

Between 1920 and 1933, the United States banned the manufacture, sale and transport of alcohol, a period sometimes referred to as the "noble experiment". This policy emerged during the temperance movement, [89] driven primarily by moral and religious concerns and the belief that alcohol was the root cause of major social problems of the time.[90] Through prohibiting alcohol, the policy sought to: reduce crime and subsequently the tax burden of prisoners; reduce domestic violence; improve public health; and increase household savings and spending on other goods and services.

The prohibition policy was ratified under the 18th amendment of the US constitution in 1919, receiving the necessary support of three-quarters of US states. Later that year Congress put forth the National Prohibition Act (commonly referred to as the Volstead Act), which provided guidelines for federal enforcement of the legislation. Enforcement was initially assigned to the Internal Revenue Service (IRS) and was later transferred to the Justice Department and the Bureau of Prohibition.

Effectiveness

Direct impacts on consumption

The majority of the proposed benefits of the prohibition were based on the assumption that it would significantly decrease alcohol consumption. However, over the 13-year Prohibition period, the supply of alcohol instead moved from legal establishments to the underground. Illicit markets for bootlegging (the illegal production and sale of liquor) and speakeasies (illegal, secretive drinking establishments) thrived, both of which were largely capitalised on by organised crime.[91] As discussed below, by creating a new form of criminal activity, the Prohibition likely increased rather than decreased crime.

While official data was not collected, several studies have used proxies to estimate actual alcohol consumption during the prohibition. Miron & Zweibel (1991) estimate the consumption of alcohol during the prohibition using: the death rate from cirrhosis of the liver; the death rate from alcoholism; the number of patients per capita admitted to hospitals with alcohol psychosis; and the rate of drunkenness arrests. The study finds consumption dropped by around 70% immediately after the law began, however as the illicit market developed, rose in the following years to 60 to 70% of the pre-Prohibition rate.

Dills and Miron (2004) similarly found that the prohibition reduced drinking by only around 10 to 20% (as proxied by cirrhosis death rates), while Dills, Jacobson and Miron (2004) found that prohibition had a substantial short-term effect but roughly no effect on high-risk alcohol consumption, as measured by drunkenness arrests.

Similarly, Miron (1999) uses the death rate from cirrhosis (the proxy considered to be most fit-for-purpose for the efficacy of the prohibition) while controlling for other factors that may have impacted on alcohol consumption. The study concludes that after an initial period of decreased supply, the prohibition had virtually no impact on alcohol consumption in the medium-run – i.e., the quantity (and

[89] A social movement promoting temperance or complete abstinence from consumption of alcoholic beverages. For more on the background to this era, see: https://ohiohistorycentral.org/w/index.php?title=Temperance_Movement .

[90] Encyclopaedia Britannica (2022).

[91] Other options for consumers reportedly included obtaining liquor from licensed pharmacists for medicinal purposes or clergy for religious reasons.

potentially price) in the illegal market recovered to virtually the same equilibrium as in the pre-existing legal market.[92] Miron proposes the following three possible explanations for this effect:

- inelasticity of demand for alcohol (meaning consumers' buying habits remain relatively constant regardless of shifts in the supply curve);
- the creation of a potential forbidden-fruit effect[93], thereby increasing demand for alcohol;[94] and
- low marginal costs for black-market suppliers resulted in either no change to alcohol prices in the medium-run (or even a reduction in prices).

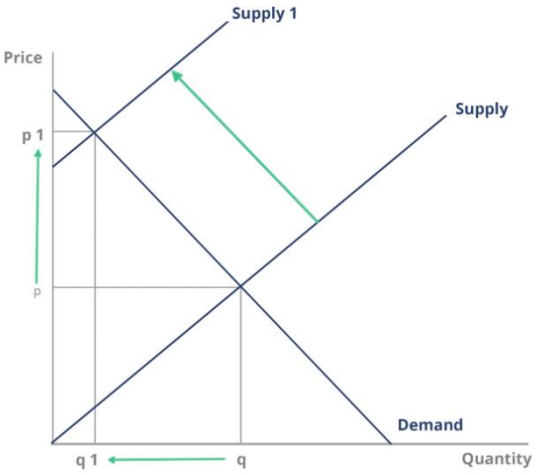
While early studies find the prohibition inflated alcohol prices[95] (by imposing additional costs of evading authorities on suppliers), Miron (1999) discusses the probability that illicit suppliers faced lower marginal costs than their predecessors. This is because black-market operators tend to avoid excise, income taxes, child labour laws, environmental regulations, union labour laws and occupational health and safety regulation, amongst other costs. If savings on these costs exceeded the cost of evading the law, lower marginal costs of supply could translate into lower alcohol prices in the illicit market.

Unintended consequences

Growth in organised crime and the illicit market

The most fundamental unintended consequence of the prohibition was the creation of a black market for alcohol that was more organised and well-functioning than likely anticipated. With the advantage of hindsight, clear market forces can be observed as illustrated in Figures 31 and 32 below.

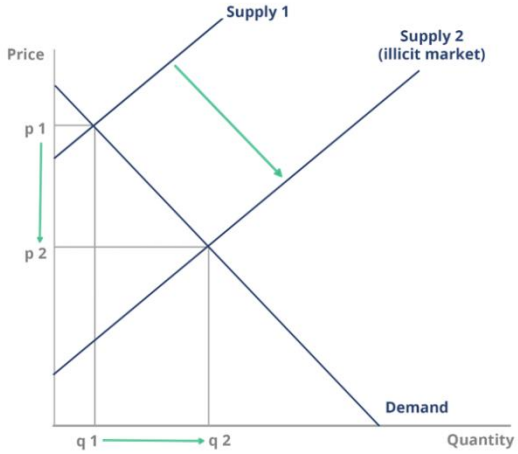
Figure 31: Short-run market for alcohol



– While the Prohibition cut legal supply, demand for alcohol remained unchanged.

– This drives up the price of alcohol in the short run, incentivising underground entrepreneurs to chase returns in a profitable, untaxed market.

Figure 32: Medium-run market for alcohol



– As the illicit market develops (an outward shift of the supply curve from Supply 1 to Supply 2 (illicit market)), consumption reverts back towards original levels.

– Producer surplus (the amount a producer benefits from producing and selling a good or service) previously received by legal alcohol suppliers is now received by organised crime groups and other illegal suppliers.

[92] Under the most extreme assumptions, only a 15% decline in cirrhosis and therefore alcohol consumption is found.

[93] The forbidden-fruit effect refers to the human tendency to want something more if it is off-limits or challenging to get.

[94] This hypothesis receives anecdotal support, as evidenced by the phrase "the roaring 20's".

[95] Warburton (1932); Fisher (1926, 1928).

Before Prohibition started in 1920, members of criminal gangs in large American cities existed on the periphery of society. However, according to historians, the illicit market for alcohol spurred growth, organisation and brought organised crime into mainstream society.[96] Bootlegging criminals operated in every state, with the largest syndicates born out of Prohibition based in New York and Chicago, both port cities with considerable immigrant populations.

Asbury (2016) found that organised crime in Chicago increased threefold during the Prohibition, and various criminal organisations and gangs previously engaged in prostitution, gambling, and theft turned to organised bootlegging and running speakeasy bars.[97] Al Capone, leader of the Chicago Outfit, made an estimated $60 million a year supplying illegal beer and hard liquor to the thousands of speakeasies he controlled in the late 1920s.[98]

An increase in alcohol potency

The prohibition period saw what has been coined by Richard Cowan as “the iron law of prohibition” – as law enforcement becomes more intense, the potency (and therefore the unit value) of prohibited substances increases. Alcohol potency reportedly rose through a shift from beer to wine and hard liquor (due to relative ease of production) as well as a lack of standardisation, regulation and proper practice in illicit-market alcohol.

The potency of products and legitimacy of ingredients reportedly varied greatly, as moonshine was created by a range of amateurs. Coinciding with high potency, the death rate from poisoned liquor rose dramatically, with a national toll of 4,154 in 1925 as compared to 1,064 in 1920.

Consumption behaviour and other industries

The expectation was that Prohibition would increase sales of substitute goods for alcohol such as juice and soft drinks, entertainment substitutes such as theatres and clothing and other household goods. In reality, these industries experienced no increase in demand, while household savings rates failed to rise. [99]

As discussed above, in the first instance, the proliferation of black-market alcohol meant household spending on alcohol did not reduce to the extent policymakers intended. At the onset of the prohibition, those who kept drinking likely faced high market prices, now having to spend a higher portion of their disposable income on alcohol, potentially reducing rather than increasing their ability to consume alternative household products and entertainment.

Secondly, as opposed to increasing the demand for juice, prohibition was found to increase the demand for substitutes for alcohol, including narcotics, hashish, tobacco and marijuana. Taking the sale of alcohol underground also decreased the distance between organised criminals and the public, improving access to other illegal products. [100]

Crime

While it is difficult to assess the direct link between Prohibition and wider criminal activity (i.e., theft and murder), a number of metrics suggest there was a general increase in crime over the prohibition period, with likely correlation with the policy. The number of federal convicts and the federal prison population increased significantly between 1914 and 1932, rising 561% and 366% respectively. Arrests were mainly due to violations of Prohibition laws, with the number of people convicted of such violations

[96] Hayes (2022) and Rods (2021).

[97] Asbury (2016).

[98] Rods (2021).

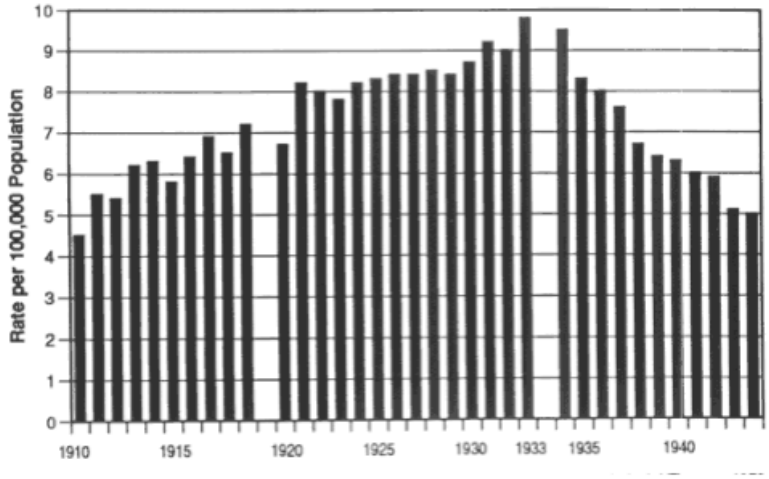
[99] Learner (n.d.).

[100] Morgan (1974).

increasing by 1,000% between 1925 and 1930. In 1930, half of all prisoners had been convicted of prohibition violations and two-thirds of all prisoners had been convicted of alcohol and drug offenses.

As for homicide, caution needs to be taken in linking homicide cases between 1920 and 1933 directly to Prohibition. However, as Figure 33 below illustrates, the total homicide rate increased from six per 100,000 population in the pre-Prohibition period to nearly ten per 100,000 by 1933. That rising trend reversed around the same time as the repeal of prohibition in 1933, and the rate continued to decline throughout the 1930s and early 1940s.[101]

Figure 33: Homicide rate in the US, 1910 to 1944, per 100,000 population



Source: Cato Institute

Efficiency

Administration costs

The Prohibition came at a significant fiscal cost to the United States, through both enforcement costs and lost excise tax. The first year's budget of administrating body, the Bureau of Prohibition, was $4.4 million. By 1933, to cope with the illicit market, the Bureau's budget had increased by over 500%. The total enforcement cost over the 13 years of Prohibition is estimated at around $300 million.[102] Reflecting these rising costs, over the prohibition period, employment at the Customs Service rose by 45% and its budget by 123%. Likewise, personnel at the Coast Guard rose 188% during the 1920s and its budget increased by more than 500%. Total federal expenditures on penal institutions increased more than 1,000% between 1915 and 1932. Despite increased expenditure and new prison space, prisons were reportedly severely overcrowded.[103]

Excise tax

Before the Prohibition, many states depended heavily on excise taxes on liquor to fund their budgets. In New York, for example, nearly 75% of the state's revenue came from liquor taxes. When Prohibition was enacted, this revenue was lost immediately (while all alcohol sales revenue went to illicit operators). At the national level, the Government forsook an estimated $11 billion in tax revenue during the

[101] Ostrowski. (1989).

[102] Learner, (n.d.).

[103] Thornton (1991).

prohibition period.[104] Given the size of this hole in the national budget, an important consequence was a movement to an increasing fiscal reliance on income-tax.

[104] Learner, (n.d.).

Annex 6: The war on drugs

Policy overview

Following rising recreational drug use in the US in the sixties, in 1971 President Nixon formally launched the 'war on drugs.' This began a policy approach to drug control, both in the US and in many other countries, which has persisted in various forms for the last five decades. Broadly speaking, the 'war on drugs' policy goal is to eradicate illegal drug use and the mechanism is a series of initiatives targeted at eliminating production, distribution and consumption. Policies are characterised by forcefully targeting the supply side of drugs through aggressive law enforcement, surveillance, arrests and prosecution of drug offenders, and domestic and international action to disrupt drug-trafficking networks.

The philosophy behind the 'war on drugs' approach shares similarities with that behind prohibition. Drug production and consumption are seen as causing major social problems such as crime, domestic violence and negative health outcomes. By prohibiting drug use and punishing supply, consumption (and the social problems caused by drug consumption) is believed to be reduced. This approach has been controversial, with opponents arguing it has come at a cost disproportionate to its impact, led to the over-criminalisation of drug users, has disproportionately affected marginalised communities, and has been questionable in its impact in reducing drug use and availability.

Effectiveness

Anticipated impacts on drug consumption

Miron and Zwiebel (1995) present a comprehensive explanation of the anticipated impact of the prohibitionist 'war on drugs' policy approach on the drugs market. These anticipated impacts are bulleted in Box 1: Anticipated market effects of war on drugs policies, below.

Box 1: Anticipated market effects of war on drugs policies

Under a policy of drug prohibition, supply is forced underground to the illicit markets. Compared to a situation where drugs are legal, supply costs are typically higher because an effective "tax" is imposed on producers, who must now incorporate the risk of penalties and prison time and the cost of evading enforcement into their business models. This has the following impacts:

- sellers with higher cost structures are driven out of the market;
- supply is reduced and the price of drugs rises; and
- at the higher price, equilibrium quantity consumed falls.

