

Evidence brief 1: vaping is far less harmful than smoking

Smoking is a uniquely harmful consumer behaviour, creating major risks for cancer, cardiovascular and respiratory disease.¹ Nearly all the risks from tobacco use arise from smoking: inhaling thousands of chemical agents, many toxic or carcinogenic, produced during the combustion of tobacco leaves in the burning tip of a cigarette.² *Smoking* dominates (99.4%) the global tobacco-related death toll: the Global Burden of Disease study shows 7.69 million deaths attributable to smoking annually, 1.30 million attributable to secondhand smoke, and just 55,600 attributable to smokeless tobacco.³ This annual smoking-related death toll exceeds the annual excess mortality attributable to COVID-19 in 2020 and 2021.⁴

The imperative to stop smoking. Stopping smoking at any time reduces risks of serious disease and premature death. Nearly all excess mortality risk is eliminated by stopping before age 40.⁵ It is beyond reasonable doubt that vaping (e-cigarette or ENDS use) and the use of other smoke-free nicotine products (oral nicotine pouches, smokeless and heated tobacco) are far safer than cigarette smoking. Smoke-free products do not involve combustion or produce products of combustion. Switching from smoking to smoke-free nicotine use leads to greatly reduced exposure to the main toxicants associated with serious disease.

Four main categories of smoke-free nicotine products.



Though each non-combustion product category has a different risk profile, they are clustered closely together on a continuum of risk that has cigarettes at the opposite extreme. Most of the hazardous chemical agents in cigarette smoke are either not present in vape aerosol at detectable levels or present at much lower levels. Similar findings apply to all the smoke-free alternatives to smoking.⁶

Chemical basis for reduced risk. Combustion of tobacco creates thousands of chemical reactions and new toxic chemicals not found in the tobacco. Tobacco smoke contains around 7,000 identifiable chemical agents, of which at least 158 are known to be toxic or carcinogenic.⁷ The switch to non-combustible, smoke-free nicotine radically changes the chemical risks and demands a rethink of our whole approach to nicotine. According to independent American experts, these alternative products have *“the potential to disrupt the 120-year dominance of the cigarette”*.⁸

Major assessments. Several high-quality, independent reviews conclude that exclusive ENDS use poses a small fraction of the risks of cigarettes and is likely to be at least 95% lower risk than smoking:

- *Laboratory tests of e-cigarette ingredients, in vitro toxicological tests, and short-term human studies suggest that e-cigarettes are likely to be far less harmful than combustible tobacco cigarettes.* National Academies of Sciences, Engineering, and Medicine, United States (2018).⁹

- *Based on the reviewed evidence, we believe that the ‘at least 95% less harmful estimate’ (that is, smoking is at least 20 times more harmful to users than vaping) remains broadly accurate, at least over short- and medium-term periods, but it might now be more appropriate and unifying to summarise our findings using our other firm statement: that vaping poses only a small fraction of the risks of smoking.* Office for Health Improvement and Disparities, England (2022).¹⁰
- *Vaping poses only a small fraction of the risks of smoking and switching completely from smoking to vaping conveys substantial health benefits over continued smoking. Based on current knowledge, stating that vaping is at least 95% less harmful than smoking remains a good way to communicate the large difference in relative risk unambiguously so that more smokers are encouraged to make the switch from smoking to vaping. It should be noted that this does not mean e-cigarettes are safe.* Public Health England (2018).¹¹
- *Although it is not possible to quantify the long-term health risks associated with e-cigarettes precisely, the available data suggest that they are unlikely to exceed 5% of those associated with smoked tobacco products, and may well be substantially lower than this figure.* Royal College of Physicians, London (2016).¹²

This suggestion that vaping is at least 95% less risky than smoking has often been misunderstood: it is intended as a clear and actionable way of communicating the scale of risk reduction to consumers and professionals.¹³

Public health advice. The National Health Service of the UK provides straightforward advice to smokers: *“Also known as vapes or e-cigs, they’re far less harmful than cigarettes, and can help you quit smoking for good”*¹⁴, and English authorities advertise vaping on TV as a smoking cessation strategy. New Zealand, which has seen an extremely impressive decline in smoking, has similar advice to the public: *“Vaping is not harmless, but it is much less harmful than smoking.”*¹⁵

