

Population Impact of the growth of e-cigarettes use on smoking and smoking cessation in England

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Statement of funding and competing interests

- I undertake research and consultancy for companies that develop and manufacture smoking cessation medicines
- The study was funded by CRUK

Aim of this presentation

- To describe a study¹ assessing how far changes in the prevalence of e-cigarette use while smoking and in a quit attempt have been associated with changes in quitting-related behaviours in England

¹BMJ. 2016 Sep 13;354:i4645. doi: 10.1136/bmj.i4645

Reason for the study

- Divergent claims are being made about whether and how far use of e-cigarettes contribute to or detract from smoking cessation
- Two small RCTs suggest that when used in a quit attempt they improve the chances of success of that quit attempt¹
- One large comparative observational study yields a similar finding²
- Many other studies find that past use of e-cigarettes is associated with a reduced likelihood of quitting in the future³
- None of these studies is able to provide a direct estimate of the population impact and whether it is positive or negative

¹Cochrane Database Syst Rev. 2016 Sep 14;9:CD010216; ²Addiction. 2014 Sep;109(9):1531-40. doi: 10.1111/add.12623.

³Lancet Respir Med. 2016 Feb;4(2):116-28. doi: 10.1016/S2213-2600(15)00521-4

Study design

- A time series analysis (ARIMAX) assessing associations between quarterly changes in input and output measures
- **Input measures**
 - Prevalence of e-cigarettes use by smokers
 - Prevalence of e-cigarette use in the most recent quit attempt made in the past 12 months
- **Output measures**
 - Success rate of most recent quit attempt made in the past 12 months
 - Prevalence of recent (past 12-month) quit attempts
 - Use of each of several smoking cessation support methods
- **Covariates**
 - Mass media spend
 - Tobacco control policies
 - Cost of smoking

Measures

- **Period:** Nov 2006 to March 2015
- **Sources:**
 - **Smoking Toolkit Study:** Monthly national surveys of representative samples of adults aged 16+ in England aggregated quarterly (approx. 6000 adults, 1200 smokers per quarter)
 - **NHS Information Centre:** Quarterly returns from stop-smoking services, totalling 8 million quit dates
 - **Public Health England:** Covariates

Results: quit success rates

	Analysis of e-cigarette use during a quit attempt*		Analysis of current e-cigarette use†	
	Unadjusted	Fully adjusted	Unadjusted	Fully adjusted
Percentage change per 1% change in the exposure (95% CI), P value				
Use of e-cigarettes in a quit attempt	0.042 (0.018 to 0.065), <0.001	0.058 (0.038 to 0.078), <0.001	NA	NA
Use of e-cigarettes by current smokers	NA	NA	0.076 (-0.002 to 0.155), 0.06	0.098 (0.064 to 0.132), <0.001
Mass media expenditure	—	0.059 (0.020 to 0.097), 0.003	—	0.063 (0.025 to 0.101), 0.001
Total change due to the exposure (95% CI), P value				
Smoking ban (temporary impact in third quarter of 2007)	—	0.022 (-0.224 to 0.268), 0.86	—	0.005 (-0.237 to 0.246), 0.97
Increase in age of sale (temporary impact in fourth quarter of 2007)	—	0.328 (0.081 to 0.574), 0.009	—	0.345 (0.105 to 0.585), 0.005
Move to local authority control (temporary impact in second quarter of 2013)	—	-0.047 (-0.293 to 0.200), 0.71	—	-0.029 (-0.265 to 0.207), 0.81