On the demand side, there is also likely to be some reduction in the demand for drugs due to legal penalties for possession, greater uncertainties about product quality, additional costs and danger associated with illegal transactions, and respect for the law. This reduction in demand may be small relative to the shift in supply curve, because:

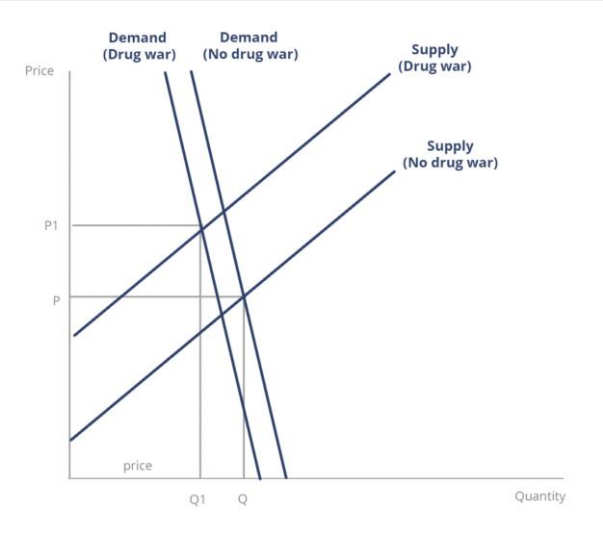
a) suppliers are typically punished by the law more than consumers;

b) increased transaction costs are likely to be greater for the supplier than the consumer (for example suppliers are likely to be targets of violence rather than consumers); and

c) respect for the law is variable. Individuals tend to comply with laws selectively (violating laws such as parking laws, tax laws etc), based on the actual costs and benefits of the action in question. Furthermore, any reduction in demand due to 'respect for the law' is likely to be mitigated by to the extent prohibition glamorises drug use.

Thus, prohibition is assumed to cause an upward shift in the supply curve and a smaller downward shift in the demand curve, as illustrated in the graph below.

Anticipated short-run impacts on the market for drugs



As the graph (left) presents, an upward shift in the supply curve and a relatively smaller downward shift in the demand curve would tend to result in an increase in the price of drugs (from P to P1) and a decrease in the quantity consumed (Q to Q1).

To the extent that quantity consumed is decreased, the policy contributes to the goal of reducing drug use but has a number of side-effects as discussed below.

Actual changes in drug consumption

While there has been some variation by location and from drug to drug, the general trend observed from the research examined is that despite the intended impact of drug control policy, prices of drugs have tended to decline over time. Werb et al. (2013), published in the British Medical Journal, is one of the most comprehensive longitudinal studies of drug price and purity. The study finds that in the US, between 1990 and 2007:

- the average inflation-adjusted and purity-adjusted price of heroin decreased by 81% and purity increased by 60%;
- the price of cocaine decreased by 80% and purity increased by 60%; and
- the price of cannabis decreased by 86% and purity increased by 161%.

Fries et al. (2008) found similar downward price trends in cocaine, heroin and cannabis, alongside an 80% decrease in the price of crack cocaine between 1986 and 2004. Methamphetamine prices appear to have fluctuated during the period, with peaks in 1991, 1995-96 and 2006-2007 coinciding with introductions of precursor chemical regulations. However, prices have been trending downward (particularly for low purity products) with the price of 2.5g AMT methamphetamine more than halving between 1981 and 2007. [105]

During the two decades studied, drug seizures in major production regions and major domestic markets generally increased. Werb et al. (2013) concludes that despite increasing investments in enforcement-based supply reduction efforts, drug prices, purity and the global supply of drugs have likely increased over time, denoting a degree of failure in the 'war on drugs' policies of controlling the illegal drug market through law enforcement.

[105] Fries et al. (2008).

This gives an indication that regardless of enforcement-based supply reduction efforts, the illicit market for drug supply is highly resilient. Costs (2013) suggests the following possible explanations for this phenomenon:

- the increased efficiency and improved strategising of dealers and traffickers;
- an increasingly globalised economy which offers more and cheaper distribution channels and makes it easier to recruit drug producers and couriers; and
- increased competition, as larger cartel monopolies have been broken up and replaced by numerous smaller and more flexible criminal enterprises.

Researchers have found that in a demand-driven market, supply-side interventions such as enforcement-based policies are often ineffective in the long-term in. For example, Dobkin and Nicosia (2009) analysed the short- and medium-term impacts of a major government seizure in the methamphetamine market in 1995 and found that although price tripled in the short-run, the effects were temporary, with the price returning to its original level within four months. Simultaneously, purity dropped by 70%, hospital treatments for meth fell 50 percent and arrests 55%. Purity, hospitalisations and arrests all reached pre-intervention levels within eighteen months. In concurrence with other researchers[106] the study notes that:

1. a lack of market concentration results in supply-side interventions often having only a temporary localised effect; and
2. most interventions fail to create a substantial and long-lasting supply shock.

Garzón & Bailey (2015) discuss the displacement effects of supply reduction of drugs. Different forms of displacement which weaken the effectiveness of supply-reduction policies are presented, including:

- the balloon effect – the displacement of the targeted activity to another location (e.g., in the late 1990s, coca was largely eradicated in Peru and Bolivia, only to be replaced by new crops in Colombia);
- the cockroach effect – the displacement of the targeted criminal groups to another territory; and
- the short-sheet effect – concentration of resources in law enforcement shifts priorities away from other kinds of policies (e.g., prevention or harm reduction).

Garzón & Bailey (2015) finds these forms of displacement were contributing factors to the ineffectiveness of 'war on drugs' supply-side policies.

Unintended consequences

Potency and overdose risk

One severe unintended consequence of enforcement-based supply reduction policies has tended to be an increase in drug potency and with it, overdose risk. As noted above, falling drug prices have tended to coincide with increasing drug purity over recent decades. This resonates with Richard Cowan's 'iron law of prohibition' mentioned in the discussion of the US Prohibition (Annex 5) – the stricter the enforcement mechanisms, the more potent the drugs. According to Coyne & Hall (2017), in a black market for drugs, quality-control mechanisms and information on purity are less effective than in a legal market, because:

[106] Jonathan P. Caulkins (2000); Yuehong Yuan and Caulkins (1998); John DiNardo (1993),

a) underground markets must operate in secret and therefore provide less information about products and vendors;

b) consumers are unlikely to report defective substances as it could implicate themselves as lawbreakers;

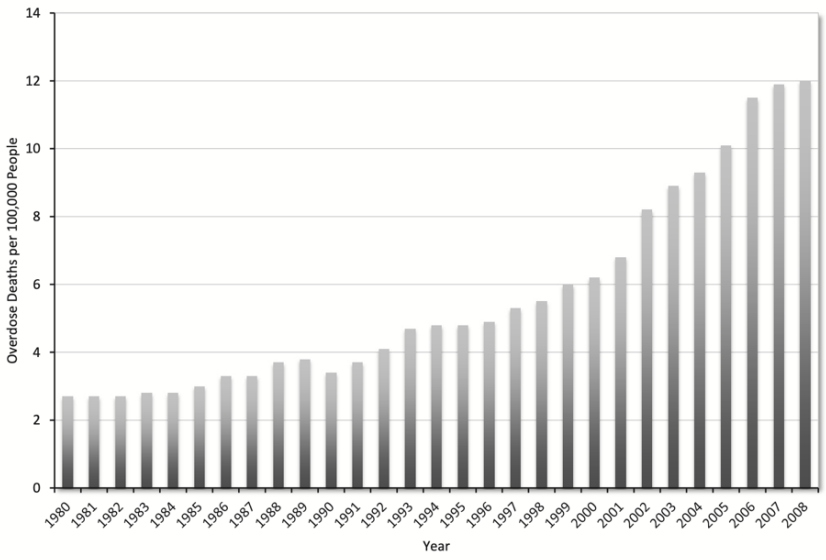
c) consumers of illegal substances have no legal recourse if they purchase an inferior quality substance; and

d) on the supply side, producers of impure and tainted products have weak incentives to remove these products as buyers are unlikely to communicate openly with each other about quality.

In the second instance, prohibition may incentivise drug sellers to focus their sale effort on higher potency drugs (which have higher unit prices) and increase the potency of existing products in a bid to chase higher returns. Likewise, consumers may be enticed by promotion of higher priced drugs, themselves seeking higher value for money (and risk).

The combination of poor information quality and flow, as well as higher potency incentives on both sides of the market has the potential to increase drug-related fatalities. The data supports this assertion, with a steep rise in death by overdose in the United States from 2.2 per 100,000 people in 1980 to 12 per 100 by 2008 (as presented in Figure 34 below).

Figure 34: Overdose deaths, 1980–2008, per 100,000 people



Source: Coyne & Hall (2017)

Violence

As was the case for alcohol, advocates of drug prohibition tend to associate drug use with violence. However, a common conclusion in recent research is that the majority of violence in drug markets may result not from drug use, but rather from the institutional context created by prohibition.[107] Prohibition is likely to lower the marginal costs and raise the marginal benefits of violence in an industry in several ways:

a) because participants in the illegal drug trade cannot use the legal and judicial system, the marginal benefits of using violence to resolve disputes increases;

[107] Resignato. (2000); Rasmussen and Benson (1993); Benson and Rasmussen (1991); Benson et al. (1992) Goldstein (1987; 1989).

b) additionally, the marginal cost of violent acts is likely to be lower in a prohibited market than in a free market, because evading apprehension for one set of illegal activities—drug dealing—is complementary with evading apprehension for another set – initiating violence;

c) likewise, the costs of legal punishment if apprehended may be inversely related to the number of offenses for which one is convicted; in other words, an extra few charges often leads to a less-than-proportional increase in the penalty; and

d) finally, participants in an illegal enterprise, having no recourse to the law, have a greater need to protect themselves. Hiring a security force for protection, however, further lowers the marginal cost of initiating violent acts.

Cartelisation

The combination of heightened incentives for violence and high competition in an illicit market can lead to the unintended consequence of cartelisation in an industry. When an industry is prohibited, suppliers must conceal their actions from law enforcement, increasing the cost of entry to an industry and reducing the risk of antitrust laws. Additionally, the lower cost of using violence to impose severe punishments can further facilitate the formation of a cartel.

The readiness of a cartel to resort to violence dissuades smaller competitors from challenging the cartel's position. In a lawful industry, if a dominant player engages in a price war with a smaller rival, the dominant player may incur a greater cost due to its larger size. However, in a violent confrontation, both parties are likely to suffer equal losses, which could have a more devastating impact on the smaller challenger. Colombian economist Eduardo Sarmiento Palacio argues that the emergence of drug cartels in Colombia is directly related to the US war on drugs.[108]

Criminalisation

Enforcement-based supply reduction policies criminalise both consumers and producers in the market, as seen in the war on drugs. Drug-related incarcerations in the US have reportedly quadrupled since 1980, with drug law violations accounting for 1.2 million arrests in 2020. Of these, eight out of nine arrests were for drug possession and the remaining one out of nine for supply.[109]

One unintended policy cost relating to criminalisation is the collateral consequences on the population convicted of drug offenses. In the US, this can include the loss of eligibility for financial aid in education, public housing and voting rights. Human Rights Watch (2016) has documented how the collateral consequences of criminalisation are in many cases long-lasting and severe), particularly for young offenders.[110]

The war on drugs approach has disproportionately punished communities of colour and other marginalised groups, which is another well-documented and important unintended consequence. According to the Drug Policy Alliance, despite similar rates of drug use across different racial and ethnic groups, black people are more likely to be arrested, convicted, and sentenced to longer prison terms for drug offenses. In 2019, black people were 3.6 times more likely to be arrested for drug offenses than white people, despite similar rates of drug use.[111]

[108] Eduardo (2017).

[109] Drug Policy Alliance (2022).

[110] https://www.hrw.org/sites/default/files/report_pdf/usdrug1016_web_0.pdf

[111] Drug Policy Alliance (2022).

Efficiency

One of the major criticisms of the war on drugs is its significant fiscal cost. The US has spent over $1 trillion USD on drug control efforts since the 1970s[112], with limited effectiveness (as discussed above). At a federal level, the costs include law enforcement, interdiction, international programs and drug treatment and prevention, which cost approximately $35 billion annually.

State and local governments also contribute significant resources to drug enforcement, treatment and prevention programs. Drug Policy Alliance (2021) estimated that state governments spent over $50 billion on drug enforcement and incarceration between 1980 and 2010.

[112] https://www.americanprogress.org/article/ending-war-drugs-numbers/#:~:text=Since%201971%2C%20the%20war%20on,States%20an%20estimated%20%241%20trillion.

Annex 7: Other case studies

Tobacco prohibition in Bhutan, 2004 to 2021

In 2010, Bhutan became the first country in the world to ban the cultivation, manufacture, supply and sale of all tobacco products. The ban lasted for over a decade, before being removed through the Tobacco Control (Amendment) Bill 2021.

The first provincial tobacco ban in Bhutan was established in 1989 by local government leaders in Bumthang, the religious heartland of Bhutan. Consumption of tobacco was not considered to conform with Buddhist practices, as well as being injurious to health. In the 70th National Assembly of Bhutan in 1991, public officials were divided on the issue of tobacco policy. Some local leaders and representatives of the people took the stance that tobacco ought be banned nationwide on religious and health grounds. However, the home minister argued that consumption of tobacco products, liquor or doma (betel nut) were personal habits and practices, the harmful consequences of which were well-known to those who indulged in them. He believed that imposing a ban on these practices would be both undesirable and near impossible to enforce. In support of this view, another local leader stated that as long as smokers were aware of the adverse effects of consumption, giving up the habit should be done out of free will and personal faith, rather than through the force of law.[113]

Despite these differing opinions, the King of Bhutan concluded that tobacco was harmful both in terms of religious faith and physical health. The Royal Government decided to launch an educational awareness campaign to be implemented through educational and health institutions. This approach was believed to be more effective and have fewer negative impacts than regulatory measures.[114]

The idea of a nationwide ban gained popularity, particularly amongst religious regions, and was reconsidered in 2003. In 2004, a national ban on tobacco sales was instated, alongside a 100 percent sales tax on imported tobacco products brought into Bhutan for personal use. In 2010 the sales ban was replaced by a comprehensive ban under the Tobacco Control Act 2010, prohibiting the cultivation, manufacture, supply and sale of all tobacco products.