Toxicants in the body. The most persuasive evidence comes from biomarker data.¹⁶ These are measures of toxicants found in users’ blood, saliva, or urine. Switching from cigarettes to ENDS,^{17 18 19 20 21 22} heated tobacco,^{23 24 25 26} snus,^{27 28 29} or nicotine pouches^{30 31 32} dramatically reduces the exposure to hazardous chemicals associated with smoking. Many biomarkers of exposure fall to background levels or below the limit of detection, and most others are radically reduced.³³

Emissions toxicity. Similar findings arise from well-conducted studies of the chemical composition of aerosol emissions, including tests for cytotoxicity, mutagenicity and genotoxicity.³⁴ However, because no humans are involved, these studies are prone to exaggerating risk. The exaggeration of risk arises because the devices can be operated in unrealistic, overheated conditions that would be intolerable for human users. This makes the liquid prone to pyrolysis, generating excessive levels of thermal decomposition products.³⁵

Health indicators. Other supportive data show improvements in health and welfare for those who switch from smoking to ENDS use completely. Studies show improvements in asthma³⁶, chronic obstructive pulmonary disease (COPD),³⁷ blood pressure,³⁸ lung function,^{39 40} respiratory conditions,^{41 42 43} cardiovascular risk factors,^{44 45} and gum disease.⁴⁶ One study showed that ENDS typically has a cancer potency of just 0.4% of cigarette smoke.⁴⁷

Snus as proof-of-concept for tobacco harm reduction. The data for snus (oral tobacco) provide a powerful proof of concept for tobacco harm reduction: epidemiological evidence *“provides scant support for any major adverse health effect of snus”*^{48 49} and also that switching from cigarettes to snus reduces the risk of cancer and heart disease, and the risk in switchers being similar to that in those who quit cigarettes.⁵⁰ Through the use of snus, Sweden has the lowest smoking prevalence in the European Union (7%

compared to the EU average of 23% in 2021)⁵¹, and this is attributable to snus use displacing smoking,⁵² with similar effects in Norway.⁵³ One estimate suggests among men over the age of 30, 355,000 lives per year could have been saved if the other European Union countries had matched Sweden's tobacco-related mortality rate.⁵⁴ The ban on snus in the European Union has no basis in science or ethics.^{55 56} Policy decisions about nicotine pouches must be informed by the experience gained with snus.

Common concerns. Critics of tobacco harm reduction raise a range of concerns, but these are often based on misunderstandings or poor methods.

1. **Correlation and causation.** Many studies find an association between vaping and specific health effects, yet most are deeply flawed.⁵⁷ Almost everyone who uses ENDS and is old enough to suffer serious illness has been smoking for decades. Few studies can isolate the effect of vaping from the impact of a long smoking history; some studies even counted effects associated with vaping that happened before users took up vaping.^{58 59} As noted above, studies which avoid these issues by following within-person changes when switching from smoking to ENDS show substantial reductions in harmful biomarkers and disease symptoms.
2. **"EVALI"**. In 2019-2020, there was an outbreak of severe lung injuries in the United States that was misleadingly named E-cigarette or Vaping Associated Lung Injury.⁶⁰ It was not caused by ENDS, which are *electronic nicotine delivery systems*. It was caused by a thickener, Vitamin E Acetate, added to cannabis (THC) liquids.⁶¹ Nicotine vaping was not and could not have been involved in EVALI.^{62 63} There were EVALI victims who claimed not to use THC, but there are strong incentives not to disclose cannabis due to consequences with the law, probation, employment, education, visas and parents.
3. **"No long-term data"**. It is often asserted that we just do not know the long-term effects. While technically accurate, the point is also misleading. Toxicology has advanced dramatically since the discovery of the health risks of smoking in the 1950s, and we now know a great deal from occupational and environmental health disciplines. We cannot know everything about ENDS risks, but we already know *enough* to be confident that the risks from the use of smoke-free products will be *far less* than those from smoking. Also, the much simpler chemistry will more easily allow remedial action if needed (for example, removing ingredients, changing materials, or controlling temperatures). Discouraging or restricting ENDS use while we wait for detailed evidence on long-term outcomes – given that we already know they are much lower risk than smoking – allows the harms of smoking to continue.

