



1 MILLION YEARS OF LIFE

How harm reduction in tobacco policy can save lives

BRIEFING PAPER

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INTRODUCTION

Smoking is the biggest cause of preventable deaths in the United Kingdom. It causes the overwhelming majority of lung cancers, increases the risk of developing various heart problems, and contributes to many other fatal or potentially fatal health conditions.¹ In England alone, recent estimates show that almost 80,000 lives (nearly two million disability-adjusted life years) are lost every year to smoking.^{2,3} Data from the United States shows that the average smoker will lose at least one decade of life expectancy compared to someone who has never smoked, and smokers are more likely to become sick when they are alive.⁴

Why then do people continue to smoke? It doesn't seem to be because people are unaware of the major risks. The 2002 International Tobacco Control survey found that the overwhelming majority of UK smokers were aware that smoking causes lung cancer, heart disease, and stroke: the major causes of excess mortality from smoking.⁵ In fact, evidence suggests that American smokers overestimated the risks of lung cancer from smoking as early as 1980, and it seems unlikely that risk perceptions have declined since then as tobacco control messaging has become more ubiquitous in public life.⁶

Addiction certainly explains why many people continue to smoke, although this does not account for those UK smokers who do not wish to quit. But this explanation is also reductive; smokers report various different benefits from their habit.

1 NHS.uk, "What are the health risks of smoking?" (2015). Available at: <https://www.nhs.uk/chq/Pages/2344.aspx?CategoryID=53>

2 For lives lost, see ONS, "Adult smoking habits in the UK: 2016". Available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthandlifeexpectancies/bulletins/adultsmokinghabitsingreatbritain/2016>

3 The exact estimate for lost DALYs is 1,823,632, taken from Table S8 of supplementary appendix for "Smoking prevalence and attributable disease burden in 195 countries and territories, 1990–2015: a systematic analysis from the Global Burden of Disease Study 2015", Reitsma, Marissa B et al. The Lancet, Volume 389, Issue 10082, 1885–1906. Available at: [https://doi.org/10.1016/S0140-6736\(17\)30819-X](https://doi.org/10.1016/S0140-6736(17)30819-X)

4 Jha, P., Ramasundarahettige, C., Landsman, V., Rostron, B., Thun, M., Anderson, R. N., ... Peto, R. (2013). "21st-Century Hazards of Smoking and Benefits of Cessation in the United States." New England Journal of Medicine, 368(4), 341–350. <https://doi.org/10.1056/nejmsa1211128>

5 Hammond, D. (2006). "Effectiveness of cigarette warning labels in informing smokers about the risks of smoking: findings from the International Tobacco Control (ITC) Four Country Survey." Tobacco Control, 15(suppl_3), iii19–iii25. <https://doi.org/10.1136/tc.2005.012294>

6 Viscusi, W. (1990). "Do Smokers Underestimate Risks?" Journal of Political Economy, 98(6), 1253–1269. Retrieved from <http://www.jstor.org/stable/2937757>

There is a vast research literature connecting nicotine with improved mental performance in various domains.⁷ Survey evidence shows that smoking is often perceived by smokers as a social activity, many find it enjoyable, it creates a positive sense of identity, and relieves boredom.⁸

From a liberal perspective, adults should be trusted to make their own judgements about the relative value of smoking's perceived benefits and costs. Some will judge the trade-off to be worthwhile and following the logic of John Stuart Mill's harm principle (the idea that the only justification for interfering with the liberty of others is in order to prevent harm to others) should have the right to smoke. They should also be aware of the health risks and bear the costs they impose on others through Pigouvian taxes and appropriate regulations. Factoring in revenue raised from tobacco duties, smoking results in a net saving to the Treasury of nearly £20 billion.⁹

Nonetheless, any measure that reduces the health harms of smoking, provides a preferred quit option for those who wish to quit, and preserves the enjoyment of nicotine for those who do not wish to quit is a win-win for all concerned. E-cigarettes and other reduced-risk nicotine products fall squarely into this category and this paper looks at how adopting a liberal, risk-reduction mindset on smoking can accomplish these aims: combating smoking-related harms while preserving the pleasure of the activity for those who wish to retain it.

SHORTCOMINGS OF TRADITIONAL TOBACCO CONTROL

The UK has enacted various policies aimed at reducing smoking rates and smoking initiation, using both the carrot (e.g. funding NHS Stop Smoking services) and the stick (excise duty on cigarettes, plain packaging). Unfortunately, many of these policies are ineffective and may be harmful. This is especially true in the case of tackling smoking initiation, where evidence suggests that non-price tobacco control policies have no effect.^{10 11} The most prominent policies also tend to focus on making smokers' options worse and raising the costs of smoking, rather than providing smokers with superior alternatives.

⁷ For a review of the literature on the benefits and costs of nicotine consumption see Gwern.net, "Nicotine - Benefits" (11 April 2018). Available at: <https://www.gwern.net/Nicotine#benefits>

⁸ Jennifer A. Fidler, Robert West; "Self-perceived smoking motives and their correlates in a general population sample", *Nicotine & Tobacco Research*, Volume 11, Issue 10, 1 October 2009, Pages 1182–1188, <https://doi.org/10.1093/ntr/ntp120>

⁹ Christopher Snowden and Mark Tovey, "Smoking and the Public Purse" (August 2017), Institute of Economic Affairs. Available at: <https://iea.org.uk/wp-content/uploads/2017/08/Smoking-and-the-Public-Purse.pdf>

¹⁰ Jan van Ours and Ali Palali, "The Impact of Tobacco Control Policies on Smoking Initiation in Europe" (2017), Available at: <https://papers.tinbergen.nl/17074.pdf>

¹¹ There is even some doubt about the effects of graphic warning labels on cigarette packets. See Beleche et al., "Are Graphic Warning Labels Stopping Millions of Smokers? A Comment on Huang, Chaloupka, and Fong" (May 2018), *Econ Journal Watch*. Available at: <https://econjwatch.org/articles/are-graphic-warning-labels-stopping-millions-of-smokers-a-comment-on-huang-chaloupka-and-fong>

Following Australia's implementation of plain tobacco packaging in 2012, the UK passed similar legislation in 2015 which came into force in 2016. May 2017 marked the beginning of total illegality for non-plain packaged cigarettes. The aim of the policy was to make smoking less attractive and therefore discourage initiation while encouraging smokers to quit. It was justified on the basis of reducing the attractiveness of tobacco products, thereby making smoking less pleasurable: encouraging smokers to quit and discouraging non-smokers from taking up the habit.