However, the illicit market was found to respond rapidly to the ban. A new market was created for tobacco smugglers. both opportunistic and organised, at the Indian border. From 2005 to 2006, $1.5 million worth of smuggled tobacco was seized, which increased to $7.9 million in 2007 and further to $17 million in 2008. With prohibition not stopping supply, smoking rates failed to decline as intended. The 2006 Youth Tobacco Survey of school age youths aged 13 to 15 conducted by the Ministry of Health found that 23.7 percent of these students had used tobacco products in the last 30 days. Over 30 percent of these students lived in a home where others smoked.[115] According to WHO survey data, tobacco use in Bhutan remained high at 24.8% in 2014, declining marginally to 23.9% in 2019, despite the ban.[116]

Tobacco smugglers willingly supplied the Bhutanese market. However the COVID-19 pandemic created a more pertinent health threat – the spread of the virus. In an attempt to reduce the risk of smugglers bringing the virus across the border and to curb the illegal market, the Bhutanese Government allowed certain duty-free shops to import and supply tobacco in August 2020. However, these shops, mainly catering to a few urban areas, reportedly met only a small portion of the demand,

[113] https://www.nab.gov.bt/assets/uploads/docs/resolution/2014/70th_Session.pdf .

[114] ibid.

[115] Ministry, Bhutan, 2006.

[116] World Health Organization (2016); Department of Public Health, Ministry of Health, (2020).

and smuggling continued to increase.[117] Eventually, in July 2021, the Government amended the 2010 Act, lifting the decade-long ban on tobacco sales and permitting the sale of tobacco products in grocery and pan shops.

The Bhutanese government has stated that the revision of the ban on tobacco and tobacco products in the country is a temporary measure. The framework for tobacco control has now shifted from a ban to regulation, which requires the government to develop new legal and policy infrastructure to support such regulation, including labelling measures and altering the taxation regime. Considering the increased access, availability and affordability of tobacco products in Bhutan, the new legal infrastructure may include WHO recommendations such as plain packaging, health warning label requirements, and earmarking of taxes.

Tobacco smuggling boom in Canada, 1990s

Canada's experience with tobacco smuggling in the 1990s illustrates the readiness of the black market to respond to strict tobacco policy. A series of tax hikes beginning in 1984 pushed up federal tobacco taxes in Canada from 42 cents per pack to $1.93 CAD per pack in 1993. Provincial cigarette taxes also increased dramatically, with Ontario's local tax rising from 63 cents to $1.66 per pack over the same period.[118]

The drastic increase in tobacco prices led to a surge in cigarette smuggling between Canada and the US, with the large land border and proximity of the two countries making smuggling relatively easy and low-cost. Trucks and ferries transported bootleg cigarettes into Canada across the St. Lawrence River from New York State. Cigarettes were also smuggled in from other foreign sources using smaller boats loaded from ships waiting in international waters. The US General Accounting Office noted that the Canadian tax increases "led to large-scale smuggling between the US and Canada conducted almost entirely by organised crime. Violence increased, legitimate merchants suffered, and in one year alone, Canada and its provinces lost over $2 billion CAD in tax revenues to the black market."[119]

By 1993, smuggled cigarettes had gained a huge share of the overall Canadian market. The Canadian government estimated that more than 60% of the cigarettes in Quebec were contraband. In other provinces, contraband cigarettes comprised between 15 and 40% of the market. One study found that the total underground economy in Canada grew by 1.6% to 1.9%, or nearly $14 billion CAD, between 1991 and 1993.[120]

The rise of cigarette black markets in Canada was accompanied by an increase in violent crime. Organised crime groups engaged in disputes with each other, while also targeting the legitimate cigarette industry and endangering employees across the distribution chain. Truck hijackings became more frequent, and warehouses and shops were frequently robbed and burgled. In a particularly tragic incident, a convenience store clerk lost their life after being shot in the head with a sawed-off shotgun, all for the sake of just ten cartons of cigarettes.

The rapid growth of the cigarette black market and related crimes sparked major concern within the Canadian government. Prime Minister Jean Chretien stated that "smuggling is threatening the safety of our communities and the livelihood of law-abiding merchants", proclaiming that the illicit trade "is a threat to the very fabric of Canadian society." The Canadian solicitor general, Herb Gray, concluded that "organized crime has become a major player in the contraband cigarette market. What we are

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[117] https://thebhutanese.bt/rbp-says-large-scale-and-uncontrollable-tobacco-smuggling-likely-to-bring-covid-into-the-heart-of-bhutan/ .

[118] Fleenor (2003).

[119] Ibid.

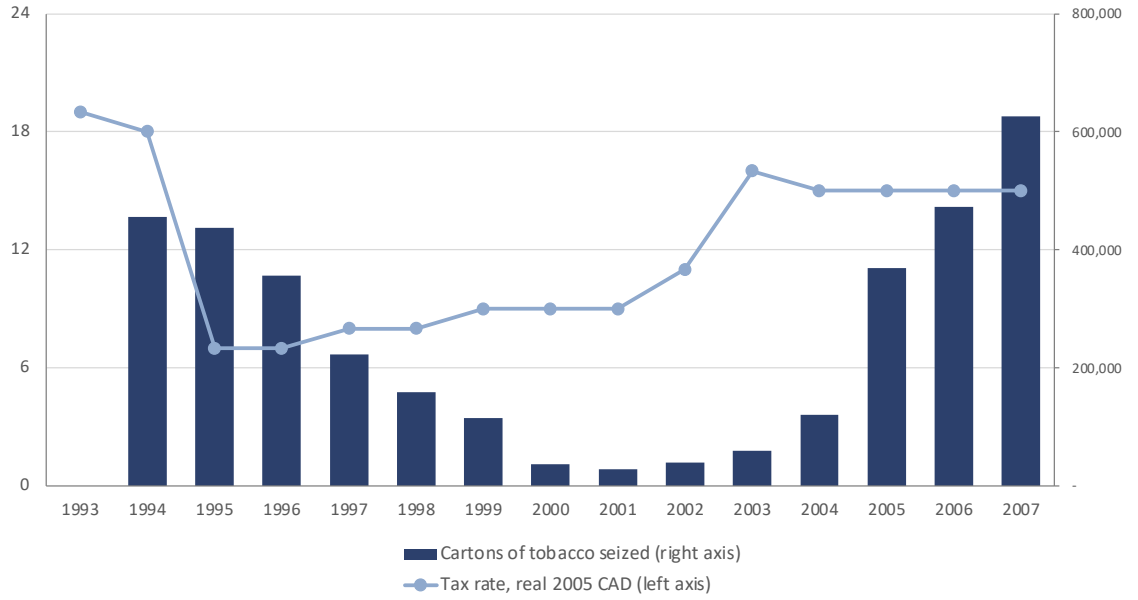
[120] Guindon, Burkhalter & Brown, (2017).

seeing is a frightening growth in criminal activity. We are seeing a breakdown in respect for Canadian law. Canadian society is the victim." [121]

In 1994, the federal government, unable to obstruct the black-market trade, resolved to reduce tobacco excise taxes to weaken incentives to smuggle and distribute contraband cigarettes. Provincial governments followed suit, with federal and provincial taxes in Ontario for example reduced by $1.92 CAD per pack. By the late nineties, the contraband market receded substantially, with illicit tobacco falling to approximately 10% of the total market.[122]

Since then, progressive tax hikes have been reinstated and there has been a resurgence in the illicit market. The influence of tobacco taxation policy on the illicit market is illustrated in Figure 35 below – plotting the excise tax rate (real 2005 CAD) alongside the number of illicit cigarette cartons seized between 1994 and 2007.

Figure 35: Federal tobacco excise tax rate per carton and cigarette carton seizures across Canada, 1994 to 2007



Source: Public Safety Canada; Fraser Institute.

The light blue line denotes the federal tax rate per carton of cigarettes, measured on the left axis. As discussed above and visible on Figure 35, the tax rate was reduced substantially between 1994 and 1995, dropping from around $18 to $7 per carton (in real terms). The tax rate hovered around the $6 to $9 mark until the early 2000's – jumping back up to around $16 in 2003. The trend in cartons of tobacco seized (represented by the dark blue bars) follows directly behind that of the federal tax rate, with approximately a two-year lag. While the 1994–95 tax drop did not immediately reduce tobacco seizures, by 1997, seizures had almost halved, and by 2000 had fallen to a fraction of six years prior. Likewise, the tax rate rise in 2003 was followed by a modest rise in tobacco seizures in 2004, which was subsequently followed by a 300% rise the following year. From this data two conclusions can be drawn:

a) there is a visible relationship between sharp changes in tobacco policy and illicit market supply in Canada; and

[121] Fleenor (2003).

[122] Gabler & Katz (2010).

b) in the Canadian case, the illicit market responded promptly to a change in legal market conditions (i.e., tax rate change), adjusting supply within around two years.

Flavoured tobacco ban in Massachusetts, 2019

In November 2019, Massachusetts became the first US state to ban the sale of all flavoured tobacco and nicotine products, including flavoured vapes and menthol cigarettes. In June 2020, a 75% excise tax on the wholesale price of vapes was also implemented, with the aim of prevent youth and other demographics considered particularly drawn to flavoured nicotine products from starting or continuing use.

However, as with prohibition cases, tobacco smugglers responded swiftly. A study of tobacco sales in Massachusetts and surrounding states after the flavour ban found that 30 million fewer cigarette packs were sold in in Massachusetts in the 12-month period compared to the prior period. But during the same post-ban period, 33 million additional cigarette packs were sold in the counties that bordered Massachusetts. Despite decreasing rates of smoking in all five bordering states between 2019 and 2020, the increase in border-state cigarette sales following the comprehensive flavour ban suggests that this is a lower-bound estimate for cigarettes that were ultimately consumed in Massachusetts.[123] In other words, interstate smuggling meant there was no change, or possibly even an increase, in tobacco consumption in Massachusetts after the ban.

The legislation created a new illicit market opportunity for smugglers to import banned products from states without bans and with lower taxes and sell them in-state. The prompt growth of the illicit market in Massachusetts is evident in Table 14 below, which presents tobacco inspection and seizure data from the Massachusetts Department of Revenue.

Table 14: Massachusetts Department of Revenue Tobacco inspections, seizures and actions, 2020 to 2022, number of seizures, CAGR %

	FY20	FY21	FY22	3-year CAGR
Department of Revenue:				
Inspections	2,978	3,418	4,264	20%
Seizures	10	170	326	471%
Actions (warning letters, suspensions, revocations)	1	56	577	2302%
Department of Public Health				
Inspections	2,840	4,935	6,290	49%
Violations Cited	650	2,178	2,080	79%

Source: Multi-Agency Illegal Tobacco Task Force (Commonwealth of Massachusetts)

In 2022, the Department of Revenue undertook 4,264 tobacco inspections (up by 43% from two years prior), undertaking 326 seizures (up from ten seizures two years prior). Many of these seizures involved substantial amounts of products, smuggled across state borders or illegally produced by organised crime groups and petty smugglers. Berkshire County Tobacco Awareness Program director, James Wilusz, expressed surprise at the level of egregious, black-market sales, “we’re seeing a blatant disregard for the regulations.”

Fines for illegal tobacco sales in Massachusetts begin at $1,000 for the first offense, $2,000 for a second illegal sale, and $5,000 for a third and subsequent offense. In many seizure cases to date, the

[123] Rich, J. J. (2022). Estimates of Cross-Border Menthol Cigarette Sales Following the Comprehensive Tobacco Flavor Ban in Massachusetts. *medRxiv*, 2022-04.

value of tobacco products confiscated by the state has been higher than the value of fines, creating little disincentive for profit-seeking operations to sell these products.[124]

To combat the issue, the Multi-Agency Illegal Tobacco Task Force proposed several measures to tighten tobacco supply controls in its 2023 annual, including:

- creating new felony criminal penalties for selling tobacco without a license;
- obtaining more inspection powers; and
- making it illegal for licensees to purchase tobacco products with cash.[125]

The annual report also noted a reduction in excise tax revenue associated with the ban, as well as increased budget expenditures to fund new enforcement obligations, amongst other expenses.

South African tobacco ban in COVID-19 lockdown, 2020

Between 27th March 2020 and 17th August 2020, as part of its national COVID-19 response, the South African government banned the sale of all tobacco and vaping products. The prohibition was implemented on the premise that a) tobacco was a non-essential product and b) smokers were more likely to develop severe illnesses and thus place extra pressure on the health system.

The 5-month smoking ban proved generally unpopular. The public found the policy abrupt, questioned its scientific foundation and the majority chose not to quit. Instead, the illicit market flourished, and consumers were forced to endure five months of exorbitant prices.[126]

The Research Unit on the Economics of Excisable Products (REEP), based at the University of Cape Town, conducted a multi-stage survey to determine how smokers responded to the ban.[127] The study found that during the ban, 41% of smokers attempted to quit smoking, while 59% continued as usual by smoking illegally sourced tobacco. Of those who tried to quit, 39% had successfully quit at the time they completed the survey (two months into the ban), while 61% were unsuccessful. Amongst the successful quitters, 12% said they would pick up smoking again when the ban was lifted.

The final survey round (which occurred in September and October after the ban was lifted) found that of 23,631 participants:

- about 9% of pre-lockdown smokers successfully quit smoking; and
- 93% of smokers continued to purchase cigarettes despite the sales ban.

For 93% of smokers to continue smoking despite a comprehensive sales ban provides insight into the ability of the illicit market to rapidly respond to the prohibition policies. According to Vellios, Walbeek and Ross (2020), the illicit market in South Africa was already well-established before the ban, with illicit cigarettes accounting for an estimated 30% of the market in 2017 and up to 50% by 2020.[128] This suggests that not only were suppliers relatively prepared to meet the market needs at the onset of the ban, but many consumers were already familiar with and willing to source their tobacco through illegal means. Regardless, the fact that the illicit market was able to increase

[124] https://www.berkshireeagle.com/news/central_berkshires/no-butts-about-it-crackdown-targets-black-market-sales-of-flavored-tobacco-items-e-cigs/article_f56c0450-d365-11eb-b5fe-83dc3a7d64a4.html

[125] https://www.mass.gov/doc/task-force-fy23-annual-report/download

[126] Harris-Cik (2020); Gerber (2020).

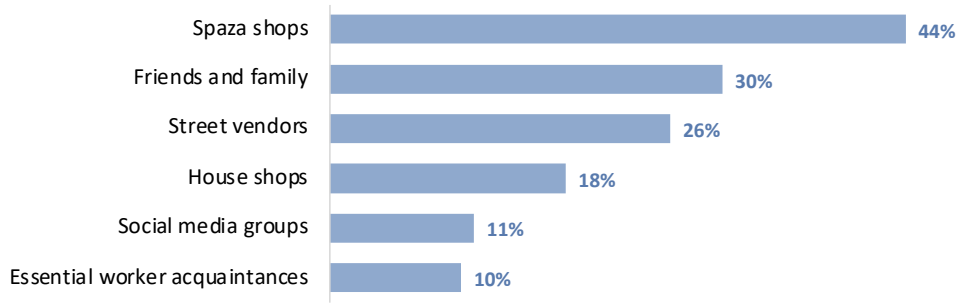
[127] van Walbeek, Filby, & van der Zee (2020).