We should be mindful of the wise words of the great tobacco epidemiologist Austin Bradford Hill:⁶⁴

All scientific work is incomplete – whether experimental or observational. All scientific work is liable to be upset or modified by advancing knowledge. That does not confer upon us a freedom to ignore the knowledge we already have, or to postpone the action that it appears to demand at a given time.

4. **"Dual use"**. Some people use both cigarettes and ENDS ("dual use") and experience lower benefits or no benefits as they continue to smoke. However, many are in a gradual transition to exclusive ENDS use or to dual use with only occasional smoking. Most dual use should be seen as progress from exclusive smoking. Dual use is not the most common form of ENDS use: in the United States, just 29% of adult ENDS users were dual users in 2021.⁶⁵ In Britain, the proportion of vapers also using cigarettes has come down from around two-thirds to around one-third over the last ten years.⁶⁶ It does not appear to reduce quitting intentions.⁶⁷ More likely, it includes people who do not want to quit smoking at all but go on to become "accidental quitters".^{68 69} Some argue that dual use makes smokers worse off, as if the exposures are additive. This arises from a misrepresentation of cross-sectional studies comparing current smokers and current dual users and, therefore, does not account for differences in dependence

and intensity of smoking. Studies that track individuals through smoking to dual use show benefits.⁷⁰

Myth-busting. Several excellent resources have been created to tackle myths about product safety and other common concerns about ENDS use. These include:

- A consumer-orientated myth buster by the UK National Health Service⁷¹ and myth-busting advice to health professionals from Public Health England.⁷²
- A detailed myth buster by Action on Smoking and Health (UK) verified by practising scientists.⁷³
- An analysis of multiple false and misleading claims made in a WHO fact sheet on ENDS.⁷⁴
- Academic responses to flawed assessments, notably those produced in Australia^{75 76} or the position statements of medical associations.⁷⁷
- Detailed methodological criticisms of misleading research on specific topics, such as carbonyl formation,⁷⁸ heavy metals migration,⁷⁹ or flawed epidemiology.^{80 81}

References

- ¹ Jha, P. (2020). The hazards of smoking and the benefits of cessation: A critical summation of the epidemiological evidence in high-income countries. *eLife*, *9*, e49979. [[link](#)]
- ² U.S. Department of Health and Human Services. How Tobacco Smoke Causes Disease: The Biology and Behavioral Basis for Smoking-Attributable Disease. Centers for Disease Control and Prevention (US); 2010. [[link](#)]