The Australian experience suggests that plain packaging hasn't yet caused a reduction in smoking rates. Using data paid for by the Australian Commonwealth government, researchers have found that plain packaging had "no statistically significant impact on smokers' quit attempts".¹² Other studies have come to similar conclusions.¹³ Cigarette sales actually rose in the first 12 months after the policy was implemented, prompting a significant hike in taxes that renders the smoking rate itself an entirely unsuitable measure for determining the policy's effects.¹⁴

The ineffectiveness of plain packaging in Australia appears to have been repeated in the UK, with analysis released in May 2018 showing no statistically significant impact on smoking prevalence so far.¹⁵ The same study also found that TPD2 (Tobacco Products Directive), a series of restrictions such as banning 10 packs of cigarettes and setting a minimum weight for rolling tobacco packs, also had no impact on smoking prevalence. It might be objected that the aim of plain packaging was long-term change via effects on smoking initiation rates, but statements from tobacco control campaigners on the policy specifically attempt to link apparent declines in smoking rates to the effect of plain packaging.¹⁶ It is possible that the effects of plain packaging may become more prominent in the long-run, but the results from Australia and early indications of the UK experience are uninspiring.

These results would not be a major problem if there were few costs to the policy, but plain packaging has been a gift to the black market in illegal tobacco and the criminal gangs who profit from it. In 2016, illicit cigarettes accounted for around

¹² Davidson, Sinclair and de Silva, Ashton, "What the Government Demanded As Proof for Plain Packaging Efficacy: An Analysis the Public Health Lobby Did Not Perform" (May 3, 2017). Available at SSRN: <https://ssrn.com/abstract=2962216> or <http://dx.doi.org/10.2139/ssrn.2962216>

¹³ Ashok Kaul and Michael Wolf, "The (Possible) Effect of Plain Packaging on Smoking Prevalence in Australia: A Trend Analysis" (2014), University of Zurich. Available at: <http://www.econ.uzh.ch/static/workingpapers.php?id=844>

¹⁴ Christopher Snowdon, "Red faces for plain packaging champions", Khmer Times (December 6 2017). Available at: <https://www.khmertimeskh.com/5094119/red-faces-plain-packaging-champions/>

¹⁵ Europe Economics, "TPD2 and standardised tobacco packaging — What impacts have they had so far?" (May 2018). Available at: http://www.europe-economics.com/publications/tpd2_and_standardised_tobacco_packaging_may_2018.pdf

¹⁶ For example, Action on Smoking and Health, "Huge drop in Australian smoking rates attributed to standardised packs" (July 2014). Available at: <http://ash.org.uk/media-and-news/press-releases-media-and-news/huge-drop-in-australian-smoking-rates-attributed-to-standardised-packs/>

one in every seven smoked in the United Kingdom, with an estimated £2.5 billion lost in tax revenue in 2016-17.^{17 18}

In Australia, plain packaging in combination with significant rises in excise duty led to a well-documented rise in illicit trade.¹⁹ Illicit cigarettes are significantly cheaper than their legal alternatives and counterfeit cigarettes may contain significantly higher levels of carcinogens and toxicants. Since some are made in illegal, unsanitary conditions, they may also contain asbestos, mould, dead flies, rat droppings, and even human excrement.²⁰

Data for the UK is limited by the short amount of time the policy has been in effect, but early indications suggest that plain packaging has benefitted the illicit tobacco trade.²¹ As plain packaging was being debated in the UK, a 2014 undercover investigation by The Sun newspaper detailed how one group of smugglers were rejoicing at the possibility:

“Indonesian forger Fauz Firdaus said his profits would soar when he no longer has to copy the complex packaging and embossing on popular makes like Marlboro and Regal.

He even punched the air as he mocked PM David Cameron, cheering: “Plain packaging... I support the UK Government!”

Firdaus, 35, told The Sun his factories in Surabaya, Indonesia’s second biggest city, were knocking out 100 MILLION cigarettes a month — enough to fill ten sea containers.”²²

In summary, plain packaging appears to be of limited effectiveness at reducing the smoking rate and evidence suggests that there are also significant costs of the policy.

¹⁷ KPMG, “Project Sun - 2016 Results” (July 2017). Available at: <https://assets.kpmg.com/content/dam/kpmg/uk/pdf/2017/07/project-sun-2017-report.pdf>

¹⁸ DHMRC, “Measuring tax gaps 2017 edition: Tobacco tax gap estimates for 2016-17” (26 October 2017). Available here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/654490/HMRC-tobacco-tax-gap-estimates-2017.pdf

¹⁹ Christopher Snowden, “Chickens coming home to roost” (26 September 2017), Velvet Glove, Iron First. Available at: <https://velvetgloveironfist.blogspot.com/2017/09/chickens-coming-home-to-roost.html>

²⁰ “Human excrement, asbestos and dead flies: The ingredients found in fake cigarettes that cost the taxpayer billions” (9 September 2012), Daily Mail. Available at: <http://www.dailymail.co.uk/news/article-2200633/Human-excrement-asbestos-dead-flies-The-ingredients-fake-cigarettes-Britain.html>

²¹ “First fake plain packs discovered, rogue retailers making small fortune” (10 Nov 2017), BetterRetailing.com. Available at: <https://www.betterretailing.com/first-fake-plain-packs-discovered>

²² “Sun smokes out Mr Cig” (6 April 2016), The Sun. Available at: <https://www.thesun.co.uk/archives/news/867896/sun-smokes-out-mr-cig/>

TOBACCO DUTY

The most visible policy aimed at reducing smoking rates (while raising revenue for the Treasury) is tobacco duty. Current UK policy prescribes a tax of 16.5% of the retail price plus £4.34 on a packet of 20 cigarettes, which makes up the majority of the cost of a pack for the consumer.²³ Excise duty on cigarettes is set to rise by RPI plus 2% for the foreseeable future, and estimates from Frontier Economics have suggested that this will result in an annual reduction in the smoking rate of around 0.14%.²⁴ This estimate incorporates the fact that some smokers respond to tobacco duty increases by substituting for illicit cigarettes, which may encourage additional youth uptake given their significantly lower price.

NHS STOP SMOKING SERVICES

The NHS provides various services to smokers who are looking to quit across the UK, including group therapy and one-to-one support. It is provided by trained personnel, such as specialist smoking cessation advisors and trained nurses and pharmacists. Every year, tens of thousands of smokers in England successfully quit long-term using NHS services, but the number of smokers using these services has been trending sharply downwards since 2011.²⁵ Although this can partially be explained by a reduction in overall smoking numbers, there has also been a significant decline in the proportion of smokers using NHS Stop Smoking services in England and Scotland.^{26 27}

One explanation for this decline could be the popularisation of e-cigarettes as a smoking cessation method. While Stop Smoking Services play an important role in helping UK smokers to successfully quit, reduced-risk products pose a significantly lower overall cost to the NHS and the taxpayer, freeing up resources for use in other areas of healthcare. Embracing alternate quit options is an important part of the harm reduction approach, which has seen great success across the world.