[128] Vellios, Walbeek & Ross (2020).

supply within a matter of months to meet the entire market's demand indicates the agility of illicit operators in response to policy change.

Figure 36 below presents a breakdown of where smokers reportedly purchased their cigarettes during the lockdown.[129]

Figure 36: Retail outlets during the prohibition, 2020, % of smokers who purchased cigarettes from a given outlet



Source: van Walbeek, Filby, & van der Zee (2020).

As Figure 36 above indicates, a large portion (62%) of the market was serviced by spaza shops[130] and house shops, with 44% and 18% of smokers purchasing from these retailers respectively. As noted by van Walbeek, Filby and van der Zee (2020), sales outlets that did not exist or were inconsequential before the ban, including street vendors, friends and family and social media groups all quickly became common illicit sources of cigarettes. This contrasts strongly with survey data conducted before the ban, which found that 70% of respondents purchased cigarettes through formal channels, namely retail outlets (53%), petrol stations (7%), tobacco shops (5%) and wholesalers (5%). During lockdown, however, purchases from formal outlets were negligible.[131]

During the ban, the average price of cigarettes increased by 250% (with some variation in price between provinces, and higher prices in more remote provinces). Vellios, Walbeek and Ross propose Becker and Murphy's (1988) rational addiction hypothesis as a possible explanation for why smokers persisted smoking despite high prices. According to this theory, an addict's consumption response to a temporary change in price will be relatively small. Becker and Murphy argue that addicts will change their consumption more markedly if they expect a price change to be permanent. Since South Africa's sales ban was temporary, the majority of smokers decided to bear short-term exorbitant prices rather than quit smoking.

The ban was also caused shifts in buyer behaviour, including:

- a 321% increase in smokers purchasing single cigarettes and a 192% increase in carton purchases; and
- a change in the competitive structure of the market, with a substantial fall in consumption of major cigarette brands and a rise in those produced by regional manufacturers. This shift likely reflects the relative ease of access to local products.

On August 17th 2020, the South African Government lifted its tobacco sales ban. While the ban was intended to reduce smoking prevalence, only a minority of respondents actually quit. According to van Walbeek, Filby and van der Zee (2020), several demand-side pre-conditions needed to be met for an effective ban, including lower smoking prevalence, better cessation support and adequate preparation

[129] Note that survey respondents could answer multiple outlets.

[130] Informal convenience shops, usually run from home.

[131] Vellios, Walbeek & Ross (2020).

time. On the supply side, van Walbeek, Filby and van der Zee (2020) argue that an effective ban requires control over the illicit market and synchronized policies for monitoring manufacturing, transport and distribution to reduce supply.

Van Walbeek et al. (2021) estimated the loss in excise revenue resulting from the ban using 2020/21 government budget data. They found that during the 20-week period that the sales ban was in place, an estimated R5.8 billion (approximately $315 million USD) in excise tax was not collected.

Early tobacco prohibition in the United States

In March 1893, Washington became the first state in the US to ban the sale of cigarettes to both adults and minors. Subsequently, bans came into place in North Dakota in 1895, Iowa in 1896, Tennessee in 1897 and Oklahoma in 1901. Eleven states had some general anti-cigarette legislation by 1901.[132] In 1909, Washington went as far as to ban the possession as well as the sale and manufacture of cigarettes and papers.[133]

The laws were justified on the grounds of both health and morality. Cigarette smoking was widely regarded as an addictive, dangerous new habit, particularly seductive to young and a gateway to use of alcohol and other drugs. With cigarettes nicknamed by oppositionists as “coffin nails”, bans sought to regulate cigarette use out of existence.

The early 1900s saw further cigarette prohibition legislation pass, particularly in the midwest and some western states. However, evasion of the law was apparently easy. Rather than cigarettes themselves, some retailers sold “cigarette makings” (e.g., cigarette papers and cigarette tobacco), while others sold matches for a higher than usual price and gave cigarettes away with them. Other retailers evaded the law through a product wrapped in tobacco leaf rather than paper.[134]

Support for the anti-tobacco cause was reportedly “broad but shallow” and it collapsed during World War I. Cigarettes had been popular amongst the armed forces since the Civil war, distributed as a form of comfort for soldiers. Men offered the comfort of a cigarette were considered less likely to seek more harmful diversions such as alcohol and prostitution. Congress included cigarettes in the rations issued to soldiers and subsidised their sale at post-exchange stores for individuals to send to soldiers in the field. Organisations such as International Red Cross even altered their anti-tobacco stance and sent cigarettes off to the soldiers in the field.[135] Soldier-directed sentiment in favour of the cigarette was a major factor in the reversal of anticigarette laws. Cigarette prohibition was repealed in Indiana in 1909; Washington in 1911; Minnesota in 1913; Oklahoma and Wisconsin in 1915; followed by other previously prohibitionist states throughout the 1920’s.[136]

[132] Outlook (1901).

[133] Tate (2005).

[134] Warfield (1930); Sobel (1978).

[135] Schudson (1984).

[136] Gottsegen (1940).

Annex 8: Drug liberalisation in Portugal

Policy overview

In July 2001, Portugal decriminalised the personal use and possession of all previously illicit drugs. The policy arose following a period of major social distress surrounding Portugal's high drug use and overdose death, to the extent that Lisbon was considered the 'heroin capital' of Europe. Despite government efforts throughout the nineties to combat supply and punish consumption, drug use was widespread. It was estimated that 1% of Portugal's population was addicted to heroin, with use of the drug spanning all economic classes.[137] This brought about widespread concern about uptake by youth, public health and the psychosocial vulnerability of high-risk users facing stigma and social exclusion.[138]

Against this backdrop, in 1997 a multi-disciplinary committee of experts, including doctors, lawyers, psychologists, economists and social activists was appointed by the government to study the problem and recommend a national response plan. The final recommendation was that ending the criminalisation of people who use both hard and soft drugs was the most effective way of limiting drug consumption and reducing dependency.

The committee also recommended the Government concentrate on prevention and education; harm reduction; broadening and improving treatment programmes for drug dependent persons and activities that helped at-risk groups and current drug users restore connections to family, work and society. The recommendations were accompanied by a new philosophy concerning drugs and drug use based on the following assumptions:

- drugs are not inherently evil;
- a drug free society is unobtainable;
- people use drugs for a number of reasons; and
- punitive policies are unethical and ineffectual.[139]

The Portuguese National Government adopted the majority of the committee's recommendations, passing the new decriminalisation law in 2000. The Ministry of Health established the Commissions for the Dissuasions from Drug Abuse (operating independent of the criminal justice system), responsible for making decisions on users on a case-by-case basis, and providing treatment, health and social support. Decriminalisation allowed a legal framework for implementing harm-reduction and social integration policies, alongside removing fears of legal penalty for drug-dependents seeking treatment. This approach was based both on humane grounds, i.e., fighting the disease, not the patients, alongside pragmatic ones, i.e., repressive war on drugs measures had been ineffective in reducing drug consumption.[140]

[137] Ashton (2019).

[138] Rêgo, Oliveira, Lameira, & Cruz (2021).

[139] Drug Policy Reliance (n.d.)

[140] Domoslawski (2011),

Effectiveness and unintended consequences

Drug consumption and price

One indicator of the effectiveness of Portugal's drug liberalisation policy is its impact on drug consumption. Analysis of the data since 2001 indicates both falls and rises in drug consumption, depending on the demographic, user-type and drug.

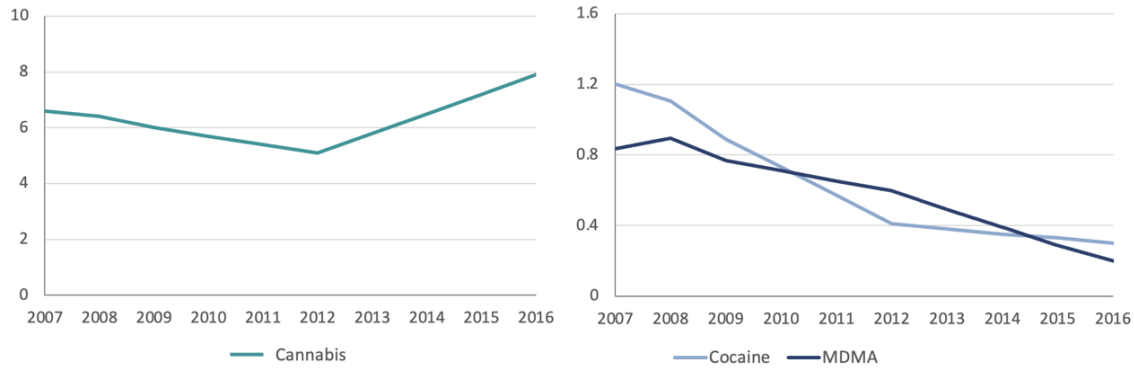
In 2001, 7.8% of the Portuguese population had tried an illicit drug in their lifetime. In 2007, this number had increased to 12%. A 2007 study found that the liberalisation policy had increased the rate of use by older Portuguese who had generally not tried drugs and began experimenting with some drug use.[141] Cocaine consumption in particular amongst older generations increased in the five years following liberalisation.

At the same time, analysis of those between 13 and 18 (the population considered most at risk of initiating drug use) indicates positive results. The rate of 7 to 9th graders (13 to 15 year olds) that had tried illicit drugs fell between 2001 and 2006 from 14.1% to 10.6%. Likewise, the rate of 10 to 12th graders (16 to 18 year olds) which had risen from 14.1% in 1995 to 27.6% in 2001, also fell to 21.6% by 2006. School survey research indicates that school pupils think that access to drugs is easy, but at the same time most claim that drug consumption is a "high-risk" decision— a potential result of information and education campaigns. More school students also believe that it is difficult to stop regular drug use even if it is "only" cannabis, which is considered by many to be a weak drug.[142]

Another phenomenon in the Portuguese case is that despite legalisation, the number of heroin users is no longer increasing. What was a heroin epidemic has reportedly been largely alleviated, with the percentage of high-risk users falling from highest in Europe to roughly on par with the European average.[143]

Figure 37 below presents estimates of last-year use of cannabis, cocaine and MDMA amongst young adults between 2007 to 2016.

Figure 37: Estimates of last-year drug use amongst young adults (15-34 years) in Portugal, 2007–2016, percentage of population



Source: European Monitoring Centre for Drugs and Addiction

As Figure 37 above indicates, between 2007 and 2012, cannabis use declined from around 6.8% to 5.1%, before rising in succeeding years to above the 2007 level. Cocaine and MDMA usage on the other hand, have both consistently declined since 2007, with 2016 usage rates of 0.3 and 0.2%

[141] IDT (2007).

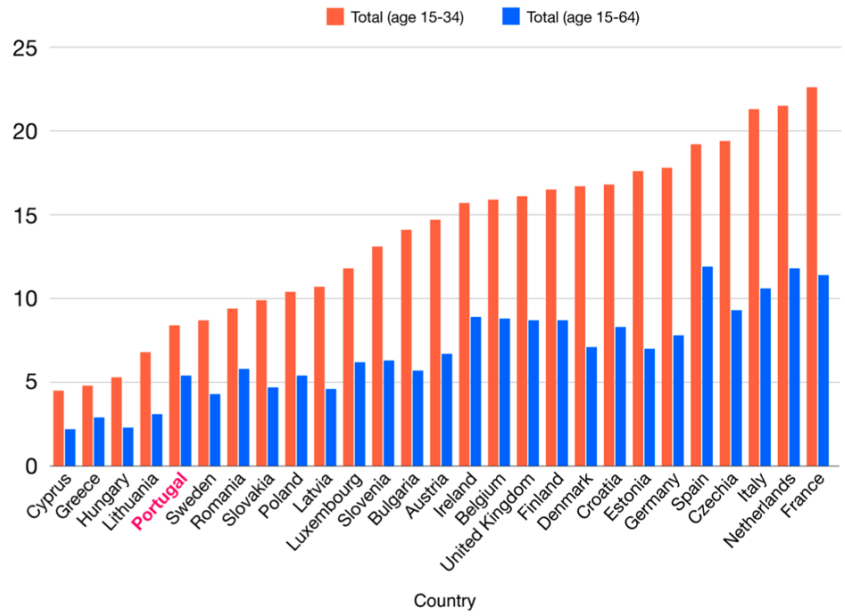
[142] Domoslawski (2011).

[143] Murkin, (2014).

respectively. While cannabis usage has remained steady, decline in other drug use may indicate a flattening out of the initial "experimentation attraction" of liberalised drugs, moving to a lower quantity consumed in the medium term.

According to 2020 data from European Monitoring Centre for Drugs and Addiction, aside from marijuana and new psychoactive substances, drug use for all other drugs has now fallen below 2001 levels.[144] Moreover, as Figure 38 below presents, the overall percentage of users is now well below the European average.

Figure 38: Percentage of people using any illegal drug last year, %, 2020



Source: European Monitoring Centre for Drugs and Addiction

Investigating the effect of decriminalisation of drug prices, a 2016 study[145] uses a control group of 16 European countries to model drug prices in Portugal against a synthetic counterfactual with no decriminalisation policy. The study finds that prices of cocaine and opiates did not decrease following the drug decriminalization. Gaps in the prices between Portugal and the synthetic Portugal suggest that, if anything, the decriminalisation policy seems to have a positive effect on price, meaning that prices were on average higher than the ones that would have been charged in the absence of the drug decriminalization policy. The study concludes that drug decriminalization seems to have caused no harmful effect of lowering illicit drugs prices (which would have in turn lead to higher drug usage).

