THE UK ELECTRONIC CIGARETTE RESEARCH FORUM

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Electronic Cigarette Research Briefing – June 2020

This research briefing is part of a series of monthly updates aiming to provide an overview of new studies on electronic cigarettes. The briefings are intended for researchers, policy makers, health professionals and others who may not have time to keep up to date with new findings and would like to access a summary that goes beyond the study abstract. The text below provides a critical overview of each of the selected studies then puts the study findings in the context of the wider literature and research gaps.

The studies selected and further reading list do not cover every e-cigarette-related study published each month. Instead, they include high profile studies most relevant to key themes identified by the UK Electronic Cigarette Research Forum; including efficacy and safety, smoking cessation, population level impact and marketing. For an explanation of the search strategy used, please see the end of this briefing.

You can find our previous research briefings at www.cruk.org/UKECRF.

If you would prefer not to receive this briefing in future, just let us know.

1. Association of Socioeconomic Position With e-Cigarette Use Among Individuals Who Quit Smoking in England, 2014 to 2019

- **Study Aims**

  This English study collected data on the prevalence of current e-cigarette use in adult ex-smokers (16+) between 2014 and 2019. Three different groups were examined:

  - Participants who had quit smoking for at least a year (n=19,297)
  - Participants who had quit smoking in the past year and did not use an e-cigarette in their quit attempt (n=904)
  - Participants who quit smoking before 2011 (when e-cigarettes became popular in the UK) (n=14,241)

  Differences in e-cigarette use by socioeconomic position (SEP) (measured by comparing C2DE and ABC1 participants) were assessed. Results were adjusted for age, sex, region and popularity of e-cigarettes. A sensitivity analysis was conducted with housing tenure as an alternative measure of SEP.

- **Key Findings**

  In participants who had quit smoking for at least a year, lower SEP was associated with current e-cigarette use (OR = 1.59, 95% CI=1.05-2.40, p = 0.03). When stratifying by year, this

association was consistently observed, with the exception of 2016 where no association was found (p=0.1).

In participants who quit smoking in the past year and did not use an e-cigarette in their quit attempt, there was no association between current e-cigarette use and SEP (p=0.62). When stratifying by year, the same trend was consistently observed, with the exception of 2015 where lower SEP was associated with current e-cigarette use (OR=3.46, 95% CI=1.05-12.64, p=0.04).

In participants who quit smoking before 2011, there was no association between SEP and current e-cigarette use (p=0.62). When stratifying by year, the same trend was consistently observed, with the exception of 2015 where lower SEP was associated with e-cigarette use (OR=3.22, 95% CI=1.06-10.81, p=0.04).

Among participants who had quit smoking for at least a year, living in social housing was associated with current e-cigarette use (OR=2.25, 95% CI=1.39-3.55, p<0.001). There was no association between housing tenure and use of e-cigarettes in participants who had quit smoking in the past year without using e-cigarettes in their quit attempt and in those who had quit before 2011 (ps=0.28 and 0.77, respectively).

- **Limitations**

  This study only reported current product use at single time points. Therefore, it cannot tell us about patterns of use in individuals over time or determine causality.

  The sample size of the sub-group of participants who quit smoking in the past year without using e-cigarettes is small meaning the statistical power to detect a relationship is limited.

  The primary measure of SEP was based on National Readership Survey (NRS) social grades, a system which is often considered outdated. Grades were grouped into ABC1 and C2DE meaning differences across all grades were not analysed.

  The study only examines former smokers meaning it doesn't capture the interaction of SEP with relapse to dual use.

  The study did not record frequency of e-cigarette use meaning it is unclear whether participants were regular or occasional users and if patterns of use has an effect on the associations observed.

  This study didn't control for all possible confounders that could affect results, such as nicotine addiction. Therefore, this study may be vulnerable to confounding.

  The results are based on self-reported cross-sectional survey data meaning that smoking status could not be biochemically verified.

Kock, L., Shahab, L., West, R., and Brown, J. (2020). Association of Socioeconomic Position With e-Cigarette Use Among Individuals Who Quit Smoking in England, 2014 to 2019. *JAMA Network Open.* doi; 10.1001/jamanetworkopen.2020.4207

2. Socioeconomic differences in motivation to stop using e-cigarettes and attempts to do so

- **Study Aims**

  This longitudinal UK study assessed the relationship between socioeconomic characteristics (educational attainment, annual income and employment status) and baseline motivation to stop using e-cigarettes / follow-up attempts to stop using e-cigarettes. Daily or non-daily e-cigarette users who were current smokers(n=649), recent ex-smokers (quit smoking in the past three months) (n=54) or long-term ex-smokers (quit smoking for more than three months) (n=291) were recruited in 2016 and followed up in 2017. Three different models were generated, each using one socioeconomic characteristic, and further adjusting for age, gender, smoking status and urges to use e-cigarettes at baseline.

