Tobacco control policies and socio-economic inequalities in smoking cessation

Evaluating natural experiments

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Did introduction of pictorial health warnings increase information seeking for smoking cessation? Time series analysis of Google Trends data in six countries

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Draft version
Chapter 7

ABSTRACT

Introduction
Various studies showed that the pictorial health warnings (PHW) influenced the smoking cessation rates and precursors thereof. However, the magnitude and duration of impacts in national populations remain uncertain, because of limitations to the available data. In this study we used Google Trends data from six European countries. We assessed whether the implementation of PHW was followed by a short-term increase in online search on smoking cessation.

Method
We applied an interrupted time series design using ARIMA models. We used weekly or monthly data on the relative search volume (RSV) for search terms about smoking cessation. First, RSV trends were seasonally adjusted and adjusted for autocorrelation. Next, regression models were fitted that included terms for the potential effect of PHW in month 1, months 2-3, and months 4-6 after implementation.

Results
Results for France and the United Kingdom (UK) were partly in line with our initial expectations. In France, a 4% increase (95% CI -2% to +11%) occurred in the first month after implementation, but not later. In the UK, a 3% increase (+1% to +6%) in ‘quit smoking’ searches occurred in months 2-3. No increases were observed for any other periods of France or the UK, nor in Ireland, Norway, Denmark or Switzerland.

Conclusion
We found no consistent support that the implementation of PHW was associated with increased internet searches for smoking cessation. Further studies are needed to assess and understand the magnitude and duration of population-wide impacts of HSV, and of plain packaging.
INTRODUCTION

The urgent need for further tobacco control action derives from irrefutable evidence on the harmful effects of smoking\textsuperscript{1-4} combined with perplexing numbers of deaths attributable to tobacco use. It is estimated that tobacco use leads to around 6 million deaths worldwide each year, a number that could rise to 8 million deaths by 2030. At least half of current tobacco users are likely to die from a tobacco related disease.\textsuperscript{1}

The fight against tobacco use in Europe is an ongoing process. The MPOWER project of the World Health Organization identified a large number of potentially effective policy measures, including taxation of tobacco, banning advertisements, restricting smoking in public places, and supporting people who want to quit.\textsuperscript{5} One measure that is introduced in increasingly more countries, including the member states of the European Union, is pictorial warnings (PHW) on cigarette packages.\textsuperscript{6} As per 2014, PHW were implemented in 77 countries or jurisdictions that together covered one half of the world population.\textsuperscript{7}

PHW as a means to disseminate information on the health hazards of smoking are in place given the fact that much of the world population is still not fully aware of most of these hazards.\textsuperscript{8} Common problems include limited awareness of health consequences apart from the most obvious ones such as lung cancer risk,\textsuperscript{9} poor knowledge about the addictive and toxic nature of tobacco,\textsuperscript{10} and people’s tendency to negate or disengage from information regarding health hazards.\textsuperscript{11} Yet, awareness and acceptance of such information is found to increase smokers’ chance to give up smoking.\textsuperscript{12}

Several studies have aimed to assess the effectiveness of PHW in increasing cessation rates.\textsuperscript{13-20} Most of the studies had an experimental design. A review from 2011 concluded that PHW have a positive impact on smokers’ tendency to consider quitting smoking, and that this effect depended on size and design of the pictures.\textsuperscript{13} One study found that PHW which elicit strong emotional reactions are significantly more effective in making people consider quitting.\textsuperscript{14} Another study concluded that PHW are more effective if warnings are placed in a social context, for referring to hazardous effects on passive smoking.\textsuperscript{20} Unfortunately, according to a 2014 review, the quality of the published studies was mostly poor to very poor, thus affecting the strength of the available evidence.\textsuperscript{16,21} This implied a need for stronger methodological designs with prospective follow-up,\textsuperscript{16} such as a more recent trial that supported earlier evidence on the effectiveness of PHW.\textsuperscript{17}
A limitation to trial studies is that results cannot be readily generalized to the real-world situation of the introduction of PHW among national populations. Complementary evidence can come from studies that assess the effects of the introduction of PHW in countries. A study in 2015 that compared 27 countries of Europe suggested that the presence of PHW was positively associated with smoking cessation behavior. Both textual and pictorial warnings on cigarette packages were associated with cognitive and behavioural outcomes, with stronger associations for pictorial warnings. An evaluation of changes in health warnings on cigarette packages between 2002 and 2011 in Canada and the USA concluded that the PHW implemented in Canada had greater effects than the text-only warnings in the United States.