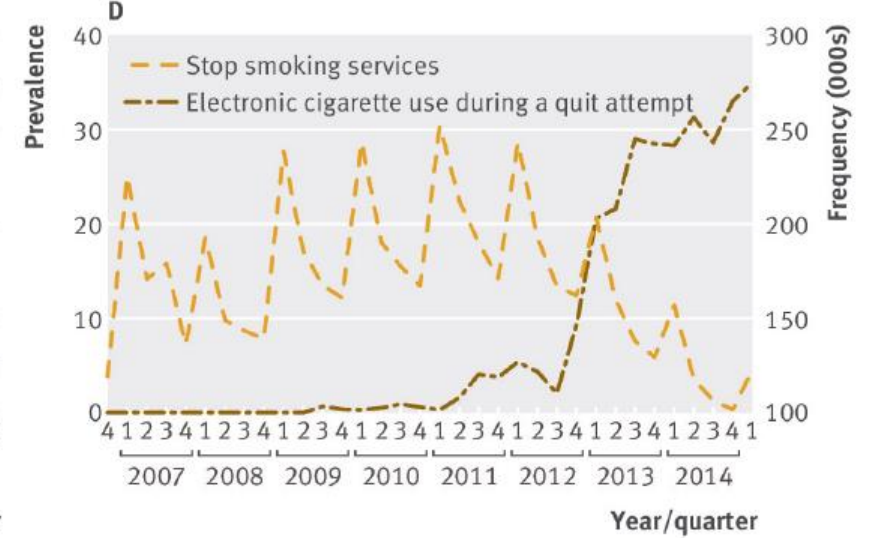
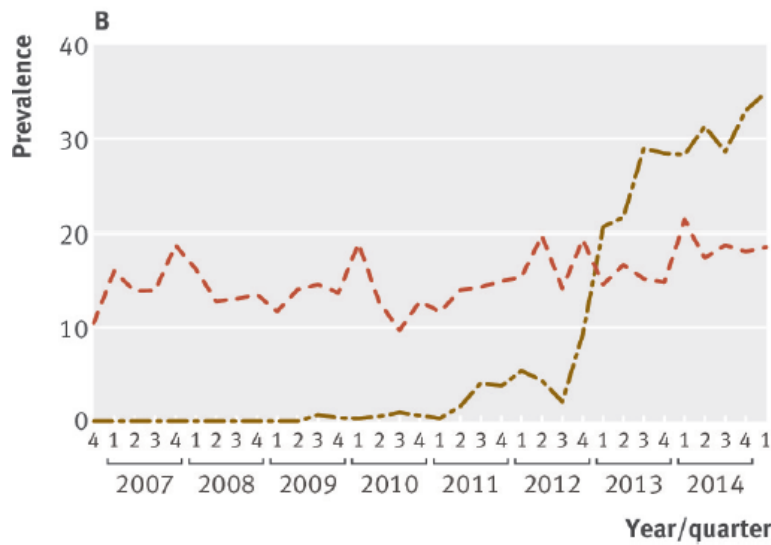
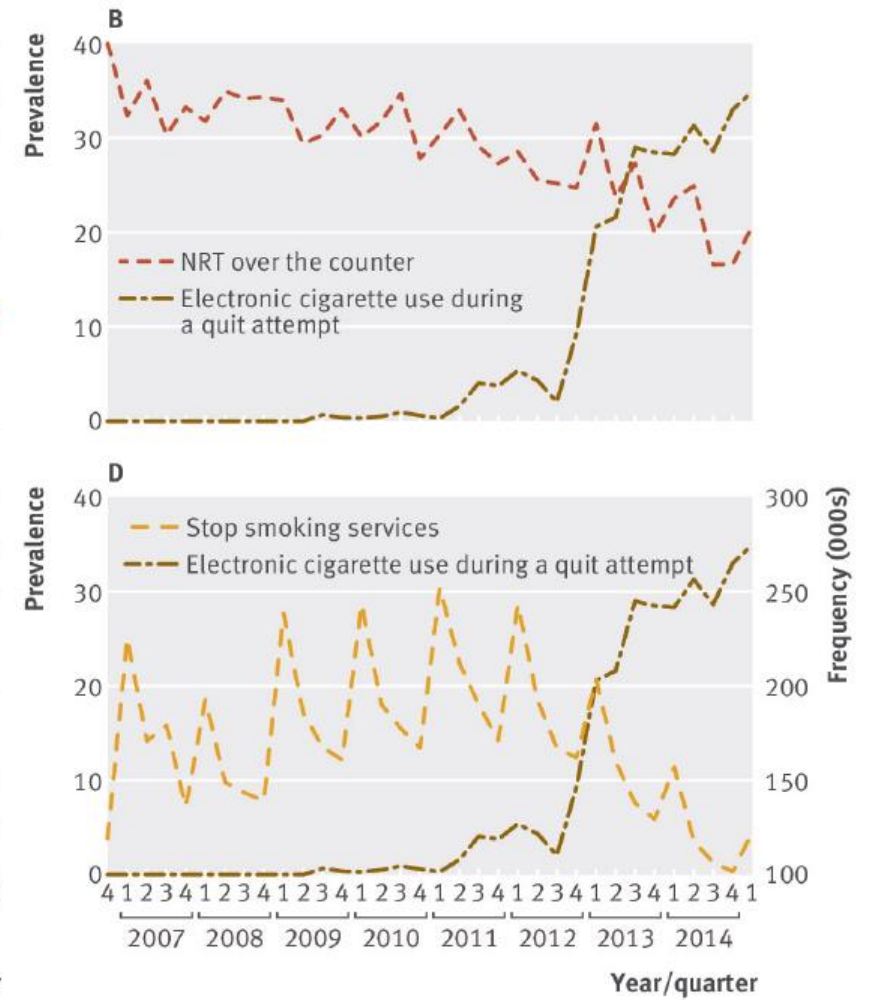