- **Key Findings**

  There was no association between educational attainment, income or employment status and motivation to stop using e-cigarettes. There was also no association between these socioeconomic characteristics and attempts to stop using e-cigarettes at follow up.

  Compared with participants who had moderate urges to use e-cigarettes, those who had strong urges were more likely to be motivated to stop using e-cigarettes (ORs=1.46-1.48, 95%CIs = 1.04-2.08, ps<0.01). Participants with no urges and those who answered “don’t know” were less likely to be motivated to stop using e-cigarettes (ORs=0.24, 95%CI=0.15-0.39, ps<0.001).

  Compared with the 18-24 age category, those who were 25-39 were more likely (ORs=1.62-1.64, 95%CIs=1.01-2.63, ps<0.05) and those who were 55+ were less likely to be motivated to stop using e-cigarettes (ORs=0.53-0.58, 95%CIs=0.32-0.96, ps<0.05). There was no association between age and attempts to stop using e-cigarettes.

  Compared with smokers, recent ex-smokers were more likely to be motivated to stop using e-cigarettes (ORs=1.46-1.48, 95%CIs=1.04-1.06, ps<0.05). However, long term ex-smokers were more likely to have attempted to stop using e-cigarettes than smokers (ORs=0.48-0.52, 95% CIs=0.27-0.92, ps<0.05).

- **Limitations**

  48% of participants were lost to follow up meaning the resulting sample was relatively small. This could have affected the accuracy of estimates. Respondents who were lost to follow up were more highly educated, had more income and were more likely to be employed which may have biased the results.

  Participants were recruited with the incentive of redeeming gift vouchers in return for completing the survey. Therefore, the sample may be subject to selection bias and may not be representative of the wider vaping population.

  The study used an adapted version of the “motivation and intention to stop” scale in order to quantify motivation to stop using e-cigarettes. This method is yet to be validated for e-cigarette use.

  The study adjusted for age, gender, smoking status and baseline urges to use e-cigarettes however did not control for all possible confounders, such as nicotine dependence.

All data was self-reported meaning it was subject to recall bias and error.

Jahnel T, Ferguson S, Partos T, Brose L. (2020). Socioeconomic differences in motivation to stop using e-cigarettes and attempts to do so. *Addictive Behaviour Reports*.; doi: 10.1016/j.abrep.2020.100247.

3. Associations of Flavored e-Cigarette Uptake With Subsequent Smoking Initiation and Cessation

- **Study Aims**

This analysis of U.S. PATH data explored the relationship between use of e-cigarettes and smoking initiation in youth (12-17 years; n=7311) and emerging adults (18-24 years; n=4634). Smoking cessation in emerging (n=1503) and prime-age (24-54 years; n=4634) adults was also examined. Participants were e-cigarette naïve when recruited at baseline Wave 1 (2013-2014) and were followed up at Wave 2 (2014-2015) to determine e-cigarette initiation. At Wave 3 (2015-2016) and/or Wave 4 (2015-2016), changes in participant's smoking status were recorded. The effect of flavoured (non-tobacco – e.g. fruit, candy, menthol, mint) vs un-flavoured (tobacco) e-cigarette use on smoking initiation and cessation in each group was examined. Results were adjusted for sociodemographic characteristics.

- **Key Findings**

Vaping uptake at Wave 2 was associated with smoking initiation at Wave 3 for both youth (AOR=6.75, 95% CI = 3.93-11.57, p<0.001) and emerging adults (AOR=3.20, 95% CI=1.70-6.02). This association remained when examining smoking initiation at wave 4 (AOR=5.62, 95%CI=3.17.9.96, p<0.001, AOR=5.62, 95%CI=2.99-10.56, p<0.001) for youth and emerging adults, respectively.

In prime-age adults, vaping initiation was associated with smoking cessation at Wave 3 (AOR=1.40, 95% CI=1.40, p=0.046), but this association was not observed when examining smoking cessation at Wave 4. There was no association between e-cigarette use and smoking cessation in emerging adults at either Wave 3 or Wave 4.