Drug-related deaths and illness

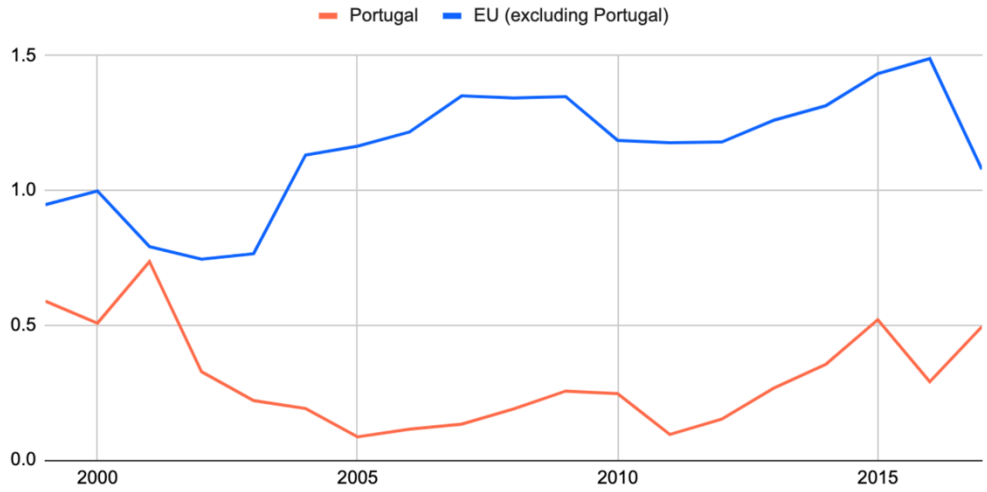
Regarding drug-related deaths, Portugal's liberalisation policy has had a mixed degree of efficacy. As Figure 39 below illustrates, drug-related deaths fell dramatically immediately after liberalisation in 2001 but have increased since 2011, although to levels well below the EU average.[146] The initial decline may have resulted from increased support to and treatment resourcing for problem users.

[144] European Monitoring Centre for Drugs and Addiction (2020).

[145] Félix & Portugal (2016).

[146] Murkin (2014).

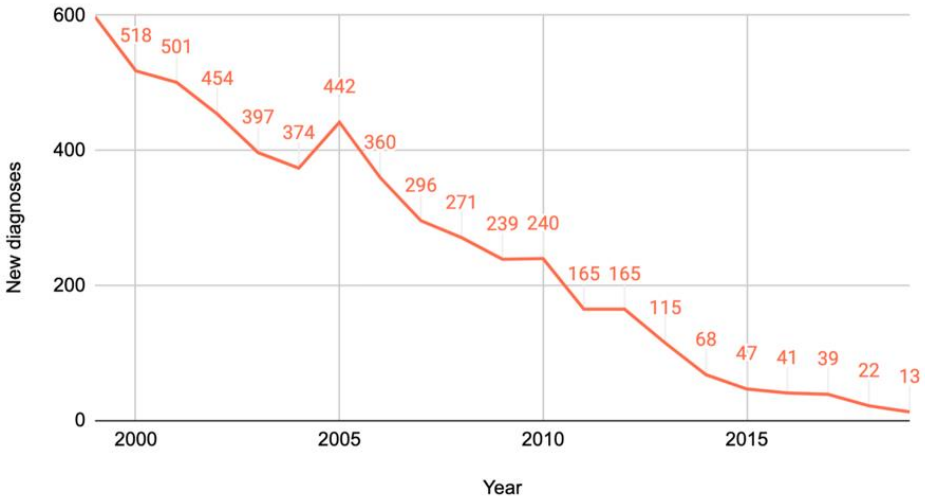
Figure 39: Drug deaths in Portugal and EU (not age adjusted), per 100,000 population, 1999–2017



Source: European Monitoring Centre for Drugs and Addiction

As for drug-related illness, there has been a clear trend downwards in drug-related HIV diagnoses since the liberalisation policy. In 2001, Portugal had 1,287 new HIV diagnoses attributed to drug use – accounting for over 50% of all new cases in Europe. As presented in the graph below, HIV rates fell sharply after liberalisation, with only 13 cases in 2019 now accounting for 1.68% of the EU total.

Figure 40: New HIV diagnoses attributed to injecting drug use, diagnoses, 1999 to 2019



Source: European Monitoring Centre for Drugs and Addiction

Though HIV rates fell globally over this period, the rate of decline in Portugal has been substantially more dramatic than its European peers. This could be attributable in part to the needle and syringe programmes included in the reform, and education and dissuasion measures increasing the percentage of heroin smoked rather than injected (with smoking a reportedly lower harm ingestion method).

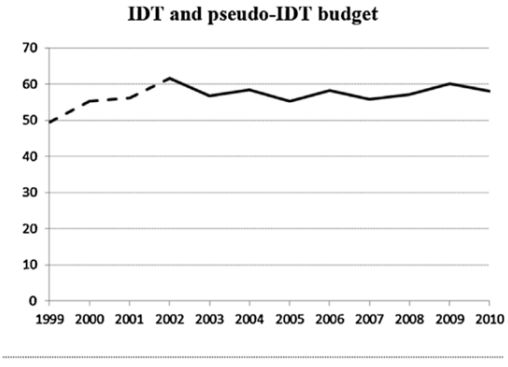
Efficiency

Gonçalves, Lourenço, & da Silva (2015) present an analysis of the social costs of illicit drug use in Portugal in the wake of the legalisation strategy. The study analyses the cost of Portugal's drug policy, including direct and indirect costs, health and non-health related.

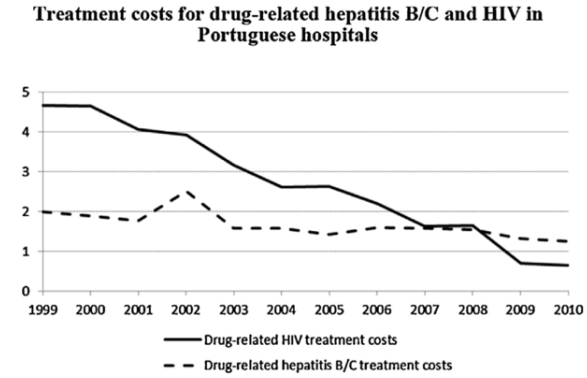
The majority of direct health-related costs associated with Portugal's treatment, prevention and risk and harm reduction strategy are incurred by a single public institution, the Institute of Drugs and Drug Addiction (IDT). As Figure 41 below (left) illustrates, the budget for this public institution has stayed largely consistent over the last ten years, between 50 and 60 million euros p.a.

The second form of health costs are those associated with the consequences of drug use, regarding hepatitis B/C and HIV patients in Portuguese hospitals. As Figure 41 below (right) illustrates, in line with reducing drug-related diseases, treatment costs have fallen substantially for HIV (around €4.6m to €1.3m p.a.), while hepatitis B/C treatment costs have fallen moderately (from around €2m to €1.2m p.a.).

Figure 41: Direct health costs associated with Portugal's drug policy



Unit: Millions of euros at 1999 constant prices
Notes: For 1999-2001, the values correspond to the sum of costs associated with IPDT, SPTT and Youth Secretary of State.



Unit: Millions of euros, at 1999 constant prices

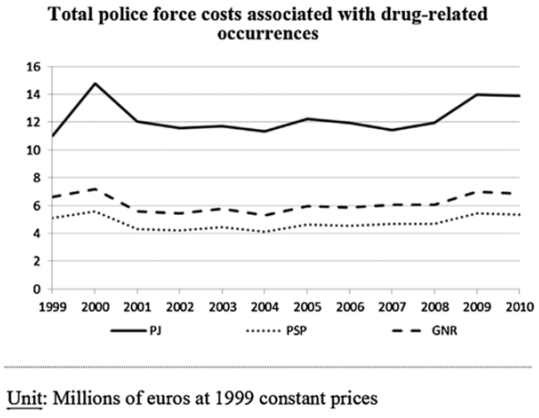
Source: Goncalves, Lourenc¸ and Sofia Nogueira da Silva, 2014

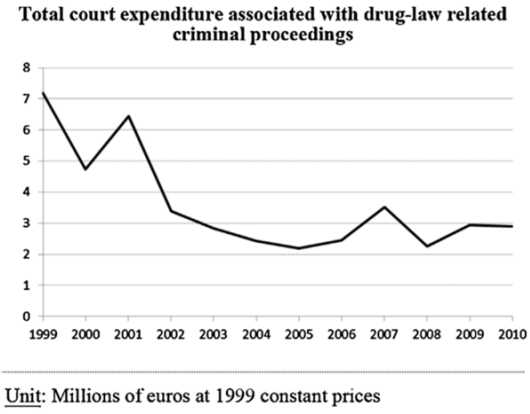
Further direct costs that are non-health related are legal system costs, including: costs of police enforcement, court costs and prison expenditure on drug-related offenders.

In Portugal, three different police forces exist: Polícia Judiciária (PJ), a specialised police force mainly responsible for major drug-law offences (such as drug trafficking or money laundering); Guarda Nacional Republicana (GNR), a standard police force which covers small and medium-sized municipalities; and Polícia de Seguranc¸a Pública (PSP), a standard police force which covers large municipalities. Cost approximations of each of these three forces between 1999 and 2010 made by Gonçalves, Lourenço, & da Silva (2015) are presented in Figure 42 (left). While there was a spike in police enforcement expenditure immediately after legalisation (particularly for PJ), police force costs have not risen dramatically since decriminalisation policy came into place. Court expenditure associated with drug related proceedings, as presented in Figure 42 (right) has fallen substantially from around €7 to €3m p.a. Likewise (as would be anticipated with a decriminalisation policy), prison expenditure on individuals imprisoned for drug related crimes reduced substantially, from €70 p.a. in 1999 to €35 p.a. in 2010.[147]

[147] Gonçalves, Lourenço, & da Silva (2015).

Figure 42: Direct non-health costs associated with Portugal's drug policy





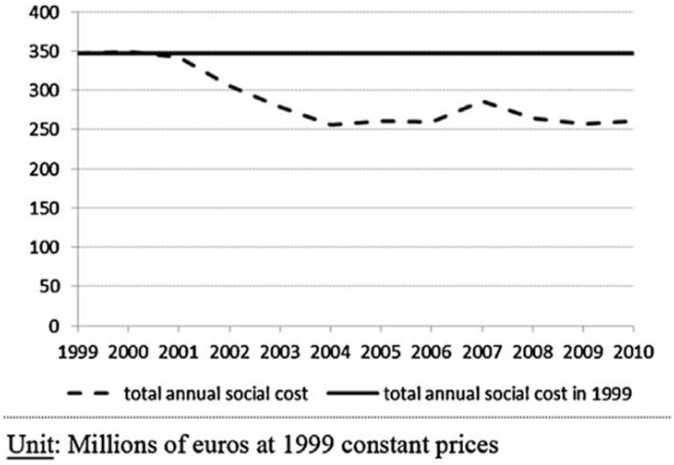
Source: Gonçalves, Lourenço, & da Silva (2015)

With regards to indirect social costs, Gonçalves, Lourenço, & da Silva (2015) found following that following drug liberalisation:

- some increase in lost income and productivity associated with drug treatment (correlating with increased patients in accessing treatment);
- a reduction in lost income and reduced productivity associated with drug-related deaths (correlating with a falling death-rate from overdose); and
- a substantial reduction in lost income and reduced productivity associated with drug-related imprisonments (correlating with falling drug-related imprisonments).

On a whole, Gonçalves, Lourenço, & da Silva (2015) notes two clear trends: a slight increase in direct health costs following the implementation of the liberalisation policy; and a significant decrease in non-health related direct and indirect costs. Aggregating all direct and non-direct costs, Figure 43 below presents an estimate of the total annual social costs of drugs between 1999 and 2010. With total costs dropping from €350 in 1999 to around €250 in 2010, the downward trend in this graph gives an indication of the success of the policy in achieving the goal of reducing social costs relating to drug use.

Figure 43: Estimates of total annual social cost, millions of euros, 1999–2010, millions of EU



Source: Gonçalves, Lourenço, & da Silva (2015)

Annex 9: Harm reduction in Sweden

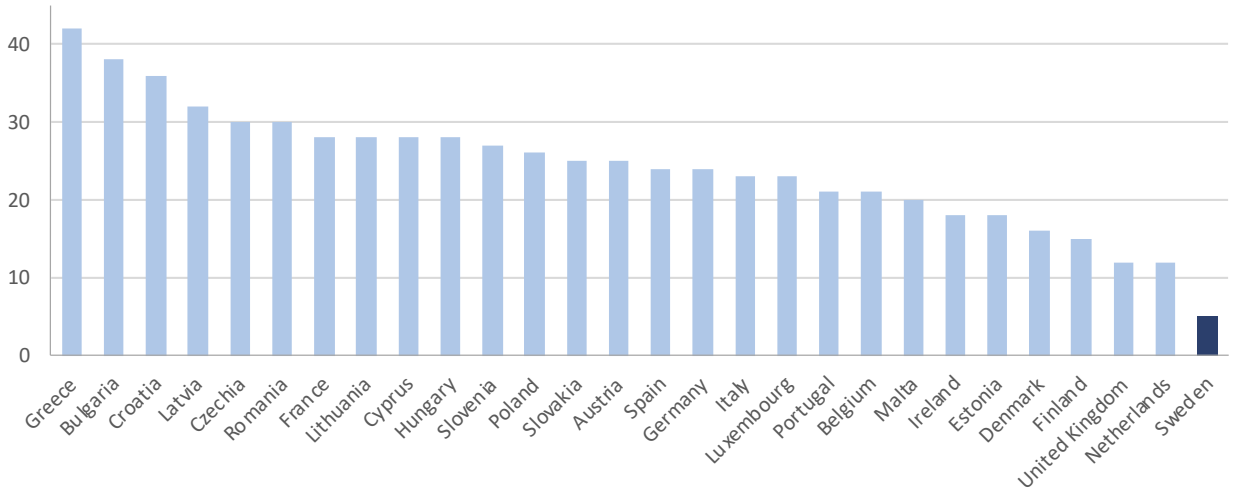
Introduction

Sweden is currently projected to become the first nation to reach smoke free status as soon as this year (2023). Smoking rates as confirmed by Swedish authorities fell to just 5.6% of their population over 16 years old in November 2022[148,149]. The country prides itself in its approach to tobacco policy and regulation that has contributed to a large reduction in smoking rates over recent decades. Elements of the Swedish policy approach can be summarised under two broad categories:

1. promotion and use of smoke-free alternatives; and
2. comprehensive tobacco control measures.

These are discussed in turn below.

Figure 44: Smoking rates across the EU, 2020, %



Source: Swedish Match

Promotion and use of smoke-free alternatives

Sweden has a long track record of successfully promoting and using reduced harm alternatives to smoking. These alternatives include snus, tobacco pouches and more recently vaping products.

History and prevalence of snus

Snus is a form of smokeless tobacco product that originated in Sweden and has been used in the country for over two centuries. Made with finely ground tobacco, it is placed between the upper lip and gum, taking the oral mucosal absorption route for nicotine exposure.