In this paper, we aim to generate further evidence on the potential impact of the real-world introduction of PHW. We apply a time series design in which trends in smoking cessation behaviours are assessed around the time of the introduction of PHW within six European countries. For this, we utilize data from Google Trends, a data source that has been used to perform time-series analyses in various outcomes, including smoking. USA studies showed that Google Trends data are a valuable tool for monitoring tobacco use, including cigar use and smokeless tobacco. A Dutch study using Google Trends found that information seeking on smoking cessation increased after the introduction of, respectively, the national ban on smoking in bars, and reimbursement for smoking cessation services.

The general aim of this study was to investigate whether the national implementation of PHW was followed by an increase in online information seeking behaviour on smoking cessation. We assumed that the online search rate would reflect the number of people within a country that consider to quit smoking. Based on this assumption, we expected that the introduction of PHW, if effective in changing smoking cessation behaviour on a short term, would be followed by an increase in the online search rate for smoking cessation. We will test this expectation for six different European countries, as the occurrence of a detectable change could depend on national conditions and the precise way in which countries introduce the PHW.

**METHODS**

**Data**

For this study we used Google Trends data, extracted in March 2015. In this data, the search rate is expressed as the relative search volume (RSV). The RSV is useful
for assessing trends in search volume over time. The RSV is calculated as the number of times that a specific search term has been searched during each week, relative to the highest number of searches for the same term observed until the moment of data extraction. However, for Ireland, Norway and Switzerland, search volumes per week were too low to accurately model, therefore for these countries, we used the RSV per month.

<table>
<thead>
<tr>
<th>Country</th>
<th>Implementation (formal start)</th>
<th>Coverage % (front – back)</th>
<th>Search term used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>February 2012 (February 2011)</td>
<td>35 (30 – 40)</td>
<td>Rygestop</td>
</tr>
<tr>
<td>France</td>
<td>April 2011 (April 2010)</td>
<td>48 (43 – 53)</td>
<td>Arreter de Fumer</td>
</tr>
<tr>
<td>Ireland</td>
<td>February 2013 (December 2011)</td>
<td>52 (45 – 58)</td>
<td>Stop Smoking</td>
</tr>
<tr>
<td>Norway</td>
<td>July 2011 (October 2009)</td>
<td>48 (43 – 53)</td>
<td>Roykeslutt</td>
</tr>
<tr>
<td>Switzerland</td>
<td>January 2010 (January 2010)</td>
<td>56 (48 – 63)</td>
<td>Rauchstopp</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>October 2008 (October 2007)</td>
<td>48 (43 – 53)</td>
<td>Stop Smoking, Quit Smoking</td>
</tr>
</tbody>
</table>

We selected European countries where PHW was implemented before 2014, in order to have sufficient time for follow-up analysis. From these countries, we excluded Latvia, Malta, Romania, Spain and Ukraine because less than 80% of the total population had access to internet. Moreover, Belgium had to be excluded due to a gap in the Google Trends data immediately after the implementation of the PHW. The six remaining countries are given in Table 1, together with the data of implementation of the PHW. In all countries, PHW covered cigarette packages by about 50 percent by the time of their introduction.

For each country, we selected a search term in the main local language that was equivalent to ‘stop smoking’ (see Table 1). If various terms could be used, we selected the term used most frequently in that country. For the United Kingdom, we selected two search terms, ‘stop smoking’ and ‘quit smoking’, because both terms were frequently used.
Google Trends data count searches, not users. As a result, no distinction can be made according to user characteristics such as age and sex. Google Trends data include every search made within that country, except for repeated searches that one user makes within a short period.

**Statistical analyses**

First, to correct for seasonality, a seasonal decomposition was performed. This enabled us to adjust for regularly occurring peaks in search queries. One example is the first day of January, when many people tend to make New Year’s resolutions and attempt to quit smoking. The seasonally adjusted series were log transformed in order to approximate a normal distribution of the variables and homogeneity of variances over time.