When examining if the association of e-cigarette use with smoking initiation at Wave 3 or 4 in youth differed for flavoured vs unflavoured e-cigarettes, no significant difference was observed. There was also no significant association observed at Wave 3 for emerging adults.

When examining if the association of e-cigarette use and smoking cessation at Wave 3 or 4 in prime-age adults differed for flavoured vs unflavoured e-cigarettes, no significant difference was observed. When both groups of adult smokers were combined, a significant association between using flavoured e-cigarettes and smoking cessation at Wave 3 (AOR=2.28, 95%CI=1.04-4.99, p=0.04), but not Wave 4 was observed.

- **Limitations**

The definitions of e-cigarette and cigarette use in the two categories were inconsistent. Adult smoking is defined by current use and vaping by ever use. Youth use of both products is defined by use in the past 30 days, which fails to distinguish between experimentation and regular use.

Due to inconsistency in product use definitions, participants who aged out of the youth category over the follow up period could not be included in the analysis. This limited the sample sizes of the youth and emerging adult groups, reducing statistical power.

The study was unable to consider former smokers who may have already used e -cigarettes to successfully quit, or those who were already vaping at baseline. This may have impact estimates of cessation.

The data collected in Wave 1 and 2 of the study precede the introduction of Juul to the U.S. market. Therefore, the results may not be generalisable to pod/salt-based devices.

Results were not adjusted for all confounders that might affect changes in patterns of e-cigarette and cigarette use, such as nicotine addiction, reasons for use, other risky behaviours and the external policy environment. Therefore, a causal relationship cannot be determined.

Data were self-reported meaning they might be subject to bias.

Friedman A, Xu S. (2020) Associations of Flavored e-Cigarette Uptake With Subsequent Smoking Initiation and Cessation. *Jama Network.* doi; 10.1001/jamanetworkopen.2020.3826.

4. Youth and Young Adult Use of Pod-Based Electronic Cigarettes from 2015 to 2019

- **Study Aims**

This study aimed to collate the evidence on JUUL and other pod-based e-cigarettes from 2015-2019. The systematic review included 35 studies that examined the nicotine delivery and exposure, marketing techniques, social media communication and population use and perceptions of these products.

- **Key Findings**

From two 2015 U.S. surveys of youth (15-17 years), ever use of JUUL ranged from 7.6%-9.5% and past 30-day use ranged from 4% to 6.1%. One study found that frequent use (20-30 days in the past 30 days) was 0.3%.

One study found that, among young adults (18 to 21 years), ever use of JUUL in 2015 was 11.2%, past 30-day use was 7.7% and frequent use was 2.2%.

Two studies found that JUUL users tended to be white and of higher socioeconomic status than nonusers. Four studies also found JUUL users tended to use other e-cigarette devices or smoke cigarettes. Four studies found that social acceptability and product features were top reasons for using JUUL.

One study found that adolescents using pod-based e-cigarettes were more likely than other e-cigarette users to vape daily (63.0% vs. 11.0%; p = 0.001). They were also more likely to give a positive response to questions on nicotine dependence (21.4% vs. 7.1%; p = 0.04).

One study estimated that 81% of followers on the JUUL twitter account were between 13 to 20 years old. Three studies found that using JUUL as a cessation strategy was mentioned in between 0.29%-16.2% of JUUL related social media posts on Twitter and Reddit. One study found that 0.9% of a sample of JUUL-related tweets were by the government, education or anti-tobacco agencies.

- **Limitations**

  The researchers did not complete a meta-analysis of any of the data. Therefore, common effects of the studies cannot be statistically verified.

  This review is vulnerable to any limitations of the individual studies included. Most the studies included were cross-sectional surveys meaning the studies do not examine use of over time. These also rely on self-reported data, which may be subject to bias.

  The majority of the research included focuses solely on JUUL. Therefore, the findings may not be relevant to other pod-based e-cigarette brands.

  The authors did not rate the quality of each paper included in the review. It is unclear how well each study adjusted for covariates meaning the studies may have been subject to confounding.

  The analyses of social media posts were conducted using different methods and different sized samples of posts. Therefore, the results may not have been directly comparable.

  This review included studies from a range of countries, including many that were US-based. It's unclear how applicable these are to countries such as the UK.