WHY WE SHOULD ADOPT A HARM REDUCTION MODEL

To its great credit, the United Kingdom has in many ways adopted a successful, pragmatic approach to smoking cessation. Our smoking rate is the second lowest in Europe (only behind Sweden), which is partially due to the rapid market penetration of e-cigarettes. Our public health establishment has been broadly consistent in supporting this harm reduction approach. Responding to the Department of Health's July 2017 position statement on tobacco control, Clive Bates (former Director of Action on Smoking and Health) summed up our world-leading approach:

²³ HMRC, "Excise Duty - Tobacco Duty rates" (22 November 2017). Available at: <https://www.gov.uk/government/publications/rates-and-allowances-excise-duty-tobacco-duty/excise-duty-tobacco-duty-rates>

²⁴ Frontier Economics, "Working towards a smoke-free England" (November 2017). Available at: https://www.pmi.com/resources/docs/default-source/uk-files/frontier-report---working-toward-a-smoke-free-england-nov-2017.pdf?sfvrsn=52d883b5_0

²⁵ *ibid.*

²⁶ *ibid.*

²⁷ Frontier Economics, "Working towards a smoke-free Scotland" (March 2018). Available at: <https://www.frontier-economics.com/documents/2018/03/pmi-scotland-smoking-report.pdf>

*“This is probably the first significant government policy paper anywhere that recognises and pursues the opportunities of tobacco harm reduction, rather than defining these technologies as a threat to be suppressed. For that, the Department of Health and its allies deserve considerable credit.”*²⁸

The basic premise of harm reduction is simple; make it as easy as possible for smokers to switch to nicotine products that cause them significantly less harm. This must involve:

1. Educating smokers on the relative risk levels of different reduced-risk products,
2. Ensuring that smokers know these reduced-risk products are available as a smoking cessation aid,
3. Expanding the range of reduced-risk products available by encouraging innovation, in order to cater to different smokers’ preferences,
4. Setting taxation levels to accurately reflect the relative risk levels of different reduced-risk products, rather than to maximise revenue,
5. Designing smart regulations that ensure a consumer-friendly experience of reduced-risk products.

The three case studies of Japan, Sweden and the United Kingdom demonstrate the successes of the reduced-risk products and elements of the harm reduction approach.

JAPAN & HEAT-NOT-BURN

“Heat-not-burn” refers to a relatively recent category of reduced-risk tobacco products that work by using a heating element to produce a nicotine-containing vapor without combustion occurring. Public Health England recently summarised the emerging evidence base for heat-not-burn products by stating that they “may be considerably less harmful than tobacco cigarettes and more harmful than e-cigarettes.”²⁹ The Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) recently looked at two heat-not-burn products available in the UK and found that compared to conventional cigarettes “there were some HPHCs [harmful and potentially harmful compounds] where the reduction was approximately 50%, but the reduction in a number of other HPHCs was greater than 90%.”³⁰

²⁸ Clive Bates, “English tobacco control plan embraces tobacco harm reduction - world first” (July 18 2017). Available at: <https://www.clivebates.com/english-tobacco-control-plan-embraces-tobacco-harm-reduction-world-first/>

²⁹ McNeill A, Brose LS, Calder R, Bauld L & Robson D (2018). “Evidence review of e-cigarettes and heated tobacco products 2018. A report commissioned by Public Health England.” London: Public Health England. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/684963/Evidence_review_of_e-cigarettes_and_heated_tobacco_products_2018.pdf

³⁰ COT, COC and COM, “Statement on the toxicological evaluation of novel heat not-burn tobacco products” (December 2017). Available at: https://cot.food.gov.uk/sites/default/files/heat_not_burn_tobacco_statement.pdf

Nicotine-containing e-cigarettes have been banned in Japan since 2010, as a result heat-not-burn products comprise virtually the entire reduced-risk market in the country.

Since 2014, several heat-not-burn products have been introduced in Japan: Philip Morris' *IQOS* in 2014, followed Japan Tobacco's *Ploom Tech* in March 2016 and British American Tobacco's *glo* later that year.

In one year, *Heatsticks* (the tobacco units used with *IQOS*) massively increased their market share in Japan from 2.2% to 10%.³¹ This is likely to have been partially driven by *IQOS* being featured on a popular Japanese TV entertainment show in April 2016, and the rise in use has been so great that Heatsticks now outsell *Marlboro* cigarettes.³² The displacement of smokers to *IQOS* in Japan is clearly reflected in significant declines in cigarette sales.³³

SWEDEN & SNUS

Less than 9% of Swedish adults smoke cigarettes: the lowest rate in Europe.³⁴ This is undoubtedly linked to snus: a smokeless tobacco product placed under the top lip in order to deliver nicotine. Snus grew significantly in popularity since its emergence in the 1970s, although variants have been in use since the early 18th century. Snus is significantly safer than smoking and experts have estimated that switching completely from cigarettes to snus would result in a 90% reduction in overall risk.³⁵ Other research has found very little difference in life expectancy between ex-smokers and snus users.³⁶ Recent survey evidence covering more than 60,000 Swedes has found that "snus has both contributed to decreasing initiation of smoking and, when used subsequent to smoking, appears to facilitate smoking cessation."³⁷

However, snus is banned in every European country except Sweden. Although this is unfortunate for smokers who enjoy nicotine use but want to avoid significant

³¹ PMI, PHILIP MORRIS INTERNATIONAL INC. (PMI) REPORTS 2017 SECOND-QUARTER RESULTS. Available at: <http://phx.corporate-ir.net/External.File?item=UGFyZW50SUQ9Njc1NTk5fENoaWxkSUQ9MzgZnZUzffR5cGU9MQ==&t=1>

³² Tabuchi T, Gallus S, Shinozaki T, et al, "Heat-not-burn tobacco product use in Japan: its prevalence, predictors and perceived symptoms from exposure to secondhand heat-not-burn tobacco aerosol" *Tobacco Control*. Published Online First: 16 December 2017. doi: 10.1136/tobaccocontrol-2017-053947

³³ Abrams et. al, "Submission to Tobacco Products Scientific Advisory Committee" (14 December 2017). Available at: <https://www.fda.gov/downloads/AdvisoryCommittees/CommitteesMeetingMaterials/TobaccoProductsScientificAdvisoryCommittee/UCM593125.pdf>