We analysed the adjusted data using autoregressive integrated moving average (ARIMA) modelling, for each search term and country separately. Using ARIMA enabled us to account for dependence between the data points in the time series, which would otherwise cause standard errors to be estimated incorrectly. In a first step, ACF (autocorrelation function) and PACF (partial autocorrelation function) plots were examined to identify time patterns within the data. The ACF plot is a bar chart of the correlation coefficients of correlation between a time series and lags of itself. The PACF plot is a bar chart that plots correlation coefficients between the series and lags of itself that are not explained by correlation at all lower order lags. Based on this visual inspection of the ACF and PACF, we identified initial values of the p, d and q parameters of the ARIMA regression model. The autoregressive parameter (p) specifies how previous values from the data series are used to predict current values, the differencing parameter (d) is used to make non-stationary data stationary, and the moving average value (q) specifies how the mean for previous values are used to predict current values.

Next, this preliminary model was fitted to the seasonally adjusted RSV series, and the fit of the model was determined. Based on this, we fitted alternative models that included additional p, d and q parameters. Finally, the best fitting model was determined based on residual ACF and PACF plots. The parameters used in the final models for each country are given in Table 2. About the same ARIMA models were used in each country, with the exception of the UK (‘stop smoking’) and Norway. As a sensitivity analysis, we re-ran the analyses with the same ARIMA model, (0,1,1) which is a commonly used parametrization, for all countries.
This final model was used to estimate the association with the implementation of PHW (Table 1). To assess the timing and duration of the potential effect of PHW, three effect periods were distinguished: 1 month, 2-3 months and 4-6 months after implementation. A more detailed distinction was avoided in order to avoid the risks of multiple testing. The respective periods were modelled as binary intervention dummies coded ‘1’ for the duration of the intervention period and coded ‘0’ for other weeks. The dummies for the different periods were added simultaneously to the final model. In addition, the model controlled for long-term trends, measured by numbering all weeks from 1 upwards. Output was measured in percentage points relative to the expected level without the influence of the tobacco control policies. All analyses were performed in IBM SPSS (version 21).

### Table 2
The best fitting ARIMA model parameters per country and interval of data used per country

<table>
<thead>
<tr>
<th>Country</th>
<th>Model parameters¹</th>
<th>Data interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>0,1,1 (1,0,0)</td>
<td>Weekly</td>
</tr>
<tr>
<td>France</td>
<td>0,1,1 (0,0,0)</td>
<td>Weekly</td>
</tr>
<tr>
<td>Ireland</td>
<td>0,1,1 (0,0,0)</td>
<td>Monthly</td>
</tr>
<tr>
<td>Norway</td>
<td>1,0,0 (0,0,0)</td>
<td>Monthly</td>
</tr>
<tr>
<td>Switzerland</td>
<td>0,1,1 (0,0,0)</td>
<td>Monthly</td>
</tr>
<tr>
<td>UK (stop smoking)</td>
<td>1,1,9 (0,0,0)</td>
<td>Weekly</td>
</tr>
<tr>
<td>UK (quit smoking)</td>
<td>0,1,1 (1,0,1)</td>
<td>Weekly</td>
</tr>
</tbody>
</table>

¹ These are the p, d and q parameters of the best fitting ARIMA model, with the seasonal parameters between brackets.

### RESULTS

The detailed RSV trends per country can be seen in Appendix Figure 1. This Figure displays both the ‘raw’ trends observed after seasonal adjustment, and the trends after adjustment using the ARIMA models as specified in Table 2. In many countries, the RSV strongly varies over time. In France, the RSV increased shortly after implementation of the PHW. In other countries, no such immediate increase is visible from the graphs.

Table 3 shows the results of the regression analyses of the potential effect of PHW. The ratios represent the ratio of change in RSV in a period after the implementation of PHW as compared to the baseline value. In the United Kingdom, estimates for
the two search terms followed the same pattern, with a small increase in months 1 and 2-3 followed by a small decrease 4-6 months after implementation. The increase in months 2-3 for ‘quit smoking’ was statistically significant and implied an increase of 3% in RSV after the implementation of PHW. A similar pattern was observed in France, where the RSV increased by 4% in month 1, but decreased by 1% in months 4-6. However, none of these changes were statistically significant. In other countries, we found no consistent increases to support our hypothesis. In Denmark and Ireland, changes were small. In Norway and Switzerland, the RSV decreased in the first month after implementation, in Norway, this decrease was large in absolute terms. However, none of these changes were statistically significant.