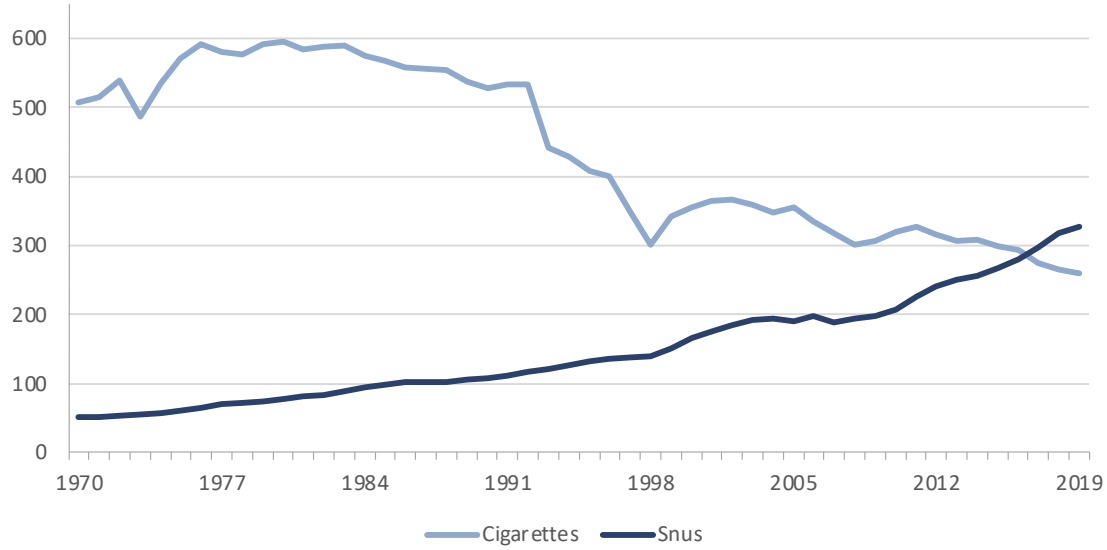
[148] Human, Milton & Fagerström (2023).

[149] The European Network for Smoking and Tobacco Prevention (ENSP) and WHO are consistent in their definition of smoke free as an adult population of fewer than 5% who smoke tobacco.

When tobacco was first introduced to Europe in the early 1500s, it was mainly popular amongst the upper class. However, the French Revolution saw a huge upheaval in the tobacco market and set forth a growth in tobacco cultivation and innovation in Sweden.[150] Sweden was the only European country to encourage tobacco cultivation at the time. Farmers began to make their own mixtures of ground tobacco, potash and water for personal use, one of which created snus. This smokeless form of tobacco grew in popularity, favored due to its convenience in industrial and agricultural settings. In 1795, the first snus factory was founded in Goteborg and by the 1840s, snus was firmly established as the most popular tobacco product in Sweden.[151]

Today snus is widely used in Sweden, particularly amongst men, with around 18.5% of the male population over 16 using snus, along with 4.2% of women. The acceptance of snus as a smoke-free alternative in Sweden can be attributed to cultural factors such as the Swedish emphasis on health and wellness, the concept of "lagom" (moderation), and a strong sense of individual responsibility for health.[152] This cultural acceptance has allowed snus to be seen as a viable alternative to smoking.

Figure 45: Consumption of cigarettes and snus, 1970 to 2019, million packs/cans



Source: Swedish Match

A significant uptake of smoke-free alternatives alongside falling smoking rates suggests the two trends were associated. As demonstrated by Figure 45, cigarette consumption rates dropped from around 500 million packs in the 70s to around 225 million packs in 2019, while snus consumption rates grew from around 75 million cans in the 70s to nearly 325 million cans in 2019. Smoking rates declined as each new reduced risk nicotine product was introduced. Where snus could not sway smokers, the introduction of nicotine pouches in 2018 (now used by 5% of the population) may have. Similar to snus, nicotine pouches are oral nicotine products, the main difference being the presence of tobacco in snus. Similarly, the Eurobarometer poll found that as the number of Swedes who had tried vaping increased from 7% in 2015 to 12% in 2020, smoking decreased.[153]

The growth of smoke-free alternatives in Sweden may be credited at least in part to the investment Sweden has dedicated to research and development of smoke-free alternatives. Swedish snus has undergone extensive research and development, which has resulted in the production of high-quality snus products that are low in harmful chemicals and toxins.[154] This has made snus an attractive

[150] Swedish Match (n.d.).

[151] ACSH Staff (2004).

[152] Hansson & Mäkelä (2014).

[153] Human, Milton & Fagerström (2023).

[154] Fagerström (2003).

alternative to smoking for many Swedes. The government has also sought to provide fact-based information on low-risk alternatives, acknowledging that though there are no risk-free tobacco or nicotine products, vaping products are perhaps 95% or more less harmful than cigarettes. Making alternative products widely accessible, acceptable and affordable increased awareness around the risks of these products compared to cigarettes.[155]

Health impacts of smoke-free alternatives

The growing acceptance of smoke-free alternatives to cigarettes in Sweden appears to have brought about significant improvements to smoking-related illness and deaths statistics. Although alternatives can certainly be used alongside cigarette smoking, the vast majority in Sweden choose to use these as an aid to quitting smoking. Consequently, illnesses related to smoking seem to have decreased as a result.

In comparison to other EU countries, Sweden boasts the lowest rates of smoking-related diseases and deaths in Europe and a 41% lower incidence of cancer than the rest of the EU.[156] The risk of developing diseases from snus use is approximated at about 1% of that from smoking.[157] This suggests that the use of snus has not only contributed to lower smoking rates in Sweden but also important health recuperation. These conclusions are supported by 2018 data published by WHO, finding that Sweden had the lowest rate of tobacco-related mortality and the lowest incidence of male lung cancer in Europe. Research found that the health risks associated with snus use are comparable to those of nicotine replacement therapies such as nicotine gum or patches.[158]

Snus has established a firm standing as the dominant form of tobacco-consumption in Sweden. While consumption still carries health risks including oral cancer, gum disease, and cardiovascular disease, snus is substantially less harmful than smoking because it does not involve combustion and the subsequent release of chemicals such as tar and carbon monoxide. As a more established and arguably well-evidenced harm reduction product, snus stands out against other smokeless alternatives such as vaping and nicotine pouches. However, its successful uptake as a low-harm alternative in Sweden is likely to some extent related to the long history of usage and overall, the availability and openness to lower-harm smoking alternatives in Sweden.

Comprehensive tobacco-control measures

In 2016, the Swedish government, with the support of Parliament, set the goal of making Sweden smoke-free by 2025.[159] The past few decades have seen strict policy measures imposed on the tobacco industry and smoking in Sweden. Tobacco control measures include:

- taxes on tobacco products – cigarettes are taxed at 1.64 Swedish kronor ($0.26 NZD) per unit;
- restrictions on public smoking – smoking is prohibited in outdoor spaces such as those intended for athletic activities, public transport and restaurants; and
- a ban on tobacco advertising and sponsorship – promoting tobacco products on commercial advertisements such as radio and television is prohibited.[160]

Smoke-free alternatives, such as snus, are also regulated and subject to quality control standards. Due to its long history in Sweden, snus is legal, even though it is prohibited in the rest of the EU. The

[155] ACSH Staff (2004).

[156] Human, Milton & Fagerström (2023).

[157] Kozlowski & Abrams (2016).

[158] Hansson & Mäkelä (2014).

[159] The Swedish Government aims at Smoke Free Sweden 2025 - Tobaksfakta.

[160] The National Institute of Public Health, 2019.

Swedish model combines recommendations from the FCTC such as reducing supply and demand for tobacco, banning smoking in certain places, with accepting smoke-free products as less harmful alternatives. Alongside rejecting the proposal to ban flavoured vaping products, the government has financially incentivised a switch to smoke-free alternatives. The government's tobacco taxation strategy is based on risk level – more harmful products such as cigarettes are higher risk and taxed more heavily while lower risk smokeless alternatives are taxed at lower rates.

Snus regulation in Sweden, the EU and NZ

In Sweden, snus is regulated as a food product under the Swedish Food Act, requiring that snus meets certain purity standards and is free from harmful substances. This also means that all ingredients are listed on the labels of each package. In 2016, the Swedish National Food Agency implemented an addendum regulating the content of the foreign substances B(a)P and NNN + NNK, which are present in snus and chewing tobacco. Lead and aflatoxins were already regulated. The production and marketing of snus is also regulated by the Swedish National Food Agency.

Although Swedish law allows the sale and use of snus within the country, its exportation to other countries within the EU is prohibited. This is due to the EU-wide ban on the sale of snus, with Sweden and Norway the only exceptions.

In New Zealand, the legal status of snus has been strictly regulated since 1990 under the Smoke-free Environments Act 1990. According to this legislation, the sale, importation and distribution of snus are explicitly prohibited, while the tobacco-free version, nicotine pouches, are now also prohibited with the recent 2020 amendment to the bill. Tobacco is taxed uniformly in New Zealand.

Support for smoke-free alternatives from public health organisations

The WHO has acknowledged the potential of smoke-free alternatives, such as snus, as part of a harm-reduction strategy for smokers who are unable or unwilling to quit.[161] The Royal College of Physicians in the UK has also endorsed the use of smokeless tobacco products as a less harmful alternative to smoking.[162] However, other public health organisations such as the American Cancer Society and the Centers for Disease Control and Prevention in the US do not recommend the use of smokeless tobacco products due to their potential health risks.[163]

[161] World Health Organization (2018).

[162] Royal College of Physicians (2018).

[163] American Cancer Society (2021); Centers for Disease Control and Prevention (2021).

Annex 10: ASH report

Review of: "Tobacco endgame intervention impacts on health gains and Māori:non-Māori health inequity: a simulation study of the Aotearoa-New Zealand Tobacco Action Plan"

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Potential competing interests: No potential competing interests to declare.

Summary

Building on recent progress towards the New Zealand Smokefree 2025 goal, the Government plans to introduce tobacco control legislation giving ministers powers to implement three significant new policies:

- a steep reduction in the number of retail outlets that can sell tobacco;
- a 'smokefree generation' proposal that would make it illegal to sell tobacco to anyone born after a certain date, and;
- regulations to remove most of the nicotine from tobacco to reduce its appeal and addictive effects.

In preparation for this legislation, the Ministry of Health funded academics from Australia and New Zealand to model estimates of the likely impact of these measures, especially their contribution to achieving the Smokefree 2025 goal. The modelling, published as a preprint, Ouakrim et al. (2022)[1] ,is the subject of this review. It focuses on the modelling of the denicotinisation of tobacco because, according to the authors, it has the greatest impact.

A number of significant flaws have been identified. The modelling is based on a fundamental and incorrect assumption that denicotinisation would reduce smoking by 85% over five years compared to business-as-usual. This draws on an earlier modelling paper, Wilson et al. (2022),[2] supplemented by other literature and expert opinion.

The assumption, used as a key input to the model, is derived from a misinterpretation of a well-conducted randomised controlled trial of smoking cessation interventions that included very low nicotine content (VLNC) cigarettes in New Zealand in 2009-10, Walker et al. (2012).[3]

The problem is that the trial design bears little relation to a population-wide denicotinisation regulatory intervention and its findings are not at all transferable to a model of the legislation.

- Volunteers who had already called the Quitline were given pharmacological and behavioural support;
- The intervention group were also given free VLNC cigarettes and instructed to smoke them if they wanted to;
- The trial intervention lasted only eight weeks and its impact assessed at six months.
- The trial does not include the most likely responses to the denicotinisation measure: switching to vaping, accessing an expanded illicit market, or workarounds by consumers or producers.

The results of the trial indicate that the 7-day abstinence quit rate at six months increased to 33% in the group with access to VLNC cigarettes, compared to 28% in the “usual care” control group, a 5% increment. The modelling, however, implicitly assumes that:

- All people who smoke - including people with no interest in quitting or who are unable or unwilling to access pharmacological and behavioural support - would achieve this rate of quitting;
- The same quit rate would apply if people had to purchase denicotinised cigarettes, rather than receive them free of charge.
- All of the quit rate, 33%, could be attributed to the introduction of a population-wide denicotinisation policy and this quit rate would compound over five years, deriving, erroneously, an 85% reduction in smoking prevalence; the trial provides no basis for assuming a regulatory intervention will have this smoking cessation effect after one year or that it will repeat year after year.

Finally, the modelling makes unrealistic estimates of the implementation timetable, transitional arrangements, and the effects of stocks and hoarding. In doing so, it greatly exaggerates any likely impact on the 2025 targets.

In conclusion, the modelling on which the proposed legislation is based is seriously flawed:

- It makes ill-founded assumptions based on a misinterpretation of a smoking cessation trial in which denicotinised cigarettes were provided as an enhancement to standard smoking cessation interventions to people who were already making a quit attempt.
- It does not reflect the real-world dynamics of the population-wide regulatory intervention it is supposed to represent.
- It fails to take into account illicit trade in regular tobacco and other “workarounds”. This could be substantial and must be incorporated into any modelling of the denicotinisation measure.
- Modelling the legislation for policymaking purposes should more accurately reflect the real-world processes involved (e.g. illicit trade, workarounds, switching to vapes) and place greater emphasis on transparency of the assumptions used, sensitivity testing and scenario analyses.

Recommendations

We recommend that the government reconsiders its confidence in the policy assessment and impact analysis that underpins Cabinet support for denicotinisation. We note that further forecasts of impact will not be reliable or informative at this stage.

We recommend that the Government should require that:

- Future modelling should focus on testing a range of scenarios in relation to quitting behaviours, switching to smokefree products, and access to illicit tobacco products;
- A more focussed examination be undertaken of plausible unintended consequences of the legislation and the impact of trying to impose abrupt non-voluntary smoking cessation on the whole population;
- Further analyses examine the optimum timing for introducing these measures, for example, once smoke-free alternatives are more widely accepted and used voluntarily as alternatives to smoking
- Such analyses build on recent progress towards the Smokefree 2025 goal by strengthening existing measures which seem to be working including a broader and more concerted push to encourage people who smoke to change to

smoke-free alternatives.

Introduction

To help New Zealand come closer to meeting its *Smokefree Aotearoa 2025* target to reduce adult daily smoking prevalence to below 5 per cent by 2025,.[4][5] the Smokefree Environments and Regulated Products (Smoked Tobacco) Amendment Bill now before Parliament proposes three major tobacco policy interventions with the following aims:[6]

1. To significantly limit the number of retailers legally able to sell smoked tobacco products.
2. To prevent young people from taking up smoking by prohibiting the sale of smoked tobacco products to anyone born on or after 1 January 2009.
3. To make smoked tobacco products less appealing and addictive, primarily by reducing nicotine levels in tobacco on sale in New Zealand ("denicotinisation").

