

Perceptions of the Relative Harm of Electronic Cigarettes Compared With Smoking in the USA: Analysis of the Population Assessment of Tobacco and Health (PATH) Study Data, 2013-2015

Grant O'Connell¹, Tanvir Walele¹, Chris Prue¹, Xavier Cahours², John D. Pritchard³, Mengran Guo² & Thomas Verron²



1 Fontem Ventures B.V., Motion Building 8F, Radarweg 60, 1043 NT Amsterdam, The Netherlands
2 SEITA - Imperial Brands plc, 45404 Fleury-les-Aubrais, France
3 Imperial Brands plc, 121 Wintarstoke Road, Bristol, UK

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1. Introduction

- Electronic cigarettes (e-cigarettes) have been characterised as significantly less harmful than smoked tobacco by an increasing number of public health authorities, including the American Cancer Society. Recent research reports that e-cigarettes can assist smokers in replacing conventional cigarettes and reducing their cigarette per day consumption [1,2].
- The prevalence of current cigarette smoking among U.S. adults declined from 24.7% in 1997 to 14.4% in 2017 [3]. In 2016, the Centres for Disease Control and Prevention reported 3.2% of U.S. adults were current e-cigarette users, the majority of whom were current or former smokers who used e-cigarettes every day or some days [4].
- The rise in e-cigarette use has coincided with recent rapid declines in U.S. adult smoking rates. E-cigarettes began to increase in popularity around 2010 with their use as an alternative to conventional cigarettes increasing significantly by 2014. The substantial increase in e-cigarette use among U.S. adult smokers has been associated with a statistically significant increase in the smoking cessation rate at the population level [5].
- Analysis of data from the 2014 and 2015 U.S. National Health Interview Surveys (NHIS) found that over half of daily e-cigarette users had quit smoking in the last five years and daily e-cigarette users were three times more likely to quit than never-use e-cigarette smokers [6]. E-cigarettes have been shown to be more frequently used as a quit smoking aid by U.S. current and former smokers than NRT products or prescription drugs [7].
- A recently published model, that considered a strategy of switching U.S. cigarette smokers to e-cigarettes to accelerate declining smoking rates, estimated that e-cigarette use could save the lives of up to 6.6 million U.S. smokers over a 10 year period [8].
- Despite a number of public health organisations in the UK and elsewhere adopting a strategy of encouraging smokers to switch to e-cigarette use, U.S. adults remain poorly informed about the relative risk of these products. To quantify this, an analysis of the U.S. Population Assessment of Tobacco and Health (PATH) study was conducted. Available data from Wave 1 (September 2013 to December 2014) and Wave 2 (October 2014 to October 2015) adult interviews was analysed in the present study [9].