Table 3 Effect of the implementation of PHW on the RSV in three periods with the best fitting ARIMA model per country

<table>
<thead>
<tr>
<th>Country</th>
<th>1 month after implementation</th>
<th>2 – 3 months after implementation</th>
<th>4 – 6 months after implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RoC (95% - CI)</td>
<td>RoC (95% - CI)</td>
<td>RoC (95% - CI)</td>
</tr>
<tr>
<td>Denmark</td>
<td>1.02 0.97 – 1.06</td>
<td>1.01 0.98 – 1.04</td>
<td>1.01 0.98 – 1.03</td>
</tr>
<tr>
<td>France</td>
<td>1.04 0.98 – 1.11</td>
<td>1.02 0.97 – 1.06</td>
<td>0.99 0.95 – 1.03</td>
</tr>
<tr>
<td>Ireland</td>
<td>1.01 0.92 – 1.11</td>
<td>0.99 0.93 – 1.05</td>
<td>1.01 0.96 – 1.06</td>
</tr>
<tr>
<td>Norway</td>
<td>0.90 0.79 – 1.02</td>
<td>0.96 0.87 – 1.07</td>
<td>1.02 0.93 – 1.11</td>
</tr>
<tr>
<td>Switzerland</td>
<td>0.96 0.83 – 1.11</td>
<td>0.94 0.85 – 1.04</td>
<td>1.01 0.92 – 1.10</td>
</tr>
<tr>
<td>UK Stop2</td>
<td>1.00 0.92 – 1.08</td>
<td>1.01 0.95 – 1.07</td>
<td>1.00 0.95 – 1.04</td>
</tr>
<tr>
<td>UK Quit2</td>
<td>1.01 0.97 – 1.05</td>
<td><strong>1.03</strong> 1.01 – <strong>1.06</strong></td>
<td>0.99 0.97 – 1.01</td>
</tr>
</tbody>
</table>

1 Estimated ratio of change in RSV due to the introduction of PHW. 2 For the UK, two different search terms were modelled separately: ‘Stop smoking’ and ‘Quit smoking’. Significant effects are highlighted in bold (p < 0.05).

Table 4 Sensitivity analysis: effect of the implementation of PHW on the RSV in three periods with a standard ARIMA model (0,1,1)(0,0,0) per country

<table>
<thead>
<tr>
<th>Country1</th>
<th>1 month after implementation</th>
<th>2 – 3 months after implementation</th>
<th>4 – 6 months after implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RoC (95% - CI)</td>
<td>RoC (95% - CI)</td>
<td>RoC (95% - CI)</td>
</tr>
<tr>
<td>Denmark</td>
<td>1.02 0.97 – 1.06</td>
<td>1.01 0.98 – 1.04</td>
<td>1.01 0.98 – 1.03</td>
</tr>
<tr>
<td>Norway</td>
<td>0.92 0.80 – 1.04</td>
<td>1.03 0.95 – 1.12</td>
<td>1.03 0.99 – 1.07</td>
</tr>
<tr>
<td>UK Stop3</td>
<td>1.00 0.95 – 1.05</td>
<td>1.01 0.98 – 1.04</td>
<td>1.00 0.97 – 1.02</td>
</tr>
<tr>
<td>UK Quit3</td>
<td>1.01 0.96 – 1.07</td>
<td>1.03 0.99 – 1.07</td>
<td>0.99 0.96 – 1.02</td>
</tr>
</tbody>
</table>

1 France, Ireland, and Switzerland were not included in the sensitivity analysis because the best fitting ARIMA model for these countries is the same as the standard ARIMA model. 2 Estimated ratio of change in RSV due to the introduction of PHW. 3 For the UK, two different search terms were modelled separately: ‘Stop smoking’ and ‘Quit smoking’. Significant effects are highlighted in bold (p < 0.05).
Table 4 presents the results of the sensitivity analysis using ARIMA models with a standard set of \( p \), \( d \) and \( q \) parameters. France, Ireland and Switzerland were not included because the best fitting ARIMA model for these countries was the same as the standard ARIMA model used for the sensitivity analysis. Results for the other countries are very similar to those presented in Table 3, only the significance levels varied little. The main differences were that the effect for the UK (quit smoking) was no longer significant, while the effect for Norway in the 2-3 month period came close to being significant.