With funding from the New Zealand Ministry of Health, Ouakrim and colleagues[1] have modelled the effect of these measures on smoking prevalence and ultimately on health outcomes and health disparities. This modelling has been promoted in support of a political decision to implement the measures.

For example, a commentary, *New Zealand's 'tobacco endgame' law will be a world first for health – here's what the modelling shows us,* enthusiastically backs the measures and assert that the modelling was used as part of New Zealand Cabinet deliberations on the proposals.[7]

> *Our findings underpinned the regulatory impact statement that set out the options to regulate tobacco products as part of the action plan, which Cabinet considered in early 2022.*

The relevant Cabinet paper confirms the modelling was a material consideration in the government's decision to proceed with these measures:[8]

> *The University of Melbourne undertook modelling to inform the proposed actions. This provides confidence that the bold actions proposed are required to meet the goal.*

While the intentions of the Bill are laudable, measures with a coercive restrictive element often give rise to perverse unintended consequences.[9] Further, over-reliance on the apparent sophistication and precision of models may lead decision-makers into complacency about unwanted harmful effects arising from such policies, and to dismiss the need to mitigate these risks.

The credibility of the modelled results, and the claims made about them, clearly depend on the credibility of the assumptions entered into the model. The critical assumption in the main modelling paper, Ouakrim et al. 2022[1] is based on two earlier papers: Wilson et al. 2022,,[2] which is an effort to model the effects of tobacco denicotinisation in New Zealand, and Walker et al. 2012[3] which is a randomised controlled trial conducted in New Zealand in 2009-10 and used as the source for the major assumptions in the Wilson et al. modelling paper. The data from the earlier papers is

supplemented by other literature and expert opinion, including opinions of the authors.

Analysis

This analysis reviews the three papers in turn and highlights major concerns with the ultimate findings of the Ouakrim et al. modelling. Ten specific problems are identified.

Are the critical assumption made in Ouakrim et al. 2022[1] credible and evidence-based?

This paper reports on modelling of combinations of the three "endgame" strategies incorporated in the legislation, making assumptions about their timing and scale:

> *1. Denicotinisation of all retail tobacco in 2023,*
> *2. 1 plus media promotion,*
> *3. 95% reduction in tobacco retail outlets in 2023,*
> *4. a tobacco free-generation whereby people born in 2006 and later are never legally able to purchase tobacco,*
> *5. combined package of 2, 3 and 4.*

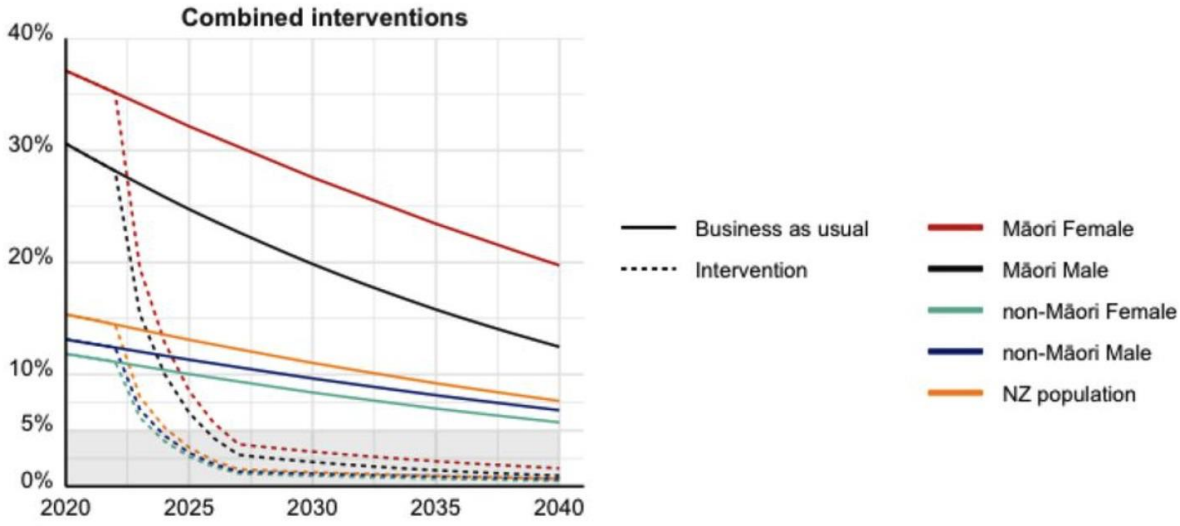
This review focuses only on the denicotinisation measure because it dominates the benefits generated by the model both individually and when the interventions were combined. According to Ouakrim et al.:

> *The denicotinisation strategy alone achieved 97% of these HALYs [health-adjusted life-years], the retail strategy 19%, and tobacco-free generation 12%.*
> ***Conclusion*** *A tobacco endgame strategy, especially denicotinisation, could dramatically reduce health inequities.*

To reach this finding, Ouakrim et al. make a boldinput assumption that in five years, smoking prevalence will fall to approximately 15% of business-as-usual (BAU) as a result of the denicotinisation measure and adjusted their smoking cessation rates to align with this assumption.

> *Denicotinisation: initiation was estimated to reduce to 10% (95% UI 2.6% to 21.5%) of that in BAU by five years after implementation;* ***cessation transition probabilities were increased so that over five years the smoking prevalence in CS [current smoker] and DU [dual use] states was 15.2%*** *(95% UI 3.7% to 32.9%)* ***of that in BAU****, and from the sixth-year onward cessation transition probabilities were doubled. (bold emphasis added)*

This assumption, an 85% reduction in smoking prevalence compared to BAU, produces extremely abrupt declines in smoking in all groups, as shown in the graphic below extracted from Ouakrim et al. Figure 1. Findings of such abrupt changes in behaviours that have proven stubbornly resistant to policy over many years of tobacco control policy test the boundaries of plausibility. Perhaps, they are possible: but it should require convincing evidence for legislators and policymakers to rely on such changes.



Problem 1. The authors have built a dramatic expected decline in smoking into their model*as an input*

Deep reductions in smoking prevalence are included as an*input* to the model. Unsurprisingly, dramatic declines in smoking emerge as an *output* of the model and account for the gains in health and health equity shown in the rest of the modelling. As this review will show, both the structure of the model and the basis for this critical assumption does not stand up to scrutiny of the sources on which it depends.

Ouakrim et al. support their input assumption of an 85% reduction in smoking prevalence compared to BAU with reference to Wilson et al. 2022 (which is cited as reference 28 in Ouakrim et al.) plus their own expert judgement and other opaque sources.

> *To parameterise the intervention scenarios we adapted initial estimates by**Wilson et al, (28)** which derived their potential effects based on A/NZ-specific literature (including a randomised trial of denicotinised cigarettes) and international literature; adaptation for this paper included incorporating additional research and **expert judgements by the authors**. (bold emphasis added)*

Problem 2. Critical assumptions and the literature used are not transparent, and authors rely on their own expert judgement, introducing risks of bias

The published preprint includes the disclaimer that “This article is a preprint and has not been peer-reviewed. It reports new medical research that has yet to be evaluated and so should not be used to guide clinical practice”. It is important, therefore, to scrutinise the nature and provenance of critical assumptions made by the authors.

For the analysis to be credible as a basis for policymaking, there must be clarity about the assumptions made and why they were chosen. Given the Ouakrim et al. modelling results are largely determined by the input assumptions made about

smoking cessation, the statement above describing how the authors made their assumptions ("*parameterise the intervention scenarios*") is insufficient and too opaque. It raises several questions.

- Why was the modelling of Wilson et al., and the particular trial it relied on, deemed a reasonable proxy for characterising the impacts of population-wide denicotinisation legislation?
- How did Ouakrim et al. translate the trial data, literature and expert judgements into an assumption that around one-third of smokers would quit in the first year and this would repeat annually?
- Which international literature was selected, and how was this chosen?
- Was other trial data considered?
- What role did expert judgements play, how did they affect the assumptions, and on what experience and evidence were these judgements based?
- How were plausible unintended consequences, such as a rise in illicit trade, addressed and incorporated?

There is no experience of a population denicotinisation intervention to draw upon and no expertise anywhere in the world in implementing and evaluating such a measure. It follows that any assumptions made about its effects will be speculative and vulnerable to confirmation bias and, therefore, must be highly transparent and open to challenge.

With this sort of modelling exercise, authors should convene independent experts other than themselves to advise on modelling assumptions in a transparent manner. This approach is to lend a measure of impartiality and to avoid bias arising from the policy preferences of the authors. This is important given some of the authors are committed advocates of the 'endgame proposals' having advocated for VLNCs for several years (see the Blakely, Waa, & Ouakrim Conversation commentary[7]).

> *If successful, this would be a monumental achievement for generations of tobacco-control advocates and researchers. The concept of a "tobacco endgame" will move beyond aspiration and into reality.*

This overt policy preference amounts to a significant and unacknowledged conflict for the authors. However, the more fundamental weaknesses arise from assumptions made by Wilson et al., which were then incorporated into Ouakrim et al., as discussed below.

Are the assumptions about smoking cessation made in Wilson et al. 2022[2] credible and evidence-based?

Wilson et al. set out their assumptions on the modelling of the impact of denicotinisation:

> *4.* ***We assumed that 33% of smokers would quit in 2023*** *as per the New Zealand trial data for such products (more specifically, in a trial of 1,410 people, 33% had quit at six months with no reported difference in impact between Māori and non-Māori (31). The remaining 67% were assumed to continue smoking, using either denicotinised tobacco or regular tobacco (obtained via illicit supply or via home-grown tobacco for personal use, which is legal in New Zealand).*
>
> *5. We assumed that there would be the* ***same impact in 2024 and 2025 as there would be in 2023*** *(ie, 33% of smokers using denicotinised tobacco would quit per year).*

> *(bold emphasis added)*

Note: Reference 31 in Wilson et al. 2022 cites the Walker et al. 2012 RCT discussed below.

These assumptions form the basis for the extremely high and abrupt rate of smoking cessation assumed by Ouakrim et al. However, neither of these assumptions is justified by the findings of the Walker et al. trial, as we show in the discussion of that paper below.

Does the Walker et al. 2012[3] trial support the assumption of a 33% quit rate following a nationwide denicotinisation measure?

No criticism of the Walker et al. trial and paper is expressed or intended. Its findings are modest, and its conclusions are cautiously stated. The scientific concern is that Wilson et al. and, therefore, Ouakrim et al. have significantly misinterpreted the Walker et al. trial findings.

Problem 3. The Walker et al. smoking cessation trial bears no relation at all to the effect of imposing a population-wide nicotine regulation covering all smokers

There is no basis for incorporating this effect size of 33% smoking cessation rate into the Wilson et al. modelling and, therefore, into the Ouakrim et al. modelling.

In the Walker et al. trial, the trial population only included people already sufficiently motivated to quit that they had previously called the Quitline. The trial specifically examined what happened when denicotinised cigarettes were added to the relatively intensive smoking “usual care” cessation intervention offered by the Quitline. Walker et al. describe it as follows:

> *Aim: To determine the combined effect of very low nicotine content (VLNC) cigarettes and usual Quitline care [nicotine replacement therapy (NRT) and behavioural support] on smoking abstinence,* ***in smokers motivated to quit.*** *Design Single-blind, parallel randomized trial. Setting New Zealand.* ***Participants Smokers who called the Quitline for quitting support*** *were randomized to either VLNC cigarettes to use whenever they had an urge to smoke for up to 6 weeks after their quit date, in combination with usual Quitline care (8 weeks of NRT patches and/or gum or lozenges, plus behavioural support) or to usual Quitline care alone.*
> *(bold emphasis added)*

Most people who smoke in New Zealand are not this motivated to quit (i.e. to the point of taking action), most are not accessing these services or interventions, and most are not volunteering to participate in an experiment. Ouakrim et al. estimate a ‘business as usual’ quit rate of about 3% per annum.

Walker et al., *by design*, do not use a population that is remotely representative of New Zealand's smoker population. The enhanced smoking cessation intervention in Walker et al. is also not a credible proxy for the market-wide denicotinisation measure, which does not involve mass participation in smoking cessation treatment and counselling for all smokers, even if offered. Uptake of such services might increase to some extent following the legislation, but it cannot be assumed that

the quit rates found with this quite intensive short-term intervention can be generalised to the whole population in response to a denicotinisation mandate. The conditions, intervention, duration and affected populations are *completely different*.

Problem 4. The results presented by Walker et al. show a small incremental effect from the denicotinised cigarettes, not the 33% used by Wilson et al.

A critical assumption in Wilson et al. is that the denicotinisation measure leads to a 33% smoking cessation rate. But the Walker et al. trial shows that offering denicotinised cigarettes made a small incremental increase in the smoking cessation rates in the intervention group compared to the "usual care" control group:

> *Participants in the intervention group were more likely to have quit smoking at 6 months compared to the usual care group [**7-day point-prevalence abstinence 33 versus 28%**, relative risk (RR)=1.18, 95% confidence interval (CI): 1.01, 1.39, P=0.037]*
> *(bold emphasis added)*

The impact made by offering denicotinised cigarettes alongside conventional smoking cessation treatments was to raise the quit rate from 28% to 33%, just five percentage points. This was only just statistically significant and only applies in this particularly motivated group alongside the "usual care" intervention. If most smokers were like that, then without denicotinisation, there would be an annual baseline smoking decline of compound 28% per year, applying the logic of Wilson et al.

Wilson et al. and Ouakrim et al. cannot assume that the intervention they are modelling ("banning nicotine-based tobacco for everyone in a country") has the same effect as the intervention used in the Walker et al. trial ("offering denicotinised cigarettes to smokers enrolled in a smoking cessation programme") yet that is what they have done. Even more concerning, most (28% of the 33%) of the smoking cessation effect used in subsequent modelling is not even attributable to denicotinised cigarettes but to the quitting behaviour of this motivated group accessing conventional smoking cessation services.

Problem 5. Denicotinised cigarettes were given free to smokers as part of a trial, but in real life, smokers would have to pay and are unlikely to use these products

The smokers calling the Quitline in the intervention group were given their denicotinised (referred to in Walker et al. as VLNC - very low nicotine content) cigarettes free-of-charge as part of the trial and instructed to use them when they wished to smoke.