- ³ GBD 2019 Risk Factors Collaborators. (2020). Global burden of 87 risk factors in 204 countries and territories, 1990–2019: A systematic analysis for the Global Burden of Disease Study 2019, *Lancet*, *396*(10258), 1223–1249. [[link](#)] GBD cause and risk summaries [[smoking](#)][[secondhand smoke](#)][[chewing tobacco](#)] (accessed 1 February 2024)
- ⁴ Msemburi, W., Karlinsky, A., Knutson, V., Aleshin-Guendel, S., Chatterji, S., & Wakefield, J. (2023). The WHO estimates of excess mortality associated with the COVID-19 pandemic. *Nature*, *613*(7942), Article 7942. [[link](#)]
- ⁵ Doll, R., Peto, R., Boreham, J., & Sutherland, I. (2004). Mortality in relation to smoking: 50 Years' observations on male British doctors. *British Medical Journal*, *328*(7455), 1519–1528. [[link](#)]
- ⁶ Murkett, R., Rugh, M., & Ding, B. (2022). *Nicotine products relative risk assessment: An updated systematic review and meta-analysis* (9:1225). F1000Research. [[link](#)]
- ⁷ Fowles, J., & Dybing, E. (2003). Application of toxicological risk assessment principles to the chemical constituents of cigarette smoke. *Tobacco Control*, *12*(4), 424–430. [[link](#)]
- ⁸ Abrams, D. B., et al. (2018). Harm Minimization and Tobacco Control: Reframing Societal Views of Nicotine Use to Rapidly Save Lives. <https://doi.org/10.1146/Annurev-Publhealth-040617-013849>, *39*, 193–213. [[link](#)]
- ⁹ National Academies of Sciences, Engineering, and Medicine (“NASEM”), *Public Health Consequences of E-Cigarettes*, National Academies Press (2018), Summary at 1, [[link](#)]
- ¹⁰ Office for Health Improvement and Disparities (“OHID”) (formerly Public Health England), *Nicotine Vaping in England: 2022 evidence update summary* (2022), at chapter 16 [[link](#)].
- ¹¹ McNeill A, et al. (2018). *Evidence review of e-cigarettes and heated tobacco products 2018. A report commissioned by Public Health England*. London: Public Health England. [[link](#)]
- ¹² Royal College of Physicians, *Nicotine without Smoke: Tobacco Harm Reduction* (2016), at 189, [[link](#)].
- ¹³ Clive Bates, Vaping is still at least 95% lower risk than smoking – debunking a feeble and empty critique, *The Counterfactual*, 17 January 2020. [[link](#)]
- ¹⁴ National Health Service (UK). Using E-cigarettes to Stop Smoking. Accessed 1 Nov 2023 [[link](#)] and Better Health & NHS: Vaping to Quit Smoking. Accessed 15 January 2024 [[link](#)]
- ¹⁵ Ministry of Health, New Zealand. Vaping Facts: vaping versus smoking. Accessed 1 Nov 2023 [[link](#)]
- ¹⁶ Akiyama, Y., & Sherwood, N. (2021). Systematic review of biomarker findings from clinical studies of electronic cigarettes and heated tobacco products. *Toxicology Reports*, *8*, 282–294. [[link](#)]