³⁴ Folkhälsomyndigheten, "Daglig tobaksrökning" (9 March 2018). Available at: <https://www.folkhalsomyndigheten.se/folkhalsorapportering-statistik/folkhalsans-utveckling/levnadsvanor/tobaksrokning-daglig/>

³⁵ Levy et. al, "The relative risks of a low-nitrosamine smokeless tobacco product compared with smoking cigarettes: estimates of a panel of experts." (December 2004). Available at: <https://www.ncbi.nlm.nih.gov/pubmed/15598758>

³⁶ Gartner, C. E., Hall, W. D., Vos, T., Bertram, M. Y., Wallace, A. L., & Lim, S. S. (2007). "Assessment of Swedish snus for tobacco harm reduction: an epidemiological modelling study." *The Lancet*, 369(9578), 2010–2014. [https://doi.org/10.1016/s0140-6736\(07\)60677-1](https://doi.org/10.1016/s0140-6736(07)60677-1)

³⁷ Ramström, L., Borland, R., & Wikmans, T. (2016). "Patterns of Smoking and Snus Use in Sweden: Implications for Public Health." *International Journal of Environmental Research and Public Health*, 13(11), 1110. <https://doi.org/10.3390/ijerph13111110>

health harms, it does provide a suggestive example of how harm reduction approaches can dramatically improve smoking cessation.

THE UK & E-CIGARETTES

Electronic cigarettes (“e-cigarettes” or “vapes”) are devices that vaporise an “e-liquid” (usually containing nicotine) that is then inhaled by the user. The February 2018 evidence review from Public Health England concluded that e-cigarettes are at least 95% safer than conventional cigarettes.³⁸ Moreover, the latest data available from the Office of National Statistics shows that nearly three million people use e-cigarettes in Great Britain: that’s around one e-cigarette user per three smokers.³⁹ Public health bodies and advocates have repeatedly affirmed their positive impact on smoking cessation, and they are more than 10 times as popular as NHS Stop Smoking services.⁴⁰ There are now more ex-smokers who use e-cigarettes than current smokers.⁴¹ The best available evidence, reviewed earlier this year by Public Health England, suggests “an upper bound estimate of around 57,000 additional quitters annually resulting from e-cigarettes (lower bound around 22,000).”⁴²

Since their emergence in the UK, successive governments have largely followed public health authorities in taking a broadly liberal, harm reduction approach to e-cigarettes. E-cigarettes “were initially regulated as consumer products and were subject to existing product safety legislation, enforced by Trading Standards.”⁴³ Their use is currently permitted in public spaces and some indoor spaces, while the National Institute for Health and Care Excellence (NICE)—which provides national guidance and advice to improve health and social care—has recently taken a comparatively liberal position on e-cigarettes when updating its advice for health workers.⁴⁴

In order to illustrate the importance of this harm reduction approach, it is instructive to compare the UK’s experience of e-cigarettes with that of Australia. The Australian government continues to maintain a total ban on selling nicotine-containing e-liquid which effectively amounts to a near-total ban on e-cigarettes for the purposes of smoking cessation.⁴⁵ Despite large hikes in tobacco duty in recent years, the Australian smoking prevalence rate experienced a statistically insignificant drop of just 0.6 percentage points from 2013 to 2016 (an average drop of 0.2 percentage points per year). Meanwhile, England’s smoking prevalence rate fell by 2.9 percentage points in the same period (an average drop of 0.95 percentage points

³⁸ Public Health England (Feb 2018)

³⁹ ONS, “Adult smoking habits in the UK: 2016”

⁴⁰ Public Health England, “E-cigarettes: an emerging public health consensus” (15 September 2018). Available at: <https://www.gov.uk/government/news/e-cigarettes-an-emerging-public-health-consensus>

⁴¹ Action on Smoking and Health, “Use of e-cigarettes (vapourisers) among adults in Great Britain” (May 2017). Available at: <http://ash.org.uk/download/use-of-e-cigarettes-among-adults-in-great-britain-2017/>

⁴² Public Health England (Feb 2018)

⁴³ Elizabeth Rough and Sarah Barber, “The regulation of e-cigarettes” (31 October 2017). Available at: <http://researchbriefings.files.parliament.uk/documents/CBP-8114/CBP-8114.pdf>

⁴⁴ NICE, “Stop smoking interventions and services - NICE guideline [NG92]” (March 2018). Available at: <https://www.nice.org.uk/guidance/ng92/chapter/recommendations#advice-on-e-cigarettes>

⁴⁵ The only exception for liquid nicotine if you have a doctor’s prescription.

per year).⁴⁶ Although this comparison between the UK and Australia is rough and uncontrolled, the stark difference is suggestive of how different approaches to e-cigarettes affect population health outcomes: especially given the aforementioned evidence on how e-cigarettes aid smoking cessation.

WHAT'S AT STAKE?

Public policy decisions in the field of reduced-risk products play a key role in ensuring smokers are best able to switch and enjoy the significant health benefits. The following illustrative model estimates the potential years of life saved under two realistic scenarios where a liberal, risk-reduction approach to e-cigarettes is taken by policymakers, thus encouraging more current smokers to switch to sole use of e-cigarettes.

Under Scenario One, we first take the proportion of e-cigarette users in Great Britain by age group and determine the age group with the highest use rate. We then calculate the number of additional sole e-cigarette users if all other age groups had the same use rate as the highest. Finally, we use World Health Organisation estimates of additional life expectancy from quitting smoking at different ages and Public Health England estimates of e-cigarette relative risk (95% safer than cigarettes) to obtain an overall estimate for years of life saved. **The total figure is 593,349 additional years of life saved (see Table 1 of Appendix for calculations and data sources).**

Under Scenario Two, we focus on an area of particular disparity in e-cigarette use rates: young men (8.9% of whom use e-cigarettes) vs. young women (2.6% of whom use e-cigarettes).⁴⁷ Firstly, we calculate the number of additional sole e-cigarette users if British women aged 16-24 had the same use rate as men of the same age group. We then use World Health Organisation estimates of additional life expectancy from quitting smoking at different ages and Public Health England estimates of e-cigarette relative risk (95% safer than cigarettes) to obtain an overall estimate for years of life saved. **The total figure is 1,036,640 additional years of life saved (see Table 2 of Appendix for calculations and data sources).**

The model rests on a number of assumptions:

- Current data on e-cigarette use is limited to Great Britain, leading to a likely underestimate of years of life saved owing to the exclusion of Northern Irish data.
- Current data on e-cigarette use in Great Britain shows that over half of current e-cigarette users are ex-smokers, with the overwhelming majority of the remainder being dual users. We therefore make the assumption that 50% of additional e-cigarette users will be ex-smokers.