> *Intervention group participants were delivered a carton of 200 VLNC [denicotinised] cigarettes (Quest 3 brand; Vector Tobacco Inc.) by courier, at no cost. Participants were instructed to stop smoking their regular cigarettes on their designated quit day (QD) and to smoke the VLNC cigarettes ad libitum whenever they had an urge to smoke during the subsequent 6 weeks.*

But under the proposed legislation, VLNCs are mandated for the entire smoking population, not provided to manage abstinence for motivated quitters as per the trial. The goal of the proposed policy is not the same as the goal of the trial on which assumed impact is based. The impact of forced abstinence will likely see very different outcomes.

Smokers would need to choose denicotinised cigarettes from the available alternatives, legal or illegal, and buy them with their own money. However, a vast literature characterises tobacco use as primarily a nicotine-seeking behaviour[10] and concludes that nicotine is the reason people smoke.[11] It is unlikely, therefore, that many smokers would choose to spend their money on tobacco with minimal nicotine content. In fact, the Walker et al. trial suggests that few users wanted these products, even if free. Only around one-fifth of those using VLNC cigarettes wanted any more of these free-of-charge cigarettes when offered at the three-week point in the trial:

> *Overall, 94% (583) of the 619 participants in the intervention group who could be contacted at 6 weeks had smoked the VLNC cigarettes given to them,* ***with 21% (n = 132) asking for a second carton.***
> *(bold emphasis added)*

It is far more likely that smokers will seek out nicotine from other sources (illicit tobacco, vaping, renicotinisation) than purchase denicotinised tobacco. The Walker et al. trial does not try to reflect the real decisions smokers would likely make when faced with a range of choices following a denicotinisation regulatory intervention.

Does the Walker et al. 2012[3] trial support the assumption of continuing year-on-year smoking cessation rates of 33%?

The authors build on the inappropriate use of the 33% quit rate from the Walker et al. trial discussed above by making a further assumption that this rate if smoking cessation will continue and compound over multiple years.

> *5. We assumed that there would be the same impact in 2024 and 2025 as there would be in 2023 (ie, 33% of smokers using denicotinised tobacco would quit per year).*

It is this compounding of the 33% smoking cessation rate that underpins the assumption of an 85% reduction in smoking prevalence in Ouakrim et al. Though the assumption is not made explicit, a compound annual 33% decline over five years (the timeframe of the assumption made in Ouakrim et al.) results in an approximately an 85% decrease used in Ouakrim et al. The effect size extracted from the Walker et al. trial and an assumed projection that this will continue and compound for several years is the critical underlying assumption in the Ouakrim et al. paper. There is no basis for making this assumption.

Problem 6. The authors assume that the smoking cessation effects estimated in year 1 will continue and accumulate in subsequent years

There is no basis for assuming that the initial effect of the denicotinisation measure would be replicated and compounded

at the same rate over three years (or, it seems, for five years in Ouakrim et al 2022). It is not possible to support this assumption with the findings from the Walker et al. trial on which the estimate of Wilson et al. is based. The Walker et al. trial concentrated the availability of denicotinised cigarette intervention into just six weeks with a follow-up to look at the results after six months. Walker et al. have nothing to say about subsequent years or a longer intervention than six weeks. The Wilson et al. assumption of continuing cumulative smoking cessation rates equivalent to the initial effect seen in the Walker et al. trial is pure invention.

It is likely that there would be a lower quitting propensity among those that did not quit at the first opportunity. These smokers would tend to be more dependent, less motivated to quit or more committed to continued smoking, and more likely to access a black market.

Have Wilson et al. made reasonable assumptions to incorporate illicit trade into their modelling?

In the Wilson et al. model, two-thirds (67%) of smokers continue to smoke after the first year of the denicotinisation legislation.

> *4. We assumed that 33% of smokers would quit in 2023, as per the New Zealand trial data for such products (more specifically, in a trial of 1,410 people, 33% had quit at six months with no reported difference in impact between Māori and non-Māori (31).* ***The remaining 67% were assumed to continue smoking, using either denicotinised tobacco or regular tobacco (obtained via illicit supply or via home-grown tobacco for personal use, which is legal in New Zealand).***
> *(bold emphasis added)*

The paper recognises that some of these may be accessing illicit trade in regular tobacco. But it does not provide an explicit assumption about the share.

Problem 7. The authors do not have a transparent approach to illicit trade and appear to have ignored it

Wilson et al. have made a hidden or implicit assumption about illicit trade. What if most of the 67% who continue to smoke in year 1 are actually using regular tobacco (e.g. illicit or homegrown), not denicotinised tobacco? Why would these users have an elevated quit rate in subsequent years, as stated in point 6? If there is an available illicit supply, it is possible that many of those in the initial wave of quitting would relapse to using illicit trade in regular tobacco as the illicit market develops. It matters, therefore, what sort of tobacco the 67% who do not quit immediately are using (denicotinised or regular). The approach to illicit trade taken by Wilson et al. is opaque and not articulated. Ouakrim et al. appear to dismiss it as irrelevant.

> *Homegrown tobacco for personal recreational use, and illicit supply, may provide some alternative tobacco source in A/NZ with denicotinisation or substantial reduction in retail access. However, homegrown tobacco is uncommon in A/NZ due to a non-ideal physical environment in most of A/NZ for growing, and tight border security in an island nation with no land borders reduces the potential of an illicit market.*

It is impossible to assess the impact of these measures without including an assessment of consumer and supplier reactions, some of which may be illegal under the proposed regime. Such reactions might include:

- Large-scale smuggling of regular cigarettes
- Cross-border trade in cigarettes via internet mail order
- Significant switching to regular hand-rolling tobacco because it is easier to smuggle
- Illicit domestic manufacture of cigarettes, cigars or rolling tobacco
- Counterfeiting denicotinised cigarettes with regular nicotine levels to avoid detection
- Use of tobacco grown on private land or in controlled environments in New Zealand
- Addition of liquid nicotine to denicotinised tobacco
- Other workarounds arising from unforeseen consumer, supplier or criminal ingenuity

Rather than ignore these possibilities, a model should include illicit market developments explicitly as a module to reflect the role of illicit markets in the real word they are modelling. This applies even if the modellers wish to argue that these effects will be small. Then at least, their assumptions will be visible and open to scrutiny, sensitivity testing and challenge.

How should policymakers and legislators think about these measures?

The problems listed above describe concerns about how the modellers choose assumptions to feed into their model. The second class of problems relates to what the modellers *did not do* and how a more rigorous policy assessment should be approached.

Problem 8. The modellers should treat the denicotinisation measure like a*de facto* ban of regular tobacco rather than a smoking cessation measure

Given smoking is well understood as a nicotine-seeking behaviour, it would be better to model denicotinisation as an outright ban on tobacco, rather than as an adjunct to a smoking cessation intervention, as in the Walker et al. trial. Similar to removing the alcohol from whiskey, removing the nicotine from a cigarette eliminates its*essence* and the main reason people buy cigarettes. These VLNC products have never been a commercial success and largely exist because of the research community's interest in them.[12] Illicit trade would increase (see Problem 7 above), but its scale and nature are difficult to anticipate. There would be little practical difference between a denicotinisation regulation and a full ban of the *tobacco people wish to buy*, and it would bring clarity to model the legislation as a*de facto* ban on tobacco rather than as a smoking cessation intervention.

Problem 9. The modellers do not use a realistic approach to timing and transition

The modelling shows full intervention effects starting in 2023. However, the legislation is still going through the Parliament of New Zealand, and the Health Committee will not deliver its report until 1 December 2022.[13] Once the legislation is passed, it will have a commencement date that will allow time for all the procedural machinery to be put in place. Once the primary legislation comes into force, the Minister will need to draft and consult on detailed implementing regulations for the measure. For example, the amending legislation inserts a new Part 3A into the Act. This new Part will require

regulations for a product approval process, a testing regime, a schedule of prohibited or limited constituents, and a temporary approval regime for non-cigarette tobacco products.

For the nicotine measure, Section 57H of the new Part 3A allows a 21-month period for introducing rules related to denicotinisation following the commencement of amended legislation:[14]

> *The Minister must,* ***within 21 months of the commencement of section 31*** *of the Smokefree Environments and Regulated Products (Smoked Tobacco) Amendment Act 2022, recommend that regulations be made prescribing the limits for the quantity of nicotine in any smoked tobacco product, and a method of determining whether those limits have been exceeded.*
> *(bold emphasis added)*

Such regulations could not take effect immediately but would require the Minister to consult and to allow a transitional period for the commencement of the regulations to permit suppliers to make the necessary applications and to manage inventories. It is unlikely that a legally watertight regime enforcing denicotinisation will be in place before 2025.

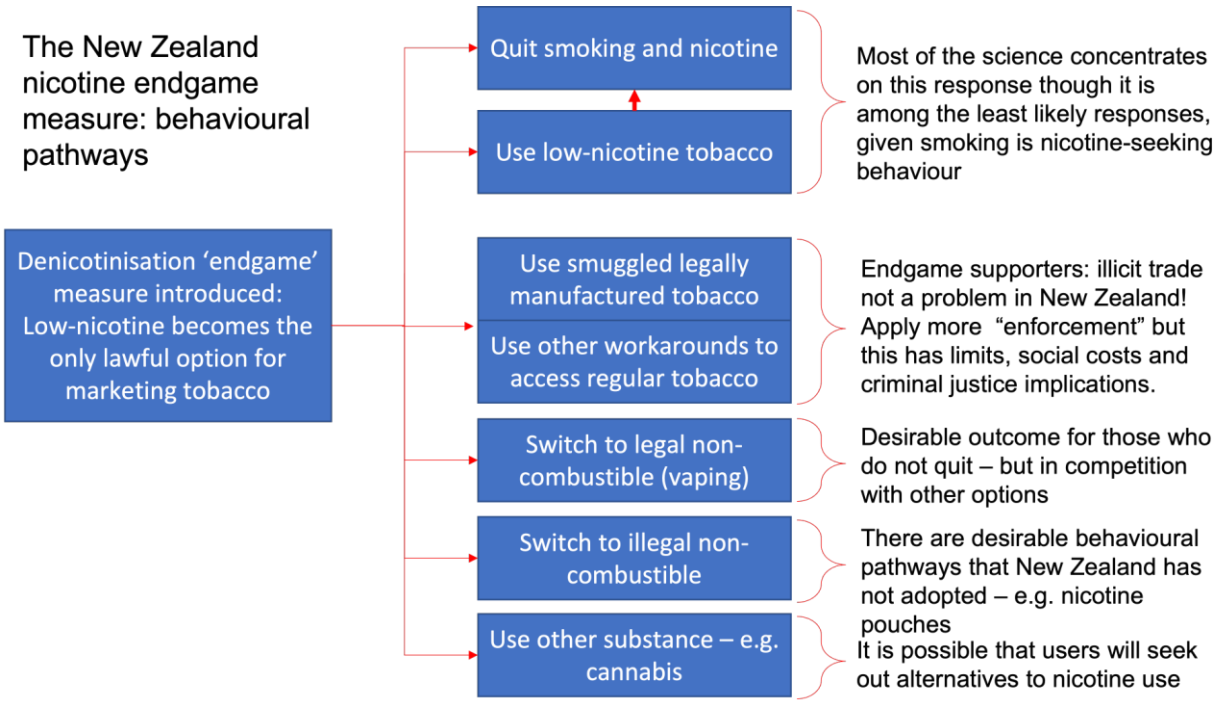
Further lags will arise from the management of inventories (regular nicotine tobacco products held in stock) through the length of the supply chain. Legislators would normally allow time for lawfully purchased stock to be sold off rather than destroyed. But inventories will also build up in the informal or illicit market as new suppliers hope to capitalise on scarcity once supply dries up in the legal market. Individual consumers may also build up stocks to the extent they can afford to purchase in advance.

For the reasons above, it is unlikely that the denicotinisation measure would have any material impact on the 2025 *Smokefree Aotearoa* targets. That does not, of course, invalidate any public health benefits that would emerge after 2025.

Problem 10. The modelling does not even try to reflect the real-world dynamics of a market intervention to denicotinise tobacco

Smokers facing the denicotinisation measure can adopt a range of responses and there would also be changes on the supply side. For example, smokers could conceivably access black-market tobacco, switch to vaping or quit. The proportions following “good” or "bad" pathways are partly a function of the communications, policy, fiscal and enforcement environment. If vapes are attractive, well-marketed, widely available and cheaper than illicit cigarettes, they will be relatively more successful. In practice, it is appropriate to conceptualise the various response options as in *competition* with each other for smokers responding to the denicotinisation measure.

The graphic below shows some possible pathways:



In taking such an approach, a model might have some of the following characteristics:

- Treat the denicotinisation measure as a*de facto* ban of tobacco, not a smoking cessation intervention
- Identify key response pathways that consumers and suppliers can adopt (see graphic above)
- Model different policy packages for each pathway - for example, "high enforcement" or "low enforcement" for illicit trade.
- Consider different responses in different communities.
- Consider the implications of increasing the available "harm reduction" pathways (heated tobacco, smokeless tobacco, nicotine pouches) to compete with the bad pathways.
- Assume initial 'announcement effects' but declining effectiveness over time
- Include the emergence of illicit trade or workarounds
- Allow for transitional timing, storage in the legal and illicit supply chain and hoarding

We do not argue that any of this would be straightforward. But a model purporting to inform policymakers about the effect of a denicotinisation would need to look more like this than the modelling presented in Ouakrim et al. and Wilson et al.

Conclusion

The statistician George Box coined the phrase *"All models are wrong, but some are useful"*[15] and followed this with the obvious corollary "*Remember that all models are wrong; the practical question is how wrong do they have to be to not be useful*." [16]. The Ouakrim model is not useful, not because it is merely wrong, but because it does not even attempt to represent the underlying dynamics that would emerge following the implementation of the proposed legislation.

The input assumptions used in the model determine the positive outcomes presented by the authors. In particular, the modelling inappropriately uses an input assumption that smoking will decline by approximately 85% in five years following

a denicotinisation rule. The basis for this assumption is opaque and cannot be justified by the findings of the trial on which it is largely based.

Further, no information in provided for the evaluation of the expert judgements used in the modelling; how did they come to their conclusion that denicotinisation would lead to an approximate one-third quit rate in the first year after mandatory denicotinisation, which is then sustained for a total of five years?

The modelling is arbitrary and wholly unreliable as a guide to the policy impact. The measures will have consequences, both intended and unintended, but this modelling provides no useful information about what these could be.

We recommend that any modelling of this legislation should more faithfully reflect the real-world dynamics of the proposed population-wide measure and likely market response. We suggest that it is compared to a stronger intervention to encourage switching to smokefree products, rather than business-as-usual.

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