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- 17 Pulvers, K., et al. (2020). Effect of Pod e-Cigarettes vs Cigarettes on Carcinogen Exposure Among African American and Latinx Smokers: A Randomized Clinical Trial. *JAMA Network Open*, 3(11), e2026324–e2026324. [\[link\]](#)
 - 18 Shahab, L., et al. (2017). Nicotine, carcinogen, and toxin exposure in long-Term e-cigarette and nicotine replacement therapy users. *Annals of Internal Medicine*, 166(6), 390–400. [\[link\]](#)
 - 19 Goniewicz, M. L. (2023). Biomarkers of Electronic Nicotine Delivery Systems (ENDS) use. *Addiction Neuroscience*, 6, 100077. [\[link\]](#)
 - 20 Dai, H., et al. (2022). Exposure to Toxicants Associated With Use and Transitions Between Cigarettes, e-Cigarettes, and No Tobacco. *JAMA Network Open*, 5(2). [\[link\]](#)
 - 21 Holt, N. M., et al. (2023). Comparison of biomarkers of exposure among US adult smokers, users of electronic nicotine delivery systems, dual users and nonusers, 2018–2019. *Scientific Reports 2023 13:1*, 13(1), 1–11. [\[link\]](#)
 - 22 Committee On Toxicity - UK (2020). Statement on the potential toxicological risks from electronic nicotine (and non-nicotine) delivery systems (E(N)NDS – e-cigarettes). [\[link\]](#)
 - 23 McEwan, M., et al. (2021). A randomized controlled study in healthy participants to explore the exposure continuum when smokers switch to a tobacco heating product or an E-cigarette relative to cessation. *Toxicology Reports*, 8, 994–1001. [\[link\]](#)
 - 24 Gale, N., et al. (2021). Changes in biomarkers after 180 days of tobacco heating product use: a randomised trial. *Internal and Emergency Medicine*, 1–12. [\[link\]](#)
 - 25 Sakaguchi, C., et al. (2021). Differences in Levels of Biomarkers of Potential Harm Among Users of a Heat-Not-Burn Tobacco Product, Cigarette Smokers, and Never-Smokers in Japan: A Post-Marketing Observational Study. *Nicotine & Tobacco Research*, 2021, 1–10. [\[link\]](#)
 - 26 Committee On Toxicity - UK (2017). *Statement on the toxicological evaluation of novel heat not-burn tobacco products*. [\[link\]](#)
 - 27 Krautter, G. R., Chen, P. X., & Borgerding, M. F. (2015). Consumption patterns and biomarkers of exposure in cigarette smokers switched to Snus, various dissolvable tobacco products, Dual use, or tobacco abstinence. *Regulatory Toxicology and Pharmacology: RTP*, 71(2), 186–197. [\[link\]](#)
 - 28 Hatsukami, D. K., et al. (2016). Randomised clinical trial of snus versus medicinal nicotine among smokers interested in product switching. *Tobacco Control*, 25(3), 267–274. [\[link\]](#)
 - 29 Naufal, Z. S., et al. (2011). Differential exposure biomarker levels among cigarette smokers and smokeless tobacco consumers in the National Health and Nutrition Examination Survey 1999–2008. *Biomarkers*, 16(3), 222–235. [\[link\]](#)
 - 30 Azzopardi, D., et al. (2023). Assessment of biomarkers of exposure and potential harm, and physiological and subjective health measures in exclusive users of nicotine pouches and current, former and never smokers. *Biomarkers*, 28(1), 118–129. [\[link\]](#)
 - 31 Rensch, J., et al. (2023). A Randomized, Controlled Study to Assess Changes in Biomarkers of Exposures Among Adults Who Smoke That Switch to Oral Nicotine Pouch Products Relative to Continuing Smoking or Stopping All Tobacco Use. *The Journal of Clinical Pharmacology*, 63(10), 1108–1118. [\[link\]](#)
 - 32 Health Risk Assessment of Nicotine Pouches: Updated BfR Opinion No. 023/2022 of 7 October 2022. (2022). *BfR-Stellungnahmen*, 2022(023). [\[link\]](#)
 - 33 Hartmann-Boyce et al. (2023). Biomarkers of potential harm in people switching from smoking tobacco to exclusive e-cigarette use, dual use or abstinence: secondary analysis of Cochrane systematic review of trials of e-cigarettes for smoking cessation. *Addiction*, 118(3), 539–545. [\[link\]](#)
 - 34 Emma, R., et al. (2023). Cytotoxicity, mutagenicity and genotoxicity of electronic cigarettes emission aerosols compared to cigarette smoke: the REPLICA project. *Scientific Reports 2023 13:1*, 13(1), 1–12. [\[link\]](#)
 - 35 Soulet, S., & Sussman, R. A. (2022). Critical Review of the Recent Literature on Organic Byproducts in E-Cigarette Aerosol Emissions. In *Toxics* (Vol. 10, Issue 12, p. 714). Multidisciplinary Digital Publishing Institute. [\[link\]](#)
 - 36 Polosa, R., et al. A. (2016). Persisting Long Term Benefits of Smoking Abstinence and Reduction in Asthmatic Smokers Who Have Switched to Electronic Cigarettes. *Discovery Medicine*, 21(114), 99–108. [\[link\]](#)
 - 37 Polosa, R., et al. (2020). COPD smokers who switched to e-cigarettes: health outcomes at 5-year follow up. *Therapeutic Advances in Chronic Disease*, 11. [\[link\]](#)