⁴⁶ Australian Institute of Health and Welfare, "National Drug Strategy Household Survey (NDSHS) 2016—key findings" (01 June 2017). Available at: <https://www.aihw.gov.au/reports/illicit-use-of-drugs/ndshs-2016-key-findings/contents/tobacco-smoking>

⁴⁷ In most age groups, men and women both smoke and vape at similar rates to each other.

- Current data on e-cigarette use by age group is not uniformly distributed. For the 35-49 age group, we use a conservative estimate of lives saved by taking the average increase in life expectancy for those who quit smoking at age 50. We do not include any additional years of life saved for the 60+ age group due to data constraints, leading to a likely significant underestimate of total years of life saved. For other age ranges, we take the midpoint as indicative of years of life saved.
- The model assumes that no additional people who have never smoked become e-cigarette users. This assumption is likely to bias estimates of years of life saved upwards but not to a significant extent: Action on Smoking and Health survey evidence shows that only 0.3% of adult never-smokers use e-cigarettes.⁴⁸

Previous estimates of positive public health impacts from increased e-cigarette adoption amongst smokers have come to varied conclusions but are all indicative of a significant gains.⁴⁹ Public Health England have argued that “the evidence suggests that EC [e-cigarettes] have contributed tens of thousands of additional quitters in England annually.” Recent modelling of e-cigarette adoption’s potential effects on premature deaths and life years saved in the United States has yielded *pessimistic* estimates that “1.6 million premature deaths are averted with 20.8 million fewer life years lost.”⁵⁰

WHAT’S HOLDING US BACK?

One of the most significant barriers to greater adoption of reduced-risk products among UK smokers is the lack of accurate knowledge about the relative risks of these products compared to tobacco cigarettes. Despite Public Health England’s recent assertion that e-cigarettes are at least 95% safer than cigarettes, the majority of smokers across the UK do not believe that e-cigarettes are less harmful than cigarettes and this situation has got worse over time. The PHE’s latest summary of survey evidence on smokers’ knowledge of the relative risks of e-cigarettes is extremely alarming:

Only half of smokers believe that EC are less harmful than smoking and this decreases to one third among smokers who have never tried EC...In contrast to evidence to date, it appears that a majority of smokers and ex-smokers does not think that complete replacement of cigarettes with EC would lead to major health benefits...Where available, international data show similar misperceptions around nicotine and relative harmfulness of EC and smoking as in England. International data also support the trends of increased harm perception of EC with the exception of one survey in youth in the US.⁵¹

⁴⁸ Action on Smoking and Health (May 2017)

⁴⁹ Public Health England (Feb 2018)

⁵⁰ Levy DT, Borland R, Lindblom EN, et al “Potential deaths averted in USA by replacing cigarettes with e-cigarettes” *Tobacco Control* 2018;27:18-25.

⁵¹ Public Health England (Feb 2018)

While smokers are at least largely aware of the existence of e-cigarettes, this is not the case with the small but growing market of heat-not-burn products. A YouGov survey conducted on behalf of Action on Smoking and Health last year found that “only 11% of a sample of GB adults had heard of heat not burn devices.”⁵² According to Public Health England, this likely represents a significant overestimation:

*...survey participants were asked about heated tobacco products prior to answering about EC, which is likely to have led to overestimations of awareness and use of heated tobacco products.*⁵³

There are a number of factors contributing to the lack of public knowledge about reduced-risk nicotine products, all of which need to be addressed.

ADVERTISING RESTRICTIONS

Current rules for most e-cigarette advertising are created, revised, and enforced by the Committee of Advertising Practice (CAP) and the Broadcast Committee of Advertising Practice (BCAP). The Advertising Standards Authority (ASA) administers the CAP and BCAP Codes and ensures that the self-regulatory system works in the public interest. Currently, “ads for nicotine-containing e-cigarettes and e-liquids which are not licensed as medicines” (a definition which describes the overwhelming majority of products on the market) can only be advertised in the following media:

- Outdoor advertising, including digital outdoor advertising
- Posters on public transport (not leaving the UK)
- Cinema
- Direct hard copy mail
- Leaflets
- Private, bespoke correspondence between a marketer and a consumer
- Media which are targeted exclusively to the trade
- Limited factual claims about products on marketers’ websites and the like⁵⁴

The most notable exclusions from this list are TV, radio, newspapers, and the overwhelming majority of online platforms. Furthermore, current advertising restrictions prevent marketers from making substantiated health claims about e-cigarettes.

However, the ASA is currently considering submissions in a consultation aimed at changing the rules around health claims in non-broadcast media. If their proposed changes are approved, non-broadcast marketers will no longer be prohibited from

⁵² Action on Smoking and Health Wales, “Heat not burn products”. Available at: <http://ashwales.org.uk/en/information-resources/topics/heat-not-burn-products>

⁵³ Public Health England (Feb 2018)

⁵⁴ ASA, “E-cigarettes: health claims and public health advertisements” (14 September 2017). Available at: <https://www.asa.org.uk/asset/710B7146-7B3C-4047-95C3E89268FAAE4A.5D38D4B3-0F1C-440D-A0B8894BF588C41D/>

making claims about the relationship between their products and health (assuming they were substantiated according to general advertising rules). This could lead to allowing e-cigarette advertising to reference Public Health England's claims about relative risk and thus result in a huge win for public health.

Unfortunately, broadcast media (regulated by BCAP) is restricted by the provisions of the European Union's Tobacco Products Directive: "BCAP Code directly transposes the European Tobacco Products Directive in prohibiting ads for unlicensed [i.e. non-medicinal], nicotine-containing e-cigarettes."⁵⁵ The potential reach of broadcast media is extremely large and the potential public health gains of diverging from EU law in this area after Brexit are significant.

This reach can be further magnified by both CAP and BCAP reconsidering limitations on promotional (as an addition to factual) e-cigarette advertising, such as celebrity endorsement (provided advertising is clearly targeted at current smokers). The culture of use around e-cigarettes for young adults is arguably unfashionable and masculinised, and allowing marketers to combat the unfavourable public image of e-cigarettes could do much to redress the significant gender imbalance in use that disproportionately damages the health and wellbeing of young women. While such advertising should remain solely targeted at current smokers, concerns about promotional advertising potentially attracting never-smokers to these products remain. Yet even if there was a slight increase in never-smoker use as a result, public health outcomes would almost certainly be very positive. Taking the lower figure of Public Health England's relative risk estimates (95%), it would take 20 never-smokers taking up e-cigarettes to nullify the positive effects of 1 smoker switching to e-cigarette use: an extremely unlikely scenario.

