Modelling the long-term healthcare cost impact of EVP use in the UK: Projected cost savings support the role of Harm Reduction in Public Health

ISPOR EUROPE 2025 in Glasgow | November 9-12th, 2025

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INTRODUCTION

Smoking is a leading cause of serious disease in smokers and places a considerable burden on both public health and the economy. In response, there is growing interest in tobacco harm reduction strategies, particularly the replacement of cigarettes with electronic vapor products (EVP). These alternatives have the potential to reduce health risks, as they do not involve burning tobacco and inhaling the smoke. Compared to cigarette smoke, EVPs contain and produce significantly fewer and substantially lower levels of harmful and potentially harmful constituents (HPHC).

To date, most scientific modelling efforts have focused on estimating the harm reduction potential of EVP using dynamic population models (DPM). These models simulate transitions between smoking, vaping, dual use, and cessation, and have been combined with disease-specific mortality and morbidity models to project health outcomes. In this study, we build on this approach by integrating economic parameters, specifically healthcare and social care costs into our DPM framework. Our model captures transitions between nicotine-use states using real-world behavioural data and population health metrics. It simulates the long-term impact of vaping compared to smoking on healthcare and social care costs.

This poster outlines our model structure, describes the key assumptions and data sources, and presents projected outcomes under different regulatory scenarios.

DATA AND METHODS

Accurately assessing the impact of changes in tobacco and nicotine product availability on population health necessitates robust modelling of consumer behaviour over time. One of the most effective approaches for simulating such consumption trajectories is the use of transition matrices, which capture initiation, cessation, and switching between smoking and next-generation product (NGP) use. These matrices are typically stratified by age, sex, and other demographic factors to reflect real-world behavioural heterogeneity.

However, this approach is often limited by the availability of longitudinal data, which are resource intensive, complex to run and expensive.

To address these challenges, we developed a Dynamic Population Model (DPM) using time series forecasting with repeated cross-sectional prevalence data[1]. This approach allows behavioral trends to be inferred, and future prevalence projected without large longitudinal datasets.

Using UK smoking and vaping prevalence data (2014–2022, ONS[2]) and statistical methods such as Prophet[3], we forecasted smoking, exclusive vaping, dual use, and cessation through to the year 2040. These prevalences were integrated into disease risk models with published relative risks for smoking-related diseases[4].

Our results showed that the introduction of EVP in the UK reduced smoking-related morbidity and mortality, underscoring their potential role as tobacco harm reduction tools.

This DPM approach has provided the basis for our economic impact prediction.

Two scenarios were used:

- **Baseline: only cigarettes available**
- **Alternative: cigarettes and EVP available**

The baseline was derived from the status quo by reclassifying all EVP users as smokers (current or former), preserving population structure and avoiding comparison with an outdated "cigarettes-only" population

Healthcare and social care unit costs attributable to smoking were taken from the UK Government's Smokefree Generation Policy Modelling Report[5]. Costs were adjusted by disease risk model outputs and applied to prevalence projections. This enabled estimation of annual and cumulative costs under each scenario. Validation against ASH estimates (CBPF model[6]) showed close alignment, supporting the robustness of our approach.

Figure 1 provides a schematic representation of our approach.

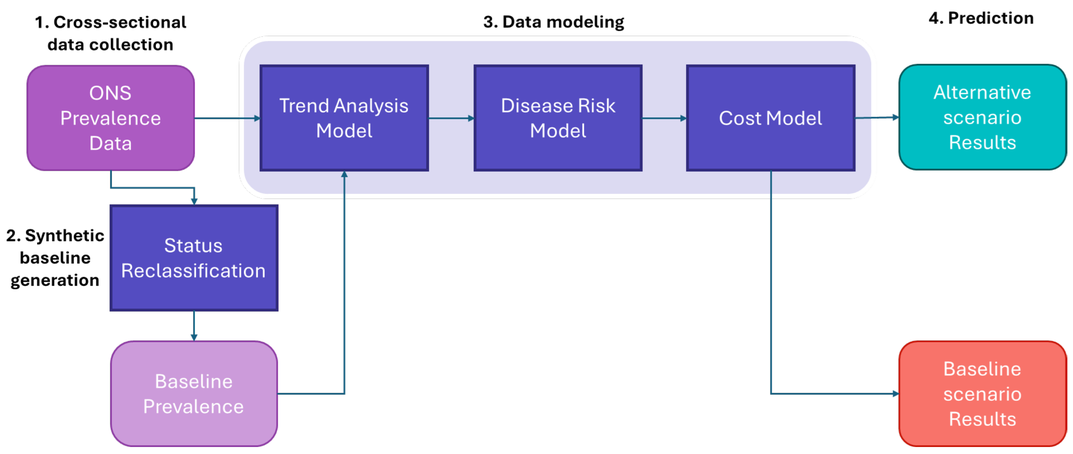

Figure 1: Dynamic Population Model Approach

RESULTS

Figures 2 and 3 show the prevalence estimates generated by our model over the next 20 years, based on vaping and smoking status. The rise in vape use is predicted to be associated with a decline in the prevalence of current smokers and an increase in former smokers. This suggests that smokers tend to switch to EVP and subsequently quit smoking, with some even discontinuing both products entirely.