-
- 38 Farsalinos, K., C et al. (2016). Effect of continuous smoking reduction and abstinence on blood pressure and heart rate in smokers switching to electronic cigarettes. *Internal and Emergency Medicine*, 11(1), 85–94. [\[link\]](#)
- 39 Cibella, F., et al. (2016). Lung function and respiratory symptoms in a randomized smoking cessation trial of electronic cigarettes. *Clinical Science*, 130(21), 1929–1937. [\[link\]](#)
- 40 Polosa, R., et al. (2021). Impact of exclusive e-cigarettes and heated tobacco products use on muco-ciliary clearance. *Therapeutic Advances in Chronic Disease*, 12. [\[link\]](#)
- 41 Miler, J. A., et al. (2016). Changes in the Frequency of Airway Infections in Smokers Who Switched To Vaping: Results of an Online Survey. *Journal of Addiction Research & Therapy* 2016 7:4, 7(4), 1–3. [\[link\]](#)
- 42 Hajek, P., et al. (2019). A Randomized Trial of E-Cigarettes versus Nicotine-Replacement Therapy. *New England Journal of Medicine*, 380(7), 629–637. [\[link\]](#)
- 43 Lucchiari, C. et al. (2020). Benefits of e-cigarettes in smoking reduction and in pulmonary health among chronic smokers undergoing a lung cancer screening program at 6 months. *Addictive Behaviors*, 103, 106222. [\[link\]](#)
- 44 George, J. et al. (2019). Cardiovascular Effects of Switching From Tobacco Cigarettes to Electronic Cigarettes. *Journal of the American College of Cardiology*, 74(25), 3112–3120. [\[link\]](#)
- 45 Berlowitz, J. B., et al. (2022). E-Cigarette Use and Risk of Cardiovascular Disease: A Longitudinal Analysis of the PATH Study (2013-2019). *Circulation*, 145(20), 1557–1559. [\[link\]](#)
- 46 Yang, I., et al. (2020). The oral health impact of electronic cigarette use: a systematic review. *Critical Reviews in Toxicology*, 50(2), 97–127. [\[link\]](#)
- 47 Stephens, W. E. (2018). Comparing the cancer potencies of emissions from vapourised nicotine products including e-cigarettes with those of tobacco smoke. *Tobacco Control*, 27(1), 10–17. [\[link\]](#)
- 48 Lee, P. N. (2011). Summary of the epidemiological evidence relating snus to health. *Regulatory Toxicology and Pharmacology*, 59(2), 197–214. [\[link\]](#)
- 49 Lee, P. N. (2013). Epidemiological evidence relating snus to health – an updated review based on recent publications. *Harm Reduction Journal*, 10(1), 36. [\[link\]](#)
- 50 Lee, P. N. (2013). The effect on health of switching from cigarettes to snus – A review. *Regulatory Toxicology and Pharmacology*, 66(1), 1–5. [\[link\]](#)
- 51 European Commission, *Special Eurobarometer 506: Attitudes of Europeans towards tobacco and electronic cigarettes—Data Europa EU*. (2021). [\[link\]](#)
- 52 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). [\[link\]](#)
- 53 Lund, I., & Lund, K. E. (2014). *How has the availability of snus influenced cigarette smoking in Norway?* [\[link\]](#)
- 54 Reports of the Snus Commission: *Snus Kommissionen*. Accessed 18 January 2024, [\[link\]](#)
- 55 Jarvis, M. J. (2016). *Jarvis M. Expert Report—Report of Professor Martin Jarvis for the High Court of Justice, Queen’s Bench Division, Administrative Court. Vol London: Department of Epidemiology & Public Health, University College London*, [\[link\]](#)
- 56 Axéll T. and 17 others, Letter from experts in tobacco science and policy regarding the European Union snus prohibition, 1 Letter to European Commissioner Frans Timmermans, June 2017. [\[link\]](#)
- 57 Hajat, C., et al. (2022). Analysis of common methodological flaws in the highest cited e-cigarette epidemiology research. *Internal and Emergency Medicine*, 17(3), 887–909. [\[link\]](#)
- 58 Bhatta, D. N., & Glantz, S. A. (2019). Electronic Cigarette Use and Myocardial Infarction Among Adults in the US Population Assessment of Tobacco and Health. *Journal of the American Heart Association*, 8(12). [\[link\]](#)
- 59 Rodu, B., & Plurphanswat, N. (2020). A re-analysis of e-cigarette use and heart attacks in PATH wave 1 data. *Addiction*, 115(11), 2176–2179. [\[link\]](#)
- 60 Pesko, M. F. et al. (2022). United States public health officials need to correct e-cigarette health misinformation. *Addiction*. [\[link\]](#)
- 61 Blount, B. C et al. (2019). Vitamin E Acetate in Bronchoalveolar-Lavage Fluid Associated with EVALI. *New England Journal of Medicine*. [\[link\]](#)