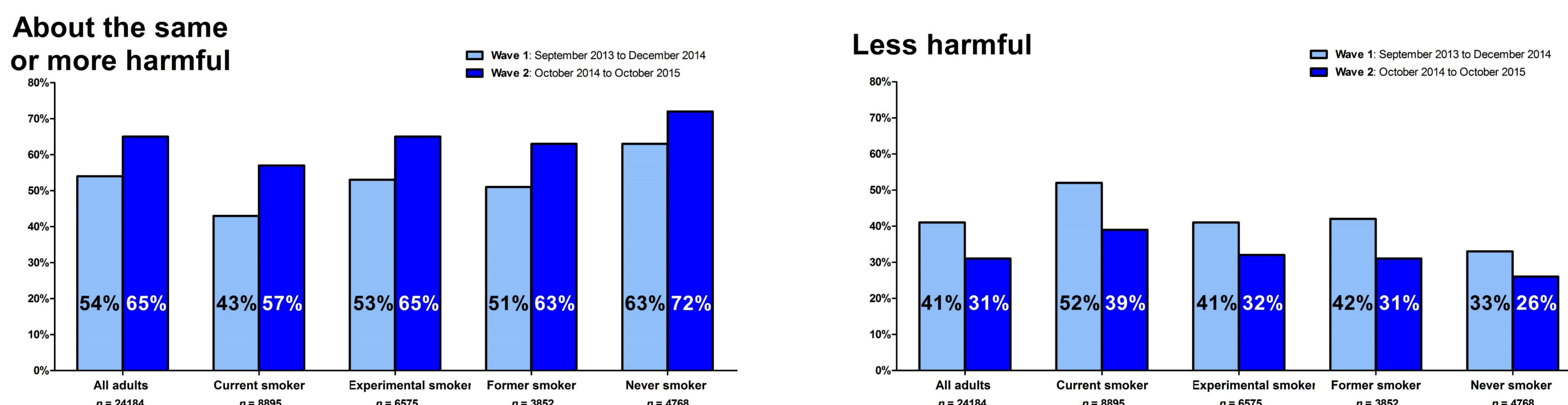
2. Data Analysis

- The PATH study is a national longitudinal study of tobacco use among youth and adults in the USA. The first wave contains baseline information for the study population. Continued follow up data become available as the consortium collects subsequent waves of data in future years. PATH study data collection involves rigorous, multi-layered sampling and weighing scheme to ensure that data are representative nationwide.
- The present study focussed on the PATH data contained in the adult interviews obtained in 2013 (Wave 1) and again in 2015 (Wave 2). The latest data was downloaded from the study's Public-Use Files [9].
- A sensitivity analysis was performed to ensure only those adults who answered question AE1099, "Is using an e-cigarette less harmful, about the same, or more harmful than smoking cigarettes?", in both Wave 1 and Wave 2 was analysed.
- Smoking status for each adult respondent was coded. The responses to PATH question AE1099 in different waves of the PATH study was assessed based on smoking status.

3. "Is Using An E-cigarette Less Harmful, About the Same, or More Harmful Than Smoking Cigarettes?"

- As shown here, between 2013 and 2015 the perception of harm from e-cigarettes did not improve. A growing proportion of the U.S. public and smokers do not recognise that e-cigarettes are less harmful than conventional cigarettes.
- The proportion of adult current smokers who believed e-cigarettes were just as, or more, harmful than smoking increased substantially from 43% in 2013 to 57% in 2015 (**Figure 1**). The poor understanding among smokers, of all smoking statuses, about the relative harms of e-cigarettes compared to smoking is of concern. Between 2013 and 2015, independent scientific evidence grew supporting e-cigarettes as a less harmful alternative to combustible tobacco.
- In 2015, only 31% of all adults identified that e-cigarettes were less harmful than smoking compared to 41% in 2013 (**Figure 1**). In addition, the proportion of the adult population believing that e-cigarettes were as harmful, or more harmful, than smoking increased from 54% in 2013 to 65% in 2015.

Figure 1. Adult population and adult smokers' perception of harm from e-cigarettes relative to smoking.



Legend: *Never smoker* is someone who has not ever smoked a cigarette, even one or two puffs; *current smoker* is someone who ever smoked a cigarette, has smoked 100 cigarettes (lifetime), and now smokes every day or some days; *experimental smoker* is someone who has ever smoked a cigarette, has NOT smoked 100 cigarettes (lifetime) and now smokes every day or some days OR has ever smoked a cigarette, has NOT smoked 100 cigarettes (lifetime) and now does not smoke at all; *former smoker* is someone who has ever smoked a cigarette, has smoked 100 cigarettes (lifetime) and now does not smoke at all.

4. Discussion

- At the 2013 baseline, there was significant confusion among U.S. smokers and adults in general about the relative harms of e-cigarettes relative to smoking; these misperceptions increased over time.
- Due to the longitudinal nature of the PATH study design, it is clear that a substantial number of respondents who identified e-cigarettes as being less harmful than conventional cigarettes in 2013 subsequently believed that e-cigarettes were at least as harmful or more harmful than conventional cigarettes in 2015.
- Misperceptions of the relative harm of e-cigarettes compared with conventional cigarettes need to be urgently addressed, particularly among smokers who may benefit from switching to e-cigarettes.
- Consistent with the data presented here, a recent global survey from the Foundation for a Smoke-Free World, found that among U.S. adult smokers in 2017, 45% believed e-cigarettes were as harmful as or more harmful than conventional cigarettes [10]. Moreover, U.S. consumers believed that using nicotine every day was more dangerous than drinking every day and nicotine was a cause of lung cancer, throat cancer, and heart disease [10].
- Another study which examined U.S. adults' knowledge of tobacco and nicotine harmfulness from the 2017 Health Information National Trends Survey (HINTS-FDA Cycle 2) reported that among smokers, only 32% believed that e-cigarettes were less harmful than conventional cigarettes [11]. Additionally, 53% of all adults believed that nicotine was the substance causing most of the cancer caused by smoking [11].
- The misperceptions about the relative risks of e-cigarettes and nicotine in general may be driven by the frequent misreporting of scientific studies that fail to put information in a relative-risk context, and their subsequent inaccurate presentation in the media.
- Policy makers should aim to assess the causes and effects of misperceptions of the relative harm of e-cigarettes compared with conventional cigarettes and improve knowledge about the role of nicotine in the development of diseases caused by smoking.

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