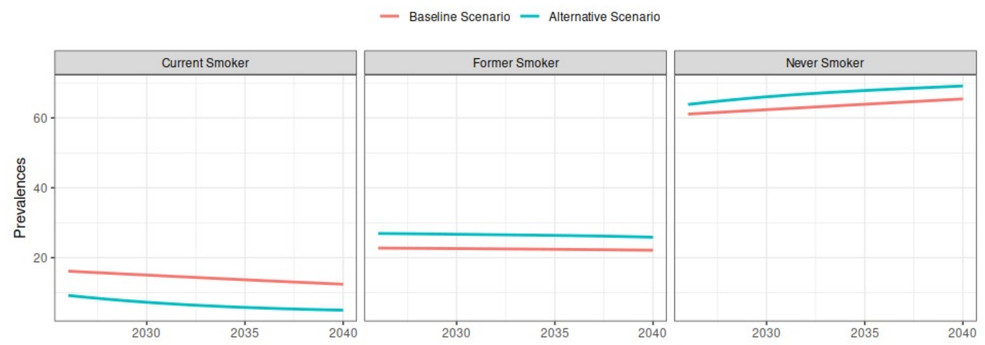

Figure 2: Prevalence (%) projection of smoking status of baseline and alternative scenarios in the UK

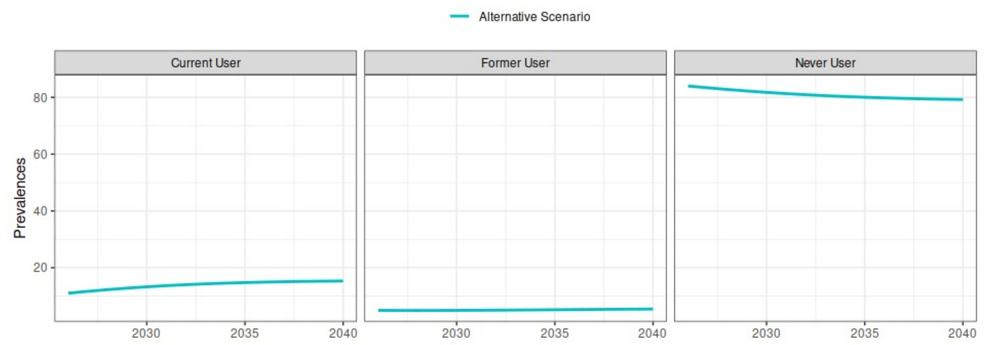

Figure 3: Prevalence (%) projection of vaping status of alternative scenario in the UK

The risk of diseases caused by smoking was determined using prevalence estimates, which serve as the foundation for calculating healthcare and social care costs. According to data from the United Kingdom, smoking-attributable costs have been estimated at £109.5 per person per year for healthcare and £68.7 per person per year for social care among current or former smokers. For individuals who have never smoked, smoking-related costs are assumed to be £0. Under our approach, all other statuses, such as vapers or dual users, are assigned a proportional cost between £0 and the full amount, based on their relative risk compared to current smokers.

Using these estimates, cumulative smoking-attributable costs from 2014 to 2040 are calculated under the two proposed scenarios. A total of **£92.5 billion** is projected under the baseline scenario (continued smoking), while **£69.8** billion is projected under the current scenario, reflecting a **24.5% reduction**.

This reduction could be further amplified if a greater number of adult smokers, particularly those not intending to quit, were to switch from cigarettes to alternative nicotine products such as EVP These alternatives, while not risk-free, are associated with potentially lower health risks compared to continued smoking.

To illustrate this potential, a scenario was simulated in which the number of individuals transitioning from cigarettes to EVP was doubled. Under this condition, a **55.4% reduction** in cumulative costs is predicted, amounting to **£41.3 billion**, compared to **£92.5 billion** if only cigarettes were available .

CONCLUSIONS

Our Dynamic Population Model demonstrates the significant economic benefits of making electronic vapor products (EVP) available to the public.

Using the UK as a case study, projections indicate that EVP availability supports a steady decline in smoking rates by helping smokers switch away from cigarettes. This shift led to substantial reductions in healthcare and social care costs linked to smoking.

Scenarios with higher EVP adoption indicated even greater cost savings, underscoring the potential of EVP as a key component in tobacco harm reduction strategies. These results highlight the broader value of harm reduction, not only in improving public health but also in likely reducing strain on healthcare systems, if these alternatives to smoking were endorsed even stronger to encourage more smokers to transition away from smoking. When additional economic benefits such as increased productivity and reduced reliance on informal care are considered (not shown here), the societal benefits of helping smokers transition to potentially less harmful alternatives become even more compelling. This evidence can guide the development of proportionate regulations and support informed decisions about the role of potentially reduced-risk nicotine products in tobacco control.

REFERENCES

1. Guo M, Verron T et al., Dynamic Population Modelling indicates that a flavored EVP ban in the UK market may negatively impact population health. ISPOR-US, Montreal, May 2025, Poster EPH138
2. Office for National Statistics: https://www.ons.gov.uk
3. Taylor S, Letham B (2021). prophet: Automatic Forecasting Procedure. R package version 1.0, https://CRAN.R project.org/package=prophet.
4. Lee PN et al. Estimating the effect of differing assumptions on the population health impact of introducing a Reduced Risk Tobacco Product in the USA. Regul Toxicol Pharmacol. 2017;88:192-213.
5. Department of Health & Social Care. Modelling for the Smokefree Generation Policy: modelling report. GOV.UK; 2023.
6. Landman Economics, Action on Smoking and Health. CBPF Model of Smoking, Version 2.3. ASH; 2025.

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