**DISCUSSION**

Various studies have showed that PHW may influence the perception, beliefs and knowledge about tobacco products, and may influence smoking initiation and cessation rates through these precursors of smoking.\(^{21}\) Population studies have suggested substantial impacts on population-wide trends in smoking cessation and smoking prevalence. However, due to methodological limitations, the magnitude and timing of these real-world impacts remains uncertain.

The aim of this study was to contribute to the evidence base by evaluating the implementation of PHW in six European countries, using an interrupted time series design with weekly or monthly data on internet searches for smoking cessation. We expected the implementation of PHW to be followed by a short-term increase in online information on smoking cessation in six European countries. Results for France and the United Kingdom were partly in line with our initial expectations. However, the increases in France were not statistically significant, whereas significant increases occurred in the UK only in ‘quit smoking’ searches (not in ‘stop smoking’) and only 2-3 months after implementation of PHW. Moreover, no (significant) increases were observed the four other countries.

**Evaluation of methodology**

Interrupted time series design can be used to gain moderate to strong evidence for the impact of a policy measure that is introduced at a single point in time. The potential of Google Trends data for such an assessment was shown in a previous analysis on The Netherlands.\(^ {26}\) This showed clear short-term changes in internet searches for smoking cessation after the introduction of a ban on smoking in bars and restaurants, and introduction of reimbursement of smoking cessation services.
A potential limitation to the current application is that there is no single date of implementation of PHW. In every country, except Switzerland, the deadline of the implementation of PHW was preceded by a period during which the PHW could already be introduced (see Table 1). We assumed that the population exposure to PHW increased slowly before the deadline, but especially rapid at the time of the implementation deadline. We checked this assumption by assessing trends in Google trends data on search terms similar to ‘pictures on cigarette packages’. Appendix Figure 2 shows trends for Denmark, France, and the UK (no relevant data could be extracted from Google Trends for Ireland, Norway and Switzerland). In each country, the highest peaks in RSV occur exactly on the dates of the implementation deadlines, supporting our assumption of maximal population-wide exposure around these dates.

Whereas we had weekly data for UK, France and Denmark, data for the other countries were only available per month. Monthly data did not affect our measurement to PHW exposure because we distinguished monthly exposure periods, and because implementation dates coincided with the first day of a month. However, control for underlying RSV trends could not be as accurate with monthly data as with weekly data. Perhaps this contributed to the fact that no evidence for a positive impact of PHW implementation was found for any of the countries with monthly data.

We confined the analysis to countries with high internet coverage and use during the study period. A potential problem is that changes may still occur in the extent or the way in which people use search engines on the internet. Appendix Figure 3 illustrates these changes with the RSV for several ‘How to’ search terms. Even though changes are substantial, there are gradual and therefore are most likely to be captured by ARIMA analyses. Moreover, on closer inspection, the few irregularities in the trends in Appendix Figure 3 do not correspond with those in Appendix Figure 1.

We used ARIMA techniques to control for potential confounding by trends that occur gradually. Inspection of Appendix Figure 1 however, shows important irregularities in RSV trends. These irregularities may reflect the impact of specific events such as public information campaigns, sudden price increases or wider national events. We could not identify and control for all potentially relevant events in all six countries. Possibly, such explicit control for events would have led to a better model fit, and therefore a more accurate assessment of impact of the
implementation of PWH. However, visual inspection of Appendix Figure 1 suggests that there were no large effects that we have missed by this lack of ability to control.

PHW can have a different impact in different subgroups of the population, in terms of age, gender and educational group. Unfortunately, with Google Trends data, we could not distinguish between such subgroups and we might therefore have missed specific effects for some subgroups.

**Interpretations of results**

We found no clear evidence for PHW to increase internet searching for smoking cessation related information. This lack of demonstrable impact might be related to avoidance behaviour among regular smokers. A study on regular smokers involved in the International Tobacco Control (ITC) project found that the implementation of PHW in the UK and France increased warning avoidance, but did not increase warning salience. A UK study found that the PHW increased warning avoidance by regular smokers. In contrast, they showed no increase in warning salience or warning persuasiveness. The lack of such increases corresponds to a lack in increase of internet searching for smoking cessation.