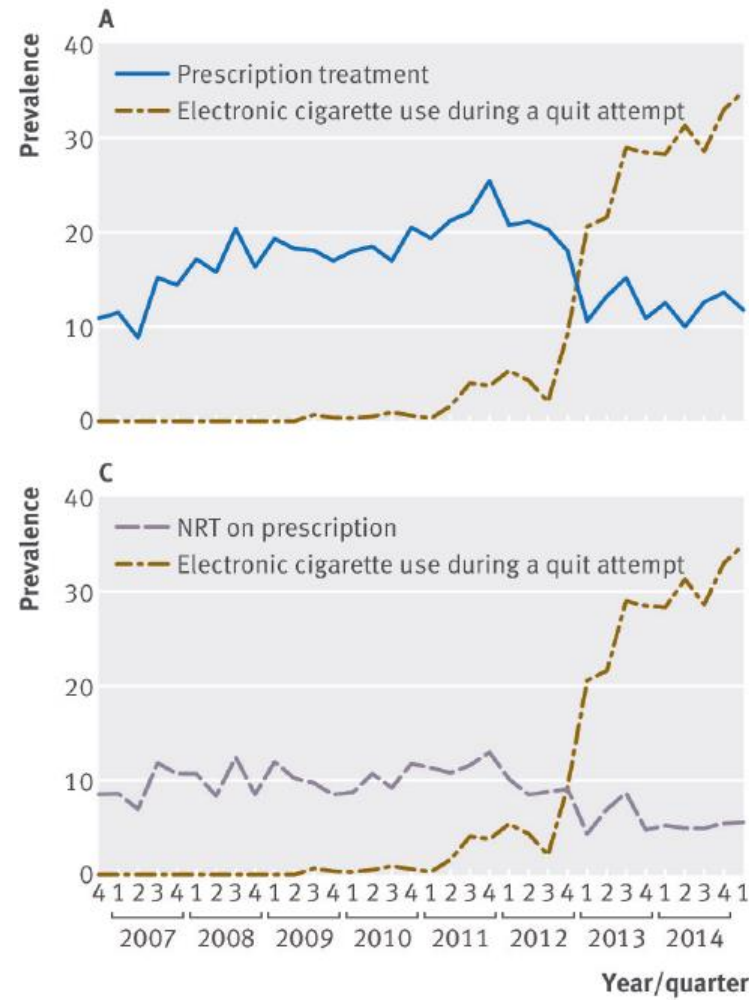
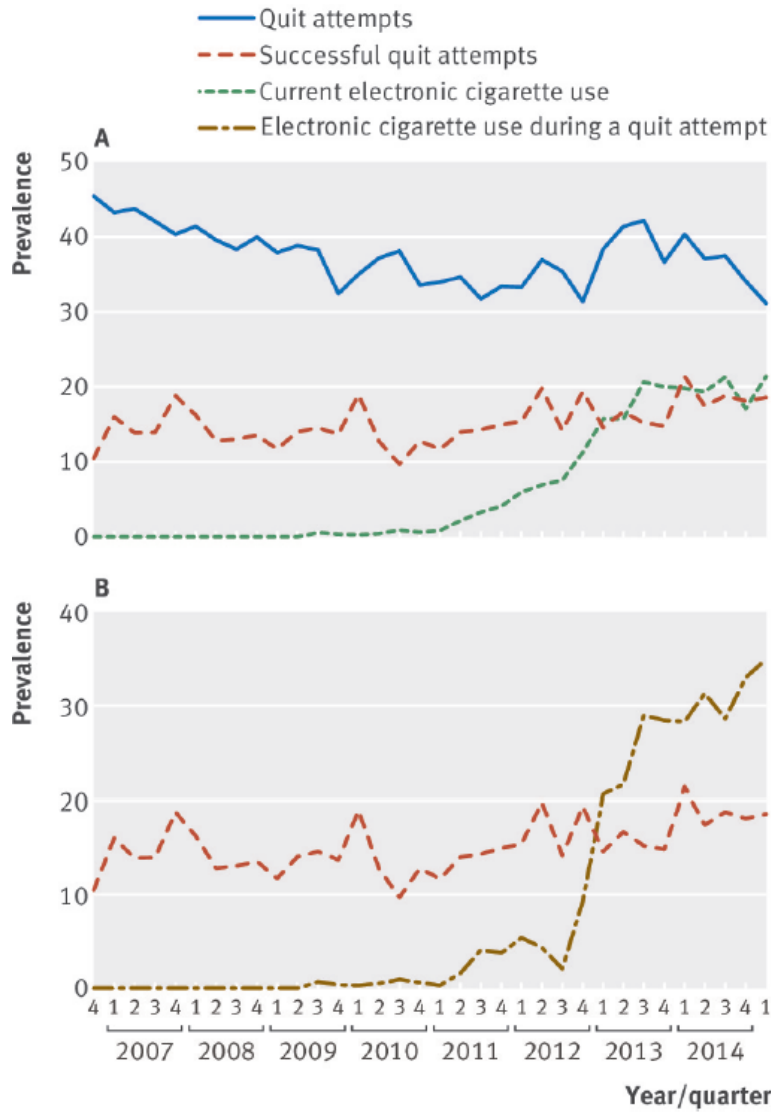
Results: quit attempt rate