Juhyun Lee, S. Rees V.W., Yossefy N, Emmons K, Tan, A. (2020). Youth and Young Adult Use of Pod-Based Electronic Cigarettes from 2015 to 2019. *Jama Pediatrics*. doi: 10.1001/jamapediatrics.2020.0259

Overview

This month we include two studies from the UK that focus on vaping and socio-economic status, one from the USA on e-cigarette flavours, and a systematic review conducted by authors based in South Korea and the USA that examined use of pod-based e-cigarettes.

The first study is the latest output from the Smoking Toolkit study in England. Funded by Cancer Research UK, it builds on an earlier analysis by the team that examined how e-cigarette use varies by socio-economic position from 2014-2017. In this paper, the focus was on uptake of vaping after quitting smoking among people from different occupational groups (socio-economic position or 'SEP', based on the type of job a person does). The study involved just under 35,000 adults who had stopped smoking for at least a year and who took part in the Toolkit between 2014-2019. The researchers assessed the extent to which 'recent initiation' (not vaping in a quit attempt but taking it up after quitting) and 'late initiation' (vaping among those who stopped smoking prior to 2011) varied by SEP.

Overall the study found that e-cigarette use increased in the sample as a whole in the study period (from 3.3% in 2014 to 10.4% in 2019). Use was highest among lower SEP groups. Uptake of vaping post smoking cessation was relatively rare, however. Only 7.1% of those who quit smoking after 2011 (when vaping became popular) took it up after stopping smoking, and no significant differences by SEP were found. Among those who quit prior to 2011, taking up vaping was more common in this group by 2019 (2.1% in 2019 compared with 0.8% in 2014) but still rare and didn't differ by SEP. The authors point to a need for more research on whether e-cigarettes play a role in relapse prevention, including by SEP.

Our second study this month is from the UK, also funded by Cancer Research UK, but uses a different dataset. The team conducted an online survey of 994 smokers, ex-smokers and vapers with baseline data collected in early summer 2016 and follow up in September 2017. They aimed to look at differences in motivation to quit vaping and attempts to stop using e-cigarettes by three measures of socio-economic status (education, income and employment). This is an interesting topic to research, as very few studies to date have looked at patterns of stopping vaping, compared to the now fairly extensive literature on vaping for smoking cessation.

After adjusting for relevant confounders, the analysis didn't find any significant associations between education, income or employment and motivation to stop vaping, or attempts to stop vaping. There were, however, differences observed between those who were more dependent on vaping (assessed via self-reported urges to vape) and those who were not. People who reported strong urges to vape had higher levels of motivation to quit vaping. In addition, people who were longer term ex-smokers (had quit more than three months ago) were more likely to have tried to stop vaping by follow up. Some differences by age in relation to motivation (but not attempts to quit vaping) were also observed, with those aged 25-39 more motivated to stop using e-cigarettes, and those age 55 and above less motivated to stop when compared with the youngest age group in the sample (18-24).

The third study this month examined the topic of e-cigarette flavours and their possible relationship with smoking uptake and smoking cessation. Authored by two researchers in the USA, the paper reports findings from a secondary analysis of data from the large PATH survey, a nationally representative longitudinal survey. The current analysis focused on participants aged 12-17 ('youth') 18-24 ('emerging adults') and 25-54 ('prime aged adults') and included four waves of PATH data from 2013-2016. The sample at baseline included just under 18,000 participants and, in relation to flavours, the analysis differentiated between self-reported use of tobacco vs non tobacco flavoured e-cigarettes.

As previous papers from the PATH study have found, youth and young adults who reported trying e-cigarettes first were significantly more likely to go on to smoke at follow up. Among adult smokers, taking up vaping was positively associated with subsequent smoking cessation between two of the waves in the study but this wasn't maintained in the final follow up. For flavours, no clear findings emerged for smoking initiation in youth or emerging adults. However, there was some evidence that using e-cigarette flavours other than tobacco was helpful for smoking cessation among adults (when the 18-24 and 25-54 age groups were combined). Overall, there is very limited evidence to date in the published literature on how flavours might play a role in smoking cessation, so this paper provides an addition to the literature in that respect. Ideally, a randomised controlled trial of unflavoured (or tobacco flavoured) e-cigarettes for smoking cessation compared with sweet or fruit flavoured e-liquids is needed to explore this relationship further.