Our findings contrast to population-wide studies that suggest that PHW are associated with increased smoking cessation rates. This lack of correspondence might imply that PHW impact on smoking cessation through mechanisms unrelated to searching for information in general. For example, where PHW are put on cigarette packages together with quit line phone numbers, PHW may prompt regular smokers to call quit lines instead of searching for information elsewhere. Studies from some countries, such as Austria, have shown that PHW are associated with a large increase in the number of quit line calls.

There is some positive evidence for an impact in France and, to a lesser extent, in the UK. The lack of consistency in the evidence for the six countries may reflect true variations in the extent to which PHW as implemented in different countries had affected smoking cessation rates. It has been suggested that this impact may be enhanced by the use of publicity campaigns around the implementation deadline, such as in England in 2008. The size or image of the PHW might influence their effectiveness. The PHW used in the six countries did not very much differ in terms of coverage (Table 1), but differed in message and presentation, and thus may have differed in warning reach, salience and persuasiveness.
We should stress that PHW were not implemented with the explicit aim to simulate people to stop smoking. The aim was to inform smokers about the health consequences of exposure to tobacco smoke, and the addictive nature of the product. There is evidence from population-wide studies for the PHW to be effective in these terms. For example, a study based on the ITC data found that in Australia, in which some PHW showed that smoking can cause blindness, much more smokers know smoking can cause blindness than in countries where these pictures were not included in the PHW set.

Conclusions
In line with other reviews, a recent review by Noar et al., based on 37 studies about PHW, concluded that there is widespread evidence that PHW are more effective in inducing people to stop smoking as compared to text-only warnings. Based on this, we expected that the implementation of PHW would be associated with increased internet searches for smoking cessation. However, we found no consistent support for such a positive impact. While this finding is not necessarily in conflict with those of other studies, it does raise issues for further research. First, interrupted time series designs are needed to assess the precise magnitude and duration of population-wide impacts of PHW. Second, comparative studies are needed to study how this impact may depend on the way in which PHW are designed and implemented in specific countries. Third, in-depth studies on both smoking cessation and its precursors are needed to assess in which ways PHW (and associated measures) may affect smoking cessation rates in national populations. Finally, further methodological development is needed, including the use of data on internet searching, not only to assess the impact of PHW, but also to pave the way for future studies on population-wide impacts of plain packaging.

Acknowledgments
We used data from Google Trends.
We would like to thank Michiel de Boer and Sigrid Troelstra for advice and assistance on the statistical analysis designs.

Author contributions
AEK, CvS, and JRB conceived and designed the study. CvS prepared, analysed and interpreted the data, and wrote the first draft of the paper. AEK wrote the final version of the paper, he is the guarantor of this paper. AEK, CvS and JRB
interpreted the data and provided critical revisions. All authors have read and approved the final manuscript.

Conflicts of interest
None declared.

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**Appendix Figure 1** Google trends RSV data graphics per country

**Denmark - Seasonally adjusted RSV**

**Denmark - ARIMA model (0,1,1)(1,0,0)**
Appendix Figure 1 Continued

France - Seasonally adjusted RSV

France - ARIMA model (0,1,1)(0,0,0)
Appendix Figure 1 Continued

Ireland - Seasonally adjusted RSV

Ireland - ARIMA model (0,1,1)(0,0,0)
Appendix Figure 1 Continued

Norway - Seasonally adjusted RSV

Norway - ARIMA model (1,0,0)(0,0,0)
Appendix Figure 1 Continued

Switzerland - Seasonally adjusted RSV

Switzerland - ARIMA model (0,1,1)(0,0,0)
Appendix Figure 1 Continued

UK (Stop smoking) - Seasonally adjusted RSV

UK (Stop smoking) - ARIMA model (1,1,9)(0,0,0)
Appendix Figure 1 Continued

UK (Quit smoking) - Seasonally adjusted RSV

UK (Quit smoking) - ARIMA model (0,1,1)(1,0,1)
Appendix Figure 2 RSV for search terms indicative of the introduction date of PHW

Denmark - RSV of the search term ‘Cigaretpakker’

France - RSV of the search term ‘Images cigarette’

UK - RSV of the search term ‘Pictures cigarette’

Note: No relevant data could be extracted from Google Trends data available for Ireland, Norway and Switzerland.
Figure 3 Graphics of the RSV’s of random ‘how to’ search terms worldwide

RSV of the search term ‘How to clean’

RSV of the search term ‘How to Google’

RSV of the search term ‘How to draw’