Another important restriction on advertising that also applies to heat-not-burn products is the total ban on inserts of any kind in cigarette packets.^{56 57} One unintended consequence of this ban is that cigarette manufacturers are unable to advertise their own ranges of reduced-risk products in a manner that is clearly targeted solely at smokers. Millions of UK smokers are currently unaware of the existence of reduced-risk substitutes for cigarettes and the most targeted measure available to make them aware of such products is currently illegal.

PUBLIC HEALTH GUIDANCE

In England and Wales, the National Institute for Health and Care Excellence (NICE) provides national guidance and advice to improve health and social care. In its most recent recommendation to healthcare practitioners on e-cigarettes as smoking cessation aids, NICE adopted a stance that in some ways echoes that of Public Health England:

⁵⁵ *ibid.*

⁵⁶ See Section 94 of the Children and Families Act 2014. Available at: <http://www.legislation.gov.uk/ukpga/2014/6/section/94/enacted>.

⁵⁷ See also Schedule 2 of The Standardised Packaging of Tobacco Products Regulations 2015. Available at: https://www.google.com/url?q=https://www.legislation.gov.uk/uksi/2015/829/schedule/2/made&sa=D&ust=1528209502784000&usq=AFQjCNFsl1nyJjWeUUqynk5bunL5_KPlwg.

For people who smoke and who are using, or are interested in using, a nicotine-containing e-cigarette on general sale to quit smoking, explain that:

- *although these products are not licensed medicines, they are regulated by the Tobacco and Related Products Regulations 2016*
- *many people have found them helpful to quit smoking cigarettes*
- *people using e-cigarettes should stop smoking tobacco completely, because any smoking is harmful*
- *the evidence suggests that e-cigarettes are substantially less harmful to health than smoking but are not risk free*
- *the evidence in this area is still developing, including evidence on the long-term health impact⁵⁸*

This guidance is extremely welcome, especially since some evidence suggests that some UK GPs may hold inaccurate views on the harms of nicotine itself.⁵⁹ NICE have also recently decided to include heat-not-burn products in their consultation on updating tobacco guidelines, which will review the evidence on their potential for harm reduction.⁶⁰ However, to the detriment of current smokers, NICE have arguably adopted a position that is more conservative than Public Health England. As Public Health England argued:

...the combination of EC with support from Stop Smoking Services is likely to optimise chances of stopping smoking when using an EC. Hence, all services should offer support to smokers wishing to use an EC to stop smoking. However, not all Stop Smoking Service practitioners are supportive of providing help to smokers wishing to use EC...an online survey of 1,801 Stop Smoking Service practitioners and managers reported that less than 5% would recommend EC to all their clients.

It seems reasonable to propose that combining the most popular source of support (EC) used by smokers in the general population (identified from the STS data), with the most effective (Stop Smoking Service support), should be a recommended option available to all smokers.⁶¹

Hopefully Stop Smoking Service practitioners and managers will become more willing to recommend e-cigarettes as a result of NICE's latest recommendation, but doctors could use more concrete reassurance that actively recommending e-cigarettes as part of a quit attempt is supported by current evidence as effective.

⁵⁸ NICE (March 2018).

⁵⁹ Sudhanshu Ramesh Patwardhan, Marina A. Murphy, (2013) "Survey of GPs' understanding of tobacco and nicotine products", *Drugs and Alcohol Today*, Vol. 13 Issue: 2, pp.119-150, <https://doi.org/10.1108/DAT-02-2013-0010>

⁶⁰ NICE, Tobacco update (May 2018). Available at: <https://www.nice.org.uk/guidance/GID-NG10086/documents/draft-scope>

⁶¹ Public Health England (Feb 2018)

Since e-cigarettes first came to market, various UK media outlets have played a key role in propagating sensationalist and misleading concerns about the relative health risks in stark contrast with the weight of evidence. In the absence of reasonable, informative advertising and GPs clearly endorsing e-cigarettes as a useful component of their smoking cessation arsenal, these reports fill the void and discourage smokers from using reduced-risk products. The following case studies serve to illustrate this problem:

Are e-cigarettes a gateway to cigarette smoking among young people?

Headline: “E-cigs ARE a gateway to tobacco – teens are MORE likely to become regular smokers after vaping” (*The Sun*, 30th October 2017)

Evaluation: *The Sun*’s website reaches millions of people every month. In this case, the headline is more worrying than the article text itself, which quotes the lead author of the Canadian study referenced in the article:

...the association between e-cigarettes and smoking may simply reflect common factors rather than a causal effect: the same individual and social risk factors that increase e-cigarette use may also increase the likelihood of youth smoking.

This hypothesis is far better supported by the available evidence than the ‘gateway effect’ narrative. As Public Health England put it:

Despite some experimentation with these devices among never smokers, e-cigarettes are attracting very few young people who have never smoked into regular use...The ‘common liability’ hypothesis seems a plausible explanation for the relationship between e-cigarettes and smoking implementation.⁶²

Another concern related to youth use of e-cigarettes often covered in the media is that the flavourings of some e-liquids used in e-cigarettes may appeal to young people, prompting calls for bans on certain flavours. While the potential for certain flavours leading to youth uptake must be considered, the potential harms are likely to be small in light of the lack of gateway effect. These uncertain and relatively minor potential harms must be compared to the significant predicted impacts of a flavour ban, with a May 2018 study in the *BMJ*’s Tobacco Control journal concluding that “banning flavours in e-cigarettes, while allowing menthol in cigarettes would result in the greatest increase in the selection of cigarettes (8.3%), and a decline in the use of e-cigarettes (–11.1%).”^{63 64}

⁶² Public Health England (Feb 2018)

⁶³ Buckell J, Marti J, Sindelar JL. “Should flavours be banned in cigarettes and e-cigarettes? Evidence on adult smokers and recent quitters from a discrete choice experiment” Tobacco Control. Published Online First: 28 May 2018. doi: 10.1136/tobaccocontrol-2017-054165

⁶⁴ A ban on both flavoured e-cigarettes and menthol cigarettes would also result in significant substitution away from e-cigarettes: “A ban on all flavours, but tobacco in both products would increase ‘opting-out’ the most (5.2%) but would also increase choice of cigarettes (2.7%) and decrease choice of e-cigarettes (–7.9%).”

How much should we worry about the unknown long-term health effects of e-cigarette use?