Our final paper is a systematic review of studies examining pod-based e-cigarettes. These products are still relatively new but are popular and account for a substantial portion of the e-cigarette market. Previous systematic reviews have included studies with findings relating to earlier generation vaping products. The authors focused the current review on youth and young adult use of these products and identified 35 studies covering a wide variety of topics including population use and perceptions, nicotine delivery and exposure, marketing techniques and social media communication. The starting point for the paper was to address knowledge gaps regarding the potential health effects of using pod-based e-cigarettes.

The vast majority of the studies identified focused on a single brand of pod-based e-cigarettes (JUUL). Several studies in the review explored different elements of nicotine content and delivery in pod-based devices and suggested that pod based devices delivered nicotine but not all of these studies compared pod devices with other e-cigarettes. Further studies in the review examined youth (aged 15-17) use of JUUL in the USA and found relatively high levels of ever (up to 9.5% of youth) and recent (past 30 day - up to 6%) use but low levels of frequent use, with slightly higher use in young adults age 18-21. Studies also provided insight into motivations among young people and young adults for using pod devices (JUUL) rather than other e-cigarettes including social acceptability and 'sleek' / easy to use design. Studies also found lack of awareness of nicotine content in JULL products. Some included studies focused on social media with examples of promotion and lack of information on any risks of use. Despite the aims of the review, the study didn't find any specific information on health effects. Future studies need to go beyond description of uptake and promotion and provide data on health outcomes of use in young people and young adults, including by smoking status.

Other studies from June you might find of interest:

Patterns of use

Association of Socioeconomic Position With e-Cigarette Use Among Individuals Who Quit Smoking in England, 2014 to 2019.

Associations of Flavored e-Cigarette Uptake With Subsequent Smoking Initiation and Cessation.

The moderating role of anxiety sensitivity in terms of fatigue severity and e-cigarette use expectancies.

Prevalence of e-cigarette use among tobacco smokers in six states and regions of Myanmar.

The effects of inhaled flavors on intravenous nicotine.

The association of e-cigarette flavors with satisfaction, enjoyment, and trying to quit or stay abstinent from smoking among regular adult vapers from Canada and the United States: Findings from the 2018 ITC Four Country Smoking and Vaping Survey.

Use of and perceptions about electronic nicotine delivery systems (ENDS) among people with mental health conditions or serious psychological distress, 2018.

Factors influencing the uptake and use of nicotine replacement therapy and e-cigarettes in pregnant women who smoke: a qualitative evidence synthesis.

A qualitative analysis of Māori and Pacific people's experiences of using electronic nicotine delivery systems (ENDS).

High Prevalence of Tobacco Product and E-Cigarette Use among Electronic Dance Music Party Attendees.

Correlates of youth vaping flavor preferences.

Electronic Cigarette Use During Preconception and/or Pregnancy: Prevalence, Characteristics, and Concurrent Mental Health Conditions.

What are the reasons that smokers reject ENDS? A national probability survey of U.S. Adult smokers, 2017-2018.

Twenty-four-hour subjective and pharmacological effects of ad-libitum electronic and combustible cigarette use among dual users.

Adult Use of and Transitions From Nicotine and Non-nicotine-Containing E-cigarettes: Data From the Population Assessment of Tobacco and Health (PATH) Study, 2013-2016.

Perception

Young Adult Identification and Perception of Hashtag-Based Vaping Claims on Instagram.

Knowledge and attitudes of adolescents to e-cigarettes: an international prospective study.

Electronic nicotine delivery system (ENDS) use patterns and its associations with cigarette smoking and nicotine addiction among Asian Americans: Findings from the national adult tobacco survey (NATS) 2013-2014.

The Effects of Self vs. Group Affirmation and Message Framing on College Students' Vape-Free Campus Policy Support.

Valence of Media Coverage about Electronic Cigarettes and Other Tobacco Products from 2014-2017: Evidence from Automated Content Analysis.

Development and Piloting Testing of an Experimental Tobacco and Nicotine Product Marketplace.

Cessation

Socioeconomic differences in the motivation to stop using e-cigarettes and attempts to do so.

Initial views and experiences of vaping in prison: a qualitative study with people in custody preparing for the imminent implementation of Scotland's prison smokefree policy.

Intensive longitudinal study of the relationship between cigalike e-cigarette use and cigarette smoking among adult cigarette smokers without immediate plans to quit smoking.

Youth

Evaluating the actual and perceived effectiveness of E-cigarette prevention advertisements among adolescents.

'Vaping and fidget-spinners': A qualitative, longitudinal study of e-cigarettes in adolescence.