-
- 62 Bates, C. (2021). The outbreak of lung injuries often known as “EVALI” was nothing to do with nicotine vaping. [Qeios](#).
- 63 Mendelsohn, C. P et al. (2023). Nicotine vaping was not the cause of e-cigarette, or vaping, product use-associated lung injury in the United States. *Drug and Alcohol Review*, 42(2), 258–261. [\[link\]](#)
- 64 Hill, A. B. (1965). The Environment and Disease: Association or Causation? *Proceedings of the Royal Society of Medicine*, 58(5), 295–300. Page 300. [\[link\]](#)
- 65 Kramarow, E., & Elgaddal, N. (2023). *Current Electronic Cigarette Use in Adults Aged 18 and Over: United States, 2021*. [\[link\]](#)
- 66 ASH (UK) & YouGov. Use of e-cigarettes (vapes) among adults in Great Britain. 2023. [\[link\]](#) see Figure 1: Smoking status among current adult e-cigarette users, Great Britain (2013–2023).
- 67 Jackson, S. E., et al. (2020). Is dual use of nicotine products and cigarettes associated with smoking reduction and cessation behaviours? A prospective study in England. *BMJ Open*, 10(3), e036055. [\[link\]](#)
- 68 Kasza, K. A., et al. (2021). Association of e-Cigarette Use With Discontinuation of Cigarette Smoking Among Adult Smokers Who Were Initially Never Planning to Quit. *JAMA Network Open*, 4(12), e2140880–e2140880. [\[link\]](#)
- 69 Foulds, J. et al. (2022). Effect of Electronic Nicotine Delivery Systems on Cigarette Abstinence in Smokers With No Plans to Quit: Exploratory Analysis of a Randomized Placebo-Controlled Trial. *Nicotine & Tobacco Research*, 24(7), 955–961. [\[link\]](#)
- 70 Lee, P. N. et al. (2021). Cigarette consumption in adult dual users of cigarettes and e-cigarettes: a review of the evidence, including new results from the PATH study. *F1000Research* 2021 9:630, 9, 630. [\[link\]](#)
- 71 National Health Service (UK). Vaping Myths and the Facts, Accessed 15 Jan 2024 [\[link\]](#)
- 72 Martin Dockrell, Public Health England (now the Health Security Agency) (2018) Clearing up some myths around electronic cigarettes. 20 February 2018. [\[link\]](#)
- 73 Action on Smoking and Health (UK). Addressing Common Myths About Vaping. Accessed 15 Jan 2024. [\[link\]](#)
- 74 Clive Bates, Fake news alert: WHO updates its post-truth fact sheet on e-cigarettes, *The Counterfactual*, 31 May 2022 [\[link\]](#)
- 75 Mendelsohn, C. P., Hall, W., Borland, R., Wodak, A., Beaglehole, R., Neal, J., Benowitz, L., Britton, J., Bullen, C., Etter, J.-F., McNeill, A., & Rigotti, N. A. (2023). A critique of the Australian National Health and Medical Research Council CEO statement on electronic cigarettes. *Addiction*. [\[link\]](#)
- 76 Mendelsohn, C. P., Wodak, A., Hall, W., & Borland, R. (2022). A critical analysis of ‘Electronic cigarettes and health outcomes: Systematic review of global evidence’. *Drug and Alcohol Review*, 41(7), 1493–1498. [\[link\]](#)
- 77 Britton, J., et al. (2020). A rational approach to e-cigarettes: Challenging ERS policy on tobacco harm reduction. *European Respiratory Journal*, 55(5). [\[link\]](#)
- 78 Soulet, S., & Sussman, R. A. (2022). Critical Review of the Recent Literature on Organic Byproducts in E-Cigarette Aerosol Emissions. *Toxics*, 10(12), 714. [\[link\]](#)
- 79 Soulet, S., & Sussman, R. A. (2022). A Critical Review of Recent Literature on Metal Contents in E-Cigarette Aerosol. *Toxics*, 10(9), 510. [\[link\]](#)
- 80 Hajat, C., et al. (2022). Analysis of common methodological flaws in the highest cited e-cigarette epidemiology research. *Internal and Emergency Medicine*, 17(3), 887–909. [\[link\]](#)
- 81 Rodu, B., & Plurphanswat, N. (2022). Cross-sectional e-cigarette studies are unreliable without timing of exposure and disease diagnosis. *Internal and Emergency Medicine* 2022, 1–5. [\[link\]](#)