Headline: “E-cigarette timebomb: Vaping is highly addictive and could cause a major health crisis in decades to come, warn lung experts” (*The Daily Mail*, 31st May 2018)

Evaluation: *The Daily Mail* has an average daily circulation of over one million people and the outlet’s online platform enjoys over ten million visits per day. The above article states the truism that e-cigarettes haven’t been around long enough to conduct cohort studies over decades on their health effects, and presents it as a reason to fear the rise of vaping. On the contrary, such concerns show a basic misunderstanding of the current evidence we have on health effects:

...‘no long-term data’ does not mean ‘no data’ or that we know nothing – in fact, there is a great deal of data on the toxicology of vapour and the exposures experienced by vapers. It all points in one direction: massively lower exposure to hazardous agents, and hence much lower risks – the legitimate dispute is whether the risks are 90% or 99.9% lower.⁶⁵

Moving to stricter regulations or, as some countries have done, near-total bans on e-cigarettes on the above basis is an abuse of the precautionary principle that ignores the enormous, near-certain costs of doing so and misrepresents the current scientific evidence on e-cigarette health effects. Even in the extremely unlikely scenario that e-cigarettes do present significant long-term health risks, this would have to be weighed against the harms of long-term risks from cigarette smoking.

Do e-cigarettes cause cancer?

Headline: “Vaping Causes Cancer, Says New E-cigarette Research” (*Lad Bible*, January 30th 2018)

Evaluation: The above *Lad Bible* article has been shared over 75,000 times as of June 1st 2018, including on the outlet’s Facebook page which is followed by over 32 million people. The study discussed does not show that vaping causes cancer, and the article did not include expert reaction, such as that of Prof. Peter Hajek (Director of the Tobacco Dependence Research Unit at Queen Mary University of London):

“Human cells were submerged in nicotine and in off-the-shelf bought carcinogenic nitrosamines. It is not surprising of course that this damaged the cells, but this has no relationship to any effects of e-cigarettes on people who use them.

⁶⁵ Clive Bates, “Ten perverse intellectual contortions: a guide to the sophistry of anti-vaping activists” (April 6 2018). Available at: <https://www.clivebates.com/ten-perverse-intellectual-contortions-a-guide-to-the-sophistry-of-anti-vaping-activists/#s4.6>

“In the other part of this study, animals [mice] were exposed to what for them are extremely large doses of nicotine and this also generated some damage, but this too has unclear relevance for effects of vaping.”

“No comparison with conventional cigarettes was made, but in the text of the article, the authors acknowledge the key bit of information that is of crucial relevance in this story: Vapers show a reduction in these chemicals of 97% compared to smokers. They should have added that this may well be the level that non-smokers obtain from their environment.”⁶⁶

Subjecting mice to human-level doses of nicotine at frequencies far in excess of even the most committed vaper’s behaviour (puffs of 4-second duration at 30-second intervals for 3 hours a day) is a poor indicator of whether vaping is carcinogenic to humans, yet the above Lad Bible article promoted an incomplete picture of the scientific evidence on the health harms of e-cigarettes.

CONSUMER CHOICE AND EXPERIENCE

One of the most important avenues for encouraging smokers to switch to reduced-risk products is the attractiveness of the products themselves. The UK e-cigarette market is burgeoning with different devices aimed at different groups of consumers with different preferences. However, regulations mandated as part of the EU’s Tobacco Products Directive (enshrined in UK law in a statutory instrument, the Tobacco and Related Products Regulations 2016) hinder consumer choice in a number of counterproductive ways.

Devices that can hold more than 2ml of e-liquid at any one time were banned, resulting in added inconvenience for users who must now refill their tanks more often. Meanwhile, the maximum size of e-liquid refill bottles was set at 10ml—smaller than the pre-TPD average—and has resulted in further inconvenience. This ban was enacted despite existing requirements that ensure all e-liquid bottles are childproof, meaning that any risks from children drinking or spilling e-liquid were already mitigated appropriately. Consumers must now carry more refill containers with them and manufacturers face increased packaging costs. Furthermore, an 20mg/ml upper limit on nicotine concentration in e-liquids has prevented some smokers from being able to effectively match their equivalent nicotine intake from cigarettes, reducing the viability of e-cigarettes as a smoking cessation aid.

Another aspect of the consumer experience of e-cigarettes is the areas in which their use is permitted. Unlike cigarettes, the current evidence base for e-cigarettes shows that “to date, there have been no identified health risks of passive vaping to bystanders.”⁶⁷ Therefore, the UK does not enforce any bans on indoor vaping, instead leaving individuals businesses and premises to decide their own policy. As the British Lung Foundation puts it, “e-cigarettes shouldn’t be banned in enclosed

⁶⁶ Prof. Peter Hajek, “Expert reaction to e-cigarettes and DNA damage” (29 January 2018). Available at: <http://www.sciencemediacentre.org/expert-reaction-to-e-cigarettes-and-dna-damage/>

⁶⁷ Martin Dockrell, “Clearing up some myths around e-cigarettes” (20 February 2018), Public health matters (PHE). Available at: <https://publichealthmatters.blog.gov.uk/2018/02/20/clearing-up-some-myths-around-e-cigarettes/>

public spaces by legislation as smoking is.”⁶⁸ However, many hospitals, councils and Transport for London do enforce indoor e-cigarette bans to the detriment of public health. Combining sensible restrictions in areas of high, concentrated foot-fall with notices reminding e-cigarette users to vape considerately (a social norm already well-established for cigarettes) is a more reasonable approach that balances the interests of e-cigarette users and other members of the public.

THE LIMITATIONS OF E-CIGARETTES

Although much can still be done to encourage smokers to switch to e-cigarettes, the growth in the number of new e-cigarette users is falling year-on-year and looks set to plateau without significant changes to public policy.⁶⁹ While this trend may be reversible, survey evidence suggests that the most common reason for smokers who have tried e-cigarettes no longer using them is that the product does not imitate smoking closely enough.⁷⁰

Evidently, different smokers have different preferences and the more variety of reduced-risk products on the market (including those that may imitate the experience of cigarettes more closely), the more likely it is that smokers will switch. A robust harm reduction approach should therefore ensure that heat-not-burn devices and hybrid products (such as those that pass e-cigarette vapour through tobacco for flavour purposes) are treated according to their relative risk profiles. While acknowledging that “heated tobacco products may be considerably less harmful than tobacco cigarettes,” Public Health England remain cautious about the potential for positive public health impacts of heat-not-burn:

*With a diverse and mature e-cigarette market in the UK, it is currently not clear whether heated tobacco products provide any advantage as an additional potential harm reduction product.*⁷¹

As discussed above, a significant segment of UK smokers have tried e-cigarettes but returned to cigarettes, citing their failure to replicate the experience of smoking for doing so. And while it is possible that heat-not-burn products may act as substitutes for e-cigarettes in some cases, the emerging evidence on relative risk profiles suggests that any substitution effect will need to be of an extremely significant magnitude to outweigh the potential benefits of smokers switching to such devices. Youth uptake also seems unlikely to be significant, given the comparatively high price point of heat-not-burn devices.