Trends and predictors of exclusive e-cigarette use, exclusive smoking and dual use among youth in Canada.

Youth and Young Adult Use of Pod-Based Electronic Cigarettes From 2015 to 2019: A Systematic Review.

Exposure to adverse childhood experiences and early initiation of electronic vapor product use among middle school students in Nevada.

Welsh Primary Schoolchildren's Perceptions of Electronic Cigarettes: A Mixed Methods Study.

Bullying Victimization and e-Cigarette Use among Middle and High School Students.

Harms and harm reduction

Adverse effects of electronic cigarettes on the disease-naive oral microbiome.

Electronic nicotine delivery system design and aerosol toxicants: A systematic review.

Estimating the population health impact of recently introduced modified risk tobacco products: a comparison of different approaches.

IMPACT OF E-CIGARETTE LIQUID FLAVORING AGENTS ON ACTIVITY OF MICROSOMAL RECOMBINANT CYP2A6, THE PRIMARY NICOTINE-METABOLIZING-ENZYME.

E-Cigarette Liquid Provokes Significant Embryotoxicity and Inhibits Angiogenesis.

ENDS Aerosol-induced Cell Death and Dysfunction in Macrophages and Lung Epithelial Cells.

Indoor Air Quality and Passive E-cigarette Aerosol Exposures in Vape-shops.

ENDS use among college students: Salivary biomarkers and persistent cough.

Relation between Tobacco Smoking/Electronic Smoking and Albuminuria/Vascular Stiffness in Young People without Cardiovascular Diseases.

Free Radical Production and Characterization of Heat-Not-Burn Cigarettes in Comparison to Conventional and Electronic Cigarettes.

Passive Exposure to Pollutants from a New Generation of Cigarettes in Real Life Scenarios.

E-vapor aerosols do not compromise bone integrity relative to cigarette smoke after 6-month inhalation in an ApoE-/- mouse model.

Airway basal cell injury after acute diacetyl (2,3-butanedione) vapor exposure.

Cytotoxic and genotoxic effects of e-liquids and their potential associations with nicotine, menthol and phthalate esters.

Use of Electronic Cigarettes and Self-Reported Chronic Obstructive Pulmonary Disease Diagnosis in Adults.

Marketing

#toolittletoolate: JUUL-related content on Instagram before and after self-regulatory action.

Compliance with FDA nicotine warning statement provisions in e-liquid promotion posts on Instagram.

An Analysis of E-Cigarette Marketing in New Zealand Tobacco Retail Outlets Prior to Legislative Change.
Exposure to Multimedia Tobacco Marketing and Product Use Among Youth: A Longitudinal Analysis.

Misc

GC-MS analysis of e-cigarette refill solutions: A comparison of flavoring composition between flavor categories.

Might limiting liquid nicotine concentration result in more toxic electronic cigarette aerosols?

Exposure to JUUL use: cue reactivity effects in young adult current and former smokers.

Flavor-specific enhancement of electronic cigarette liquid consumption and preference in mice.

Characterization of Nicotine Salts in 23 Electronic Cigarette Refill Liquids.

Rapid Brain Nicotine Uptake from Electronic Cigarettes.

Development and Piloting Testing of an Experimental Tobacco and Nicotine Product Marketplace.

Policies for Tobacco and E-Cigarette Use: A Survey of All Higher Education Institutions and NHS Trusts in England.

Search strategy

The Pubmed database is searched in the middle of each month, for the previous month using the following search terms: e-cigarette*[title/abstract] OR electronic cigarette*[title/abstract] OR ecig[title/abstract] OR (nicotine AND (vaporizer OR vaping OR vapourizer OR vaporiser OR vapouriser))

Based on the titles and abstracts new studies on e-cigarettes that may be relevant to health, the UK and the UKECRF key questions are identified. Only peer-reviewed primary studies and systematic reviews are included – commentaries will not be included. Please note studies funded by the tobacco industry will be excluded.

This briefing is produced by Alice Davies and Sophia Lowes from Cancer Research UK with assistance from Professor Linda Bauld at the University of Edinburgh and the UK Centre for Tobacco and Alcohol Studies, primarily for the benefit of attendees of the CRUK & PHE UK E-Cigarette Research Forum. If you wish to circulate to external parties, do not make any alterations to the contents and provide a full acknowledgement. Kindly note Cancer Research UK cannot be responsible for the contents once externally circulated.