



Using a population model to assess the impact of "dual use" of ENDS with conventional cigarettes

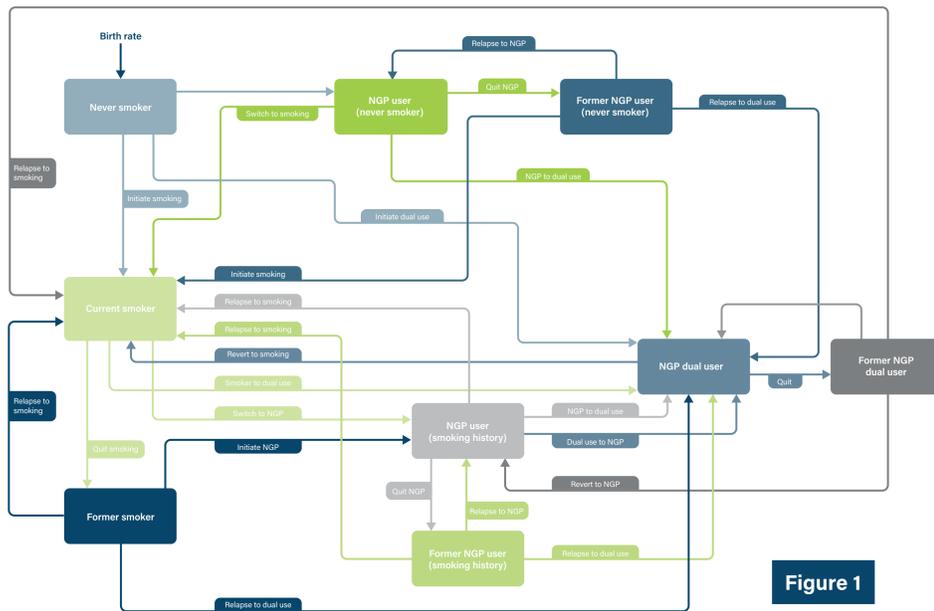


Figure 1

MODEL

We developed a model based on UK data to assess the impact of launching e-cigarettes. That assessment used a baseline scenario in which e-cigarettes were not in the market and a counterfactual (predicted) scenario where both cigarettes and e-cigarettes were available to consumers (see Figure 1 and Reference 2).

DUAL USE MODELLING

We adapted the model to make the baseline scenario the one where e-cigarettes are already available.

Comparative projections were made by changing different model parameters to create a number of different scenarios (Table 1).

Projections were made until 2100 to fully realise the effects of the changes in parameters.

Figure 2 shows a scenario in which half of dual users have been allowed to reduce their relative risk to the same level as vapers but the observed effect on smoking attributable mortality is minimal. The reason for this unexpected lack of effect is that the average time on dual use is around four years. To further assess the effect

of this phenomenon dual users were forced to stay longer at this stock. This was achieved by eliminating relapses from dual use to smoking or vaping.

There is no consensus about the benefit from reducing cigarette consumption, if any, and how that translates in terms of relative risks. One of the core principals of the model is that any potential benefit from reduced consumption would be lost if there was a relapse to high consumption rates or to smoking. Identifying credible thresholds within this multidimensional set of unknowns can be challenging. Alternatively, increasing the success rate of dual users for completely quit smoking with respect to smokers, which seems to be supported by literature³, could have an immediate positive effect as displayed in Figure 3.

Differences between these responses can appear insignificantly small but, for example, an increase of 10% of quitting probability for dual users leads to approximately 19 thousand life-years saved by 2050 and if dual users are 50% more successful quitting smoking than solely smokers then more than 25 thousand life-years by 2050.

- » Modelling suggests low adhesion of dual users with average time of dual use around four years before relapsing or quitting smoking completely.
- » Although it was shown that there could be a positive effect from the reduction in cigarette consumption by dual users, there is great uncertainty around how relative risks are associated to reductions in consumption and corresponding relapsing rates which makes any modelling efforts very speculative.
- » Dual use main benefit could come as a vehicle to completely quit smoking. The model shows that even moderate increases in the success of dual users to quit smoking compared to smokers can have significant benefit for the overall population.

Mathematical models can be used as tools to assess the population health impact of marketing novel nicotine or tobacco products¹. Here we have used such a model to assess the potential public health impact of e-cigarettes when they are used alongside conventional cigarettes ("dual use").



Table 1 | Scenarios used to assess the potential effect of dual use on mortality.

SCENARIO NAME		KEY PARAMETERS	ANNUALLY
SCENARIO 1	E-baseline scenario	Smokers switching to e-cigarettes	5%
		Smokers switching to dual use	10%
		Dual users relative risk is the same as smokers	
SCENARIO 2	No dual users	Smokers switching to e-cigarettes	15%
		Smokers switching to dual use	0%
SCENARIO 3	Dual use reduced consumption	Smokers switching to e-cigarettes	5%
		Smokers switching to dual use	10%
		50% of smokers reduce average consumption by 50% leads to significant reduction in RR (illustrative: 95% reduction)	
SCENARIO 3.1	No relapse from dual use	Same as 3 but with relapse to smoking and vaping	0%
SCENARIO 4	Dual users 10% higher quit probability	Smokers switching to e-cigarettes	5%
		Smokers switching to dual use	10%
		Dual users quitting probability is 10% higher than smokers	10%
SCENARIO 4.1	Dual users 50% higher quit probability	Same as 4 but with 50% probability higher	50%

Projections of smoking attributable mortality in under 75s for different scenarios

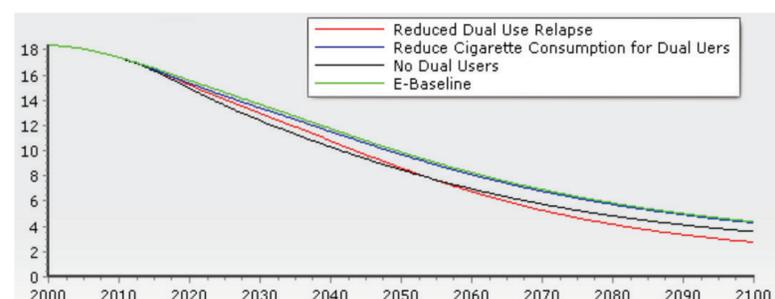


Figure 2

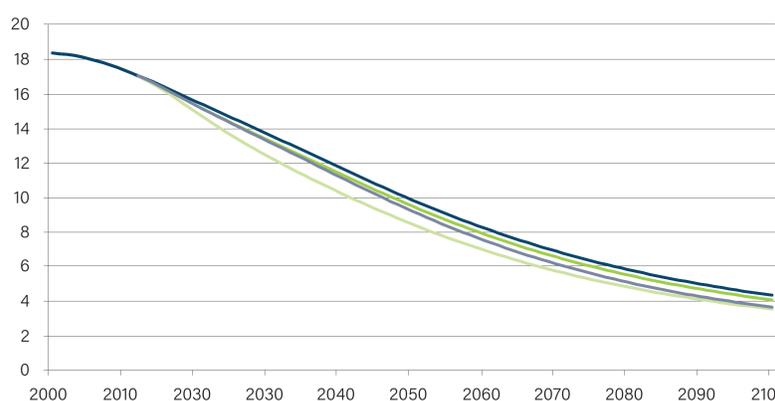


Figure 3

REFERENCES

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