⁶⁸ British Lung Foundation, “E-cigarettes” (22 May 2016). Available at: <https://www.blf.org.uk/your-stories/e-cigarettes>

⁶⁹ Action on Smoking and Health (May 2017)

⁷⁰ *ibid.*

⁷¹ *ibid.*

Given these considerations, it is important that taxation of these products and future reduced-risk devices incentivises smoking cessation and harm reduction. The government have, to their credit, conducted a consultation on creating a new taxation category for heated tobacco products which is now under deliberation.⁷² While defining such a category would reduce uncertainty and encourage innovation in itself, it is also important that the duty rate set reflects the current evidence on relative risk.⁷³

It is also vital that the regulatory processes related to these devices work to incentivise innovation. Building on the possibility of a separate taxation category, policymakers should consider allowing the Medicines and Healthcare products Regulatory Agency (MHRA) to create a separate category for reduced-risk tobacco products (referred to in the USA as a “modified risk tobacco product”) that confers the ability to make substantiated claims about relative risk to consumers, as well as other sensible measures related to marketing. The MHRA should designate precise and reasonable criteria by which products may qualify for this designation thereby providing targets for manufacturers to aim towards and ensuring a range of innovative reduced-risk products are made available to cater to the preferences of different smokers.

CONCLUSION

By taking a comparatively liberal approach to reduced-risk nicotine products and smoking cessation, the United Kingdom has thus far followed the right path in this area of tobacco harm reduction and sets a positive example on the international stage. But from the perspective of those who aim to improve public health and those who are concerned with preserving individual freedom, we should travel much further down that path.

International experiences of harm reduction strategies demonstrate the effectiveness of empowering individual smokers who want to quit by making reduced-risk products more attractive cessation options. The available evidence from the UK shows that e-cigarettes have contributed to tens of thousands of additional quits every year, and it is vital that we ensure this trend continues.

Sensible reforms to advertising restrictions could set the record straight on the relative risk of e-cigarettes among UK smokers and extend the vaping revolution to the young female smokers who it has largely failed to reach. Stop Smoking Service practitioners ought to feel confident in recommending e-cigarettes as a viable component of quit attempts. Politicians should use Brexit as an opportunity to change elements of regulation that hamper consumer choice and rail against restrictive

⁷² HM Treasury, “Tax treatment of heated tobacco products” (13 March 2018). Available at: <https://www.gov.uk/government/consultations/tax-treatment-of-heated-tobacco-products/tax-treatment-of-heated-tobacco-products>

⁷³ For a broad explanation of this approach, see: Chaloupka, F. J., Swenor, D., & Warner, K. E. (2015). “Differential Taxes for Differential Risks — Toward Reduced Harm from Nicotine-Yielding Products.” *New England Journal of Medicine*, 373(7), 594–597. <https://doi.org/10.1056/nejmp1505710>

policies on indoor vaping in hospitals, train stations, and beyond. Heat-not-burn products could add a further tool to the harm reduction arsenal by appealing to smokers who have strong preferences for products that closely imitate the experience of smoking cigarettes, and should be treated accordingly in terms of taxation and regulation. Taken together, the insights of practical liberalism could make us healthier, happier, and freer.

TABLE 1

Age Group	GB E-cig use by age 2016 (1)	GB Population 2016 (2)	GB E-Cig Use Numbers by age 2016	Total E-Cig Users by age if rates raised to highest age group	Additional e-cig users by age if rates raised to highest age group	Additional *sole* e-cig users by age if rates raised to highest age group (3)	Years saved per age group adjusted for WHO estimates (4)
16-24	5.8%	7,104,731	412,074	504,435	92,361	46,180.5	461,805
25-34	6.9%	8,670,900	598,292	615,633	17,341	8,670.5	86,705
34-49	7.1%	16,886,800	1,198,962	-	-	-	-
50-59	6.5%	8,452,000	549,380	600,092	50,712	25,356	76,068
60+	2.9%	14,953,600	433,654	1,061,705	628,051	314,025.5	-
						Total years of life expectancy added (adjusted for e-cig relative risk):	593,349.1

TABLE 2

Age Group	GB E-cig use by age 2016 (1)	GB Population 2016 (2)	GB E-Cig Use Numbers by age 2016	Total E-Cig Users by age if rates raised to highest age group	Additional e-cig users by age if rates raised to highest age group	Additional *sole* e-cig users by age if rates raised to highest age group (3)	Years saved per age group adjusted for WHO estimates (4)
16-24 (Male)	8.9%	3,640,579	324,011	-	-	-	-
25-34 (Female)	2.6%	3,464,113	90,066	308,306	218,240	109,120	1,091,200
						Total years of life expectancy added (adjusted for e-cig relative risk):	1,036,640

(1) Office of National Statistics,

“E-cigarette use in Great Britain - 2016”.

Available at:

https://www.ons.gov.uk/redir/eyJhbGciOiJIUzI1NiJ9.eyJpbnRleCI6NCwicGFnZVNpemUiOiJEWLCJwYWdlIjoxLCJ1cmkiOiIvcGVvcGxlcG9wdWxhdGlubmFuZGNvbW11bmI0eS9o-ZWFsdGhhbmRzb2NpYWxjYXJLL2RydWd1c2VhbGNvaG9sYW5kc21va2luZy9kYXRh-c2V0cy9lY2lnYXJldHRldXNlaW5ncmVhdGJyaXRhaW4iLCJsaXN0VHlwZSI6InJlbGF-0ZWRkYXRhIn0.y6asF26lbQH4tHdddWZm32AQ_NLbSfCQBZoLIahcONc

(2) Office of National Statistics,

“Population Estimates for UK, England and Wales, Scotland and Northern Ireland: Mid-2016”.

Available at:

<https://www.ons.gov.uk/file?uri=/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationestimatesforukenglandandwalesScotlandandNorthernIreland/mid2016/ukmidyearestimates2016.xls>

(3) Action on Smoking and Health (May 2017)

Available at:

<http://ash.org.uk/download/use-of-e-cigarettes-among-adults-in-great-britain-2017/>

(4) World Health Organisation,

“Fact sheet about health benefits of smoking cessation”.

Available at:

<http://www.who.int/tobacco/quitting/benefits/en/>