	Unadjusted*	Fully adjusted*
Percentage change per 1% change in the exposure (95% CI), P value		
Use of e-cigarettes	0.023 (-0.037 to 0.083), 0.46	0.025 (-0.035 to 0.085), 0.41
Mass media expenditure	—	-0.008 (-0.039 to 0.022), 0.59
Total change due to the exposure (95% CI), P value		
Smoking ban (temporary impact in third quarter of 2007)	—	-0.017 (-0.138 to 0.103), 0.78
Increase in age of sale (temporary impact in fourth quarter of 2007)	—	-0.037 (-0.159 to 0.083), 0.54
Move to local authority (temporary impact in second quarter of 2013)	—	0.031 (-0.039 to 0.022), 0.57

Results: use of stop-smoking support

	Stop smoking services		Prescription treatment		NRT over the counter		NRT on prescription	
	Adjusted for smoking prevalence*	Fully adjusted*	Unadjusted†	Fully adjusted†	Unadjusted‡	Fully adjusted‡	Unadjusted§	Fully adjusted§
Percentage change per 1% change in the exposure (95% CI), P value								
Use of e-cigarettes in a quit attempt	-0.012 (-0.091 to 0.067), 0.77	-0.013 (-0.102 to 0.077), 0.78	-0.069 (-0.161 to 0.022), 0.14	-0.070 (-0.152 to 0.013), 0.10	-0.016 (-0.096 to 0.065), 0.70	-0.006 (-0.088 to 0.077), 0.89	-0.086 (-0.187 to 0.015), 0.10	-0.098 (-0.189 to -0.007), 0.04
Mass media expenditure	—	0.013 (0.005 to 0.021), 0.001	—	-0.013 (-0.015 to 0.041), 0.37	—	-0.008 (-0.053 to 0.037), 0.74	—	-0.051 (-0.107 to 0.006), 0.08
Total change due to the exposure (95% CI), P value								
Smoking ban (temporary impact in third quarter of 2007)	—	-0.019 (-0.294 to 0.257), 0.89	—	0.173 (-0.097 to 0.442), 0.21	—	-0.128 (-0.344 to 0.087), 0.24	—	-0.128 (-0.344 to 0.087), 0.24
Increase in age of sale (temporary impact in fourth quarter of 2007)	—	0.011 (-0.219 to 0.238), 0.92	—	0.077 (-0.190 to 0.343), 0.57	—	-0.027 (-0.242 to 0.189), 0.81	—	-0.027 (-0.242 to 0.189), 0.81
Move to local authority (temporary impact in second quarter of 2013)	—	0.034 (-0.162 to 0.230), 0.73	—	0.056 (-0.225 to 0.337), 0.70	—	-0.075 (-0.303 to 0.152), 0.52	—	-0.075 (-0.303 to 0.152), 0.52

Results: unadjusted trends



Limitations

- Cannot rule out associations being at least partially attributable to unmeasured population trends
- Estimates are subject to margin of error (95% confidence intervals of approx. 50%)
- For non-significant associations, cannot rule out small effects

Comments

- The results are consistent with e-cigarette use in quit attempts increasing the chances of success by approx. 50% - similar to previous estimates
- The results are not consistent with e-cigarette use decreasing quit attempts or quit success at a population level to the extent estimated by Kalkhoran et al¹
- The effect size estimates lead to a population estimate of approx. 54,000 short-term and 18,000 long-term additional ex-smokers attributed to e-cigarette use in 2015

¹Lancet Respir Med. 2016 Feb;4(2):116-28. doi: 10.1016/S2213-2600(15)00521-4