Original Paper

Tracking Exposure to Ads Amid the COVID-19 Pandemic: Development of a Public Google Ads Data Set

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Abstract

Background: The COVID-19 pandemic has had a substantial impact on economies, governments, businesses, and most importantly, people's health. To bring the spread of COVID-19 under control, strict lockdown measures have been implemented across the globe. These lockdown measures resulted in a spate of panic buying and increase in demand for hygiene products and other grocery items.

Objective: In this paper, we describe a data set from Google Ads that looks at the presentation of ads to people while they browse the web during the COVID-19 pandemic. We are making the data set available to the research community.

Methods: We started this ongoing data collection on March 28, 2020, leveraging Developer Tools' network requests to retrieve Google Ads data. We identified a list of items related and unrelated to panic buying. We then captured these items as targeting criteria under what people are actively researching or planning on Google Ads. Google Ads data has been filtered using additional targeting criteria such as country, gender, and parental status.

Results: Since the inception of our collection, we have actively maintained and updated our repository on a monthly basis. In total, we have published over 4116 data points. This paper also presents basic statistics that reveal variations in Google Ads data across countries, gender, and parental status.

Conclusions: We hope that this Google Ads data set can increase our understanding of ad exposure during the COVID-19 outbreak. In particular, this data set can lead to further studies that look at the relationship between exposure to ads, time spent web browsing, and health outcomes.

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KEYWORDS

COVID-19; coronavirus; SARS-CoV-2; panic buying; Google Ads; data; database; tracking; research; public availability; online behaviors

Introduction

As of December 2019, cases of pneumonia were first reported in the Chinese city of Wuhan. After several days, the Chinese authorities revealed they had identified a novel coronavirus (later named SARS-CoV-2, the virus that causes COVID-19) in several of the pneumonia cases [1]. As the number of COVID-19 cases and deaths continued to grow in China, the World Health Organization announced that the outbreak constituted a Public Health Emergency of International Concern in late January 2020 [2]. The novel coronavirus continued to spread outside Chinese borders to reach Italy, Iran, the United States, and many other countries. This pushed the WHO to

re-evaluate the threat of the virus and declare the outbreak to be a global pandemic in early March 2020 [3].

As the situation unfolded, governments around the world implemented different initiatives to control the spread of COVID-19 [4]. These initiatives included introducing lockdown measures to ensure social distancing and reduce physical contact. This measure involved suspending schools and universities, cancelling events, and halting most commercial activities. Meanwhile, governments also advised people to apply certain preventive measures such as washing their hands often, using hand sanitizers, and wearing a face mask in public.

Although the growing COVID-19 pandemic was causing significant loss of life, affecting economies, and disrupting livelihoods, people were advised not to panic [5]. Despite that, people's panic was visible as they rushed to supermarkets to stockpile items like canned soup and hand sanitizer [6]. COVID-19–related panic buying shows that new behaviors and shopping habits emerged while people were trying to adapt to staying and working at home.

We describe a data set that offers a snapshot of change in Google Ads data amid the implementation of lockdown measures to curb the spread of COVID-19 (Multimedia Appendix 1). Google Ads enables businesses, agencies, and developers to create, manage, and target advertising campaigns to a potential audience; audience is defined as a "group of people with specific interests, intents, and demographic information" [7]. Google promises advertisers to help them find their potential audience on the Google Display Network. The Google Display Network reaches "90% of Internet users worldwide, across millions of websites, news pages, blogs, and Google sites like Gmail and YouTube" [8]. As such, advertisers on Google Ads can estimate the reach of their campaigns by obtaining an estimate of the number of weekly impressions (ie, the number of times an ad is shown on a search result page or another site on the Google Display Network). These impressions can be filtered by audiences' interests and habits, what they are actively researching, how they have interacted with businesses, geography, language, and other demographic attributes. Note that the ads displayed on the Google Display Network are separate from ads displayed as part of Google search results. As such, our Google Ads data set reveals the number of impressions associated with presenting ads to audiences while they browse the web during the COVID-19 pandemic. These impressions have been produced over time and disaggregated by country, gender, and parental status.

Previous work has used Google Trends [9] data to examine global public awareness [10], information demand [11], and interest in COVID-19 [12]. Moreover, Google Trends data has been used to monitor public restlessness [13] and well-being following the implementation of lockdown measures [14]. However, previous work has not used Google Ads data to provide insights about exposure to ads during the COVID-19 pandemic. Although Google Trends data can be filtered by geography, time, and search terms only, Google Ads data can be filtered by additional criteria such as what audiences are actively researching, geography, language, gender, parental status, and other demographic attributes. Accordingly, we started collecting the number of impressions from Google Ads on March 28, 2020. Here, we describe the data collection method used to retrieve the data and offer a preliminary analysis. The data can be used mainly to track exposure to ads during the COVID-19 pandemic and potentially to study the association between exposure to ads, time spent browsing different web pages, and health outcomes.

Methods

Browser Developer Tool

In this research, we measured the number of impressions on Google Ads. The number of impressions is defined as how often an ad is shown [15]. Each time an ad appears on Google or the Google Display Network, it is counted as one impression [15]. For example, say a person spent some time on a jewelry website browsing engagement rings and comparing prices. After visiting the jewelry store's website, he was added to the jewelry's store remarketing list and exposed to ads of engagement rings as he perused the internet. Each time the ring ad appears on websites he visits, it is counted as an impression.

Before accessing the page that renders the number of impressions on Google Ads, we had to create a new campaign. Google Ads allows users to select different goals for a new campaign, such as Sales, Leads, Website traffic, and Brand Awareness and Reach. Therefore, we set up the goal of the campaign as Brand Awareness and Reach. In addition, Google ads allows for the creation of different kinds of campaigns, such as Display Network or Video. We selected the Display Network campaign to retrieve the number of impressions for this study; for example, the number of impressions in the United Kingdom for a targeted audience of those who speak English, are female, and are interested in education is 900 million (Figure 1). Using a network monitoring tool, built into modern browsers as part of a suite of developer tools, we fetched the number of impressions from the new Google Ads campaign from the corresponding network requests. These network requests can be attained by using an element inspection after right-clicking the page element, then selecting Inspect or Inspect Element (Figure 2). Inspecting elements on the web page helps to find the API and then send a POST request directly to the API. These POST requests have been made to automatically retrieve the number of impressions for each country (Canada, the United Kingdom, the United States) and for the following parameters: female, male, male and female, unknown gender, parent, not parent, unknown parental status. However, the IDs for each related (eg, hand sanitizer) and unrelated item (eg, accessories) were changed manually every time a POST request was made. The number of impressions was collected once every month, starting on March 28, 2020, resuming on April 28, and again on May 28, until September 28, 2020. Users are not required to purchase ads to collect the number of impressions, as information on Google Ads' Display Network is mainly offered for free to advertisers who wish to better target their advertisements.

Figure 1. Google Ads (Display Network campaign).

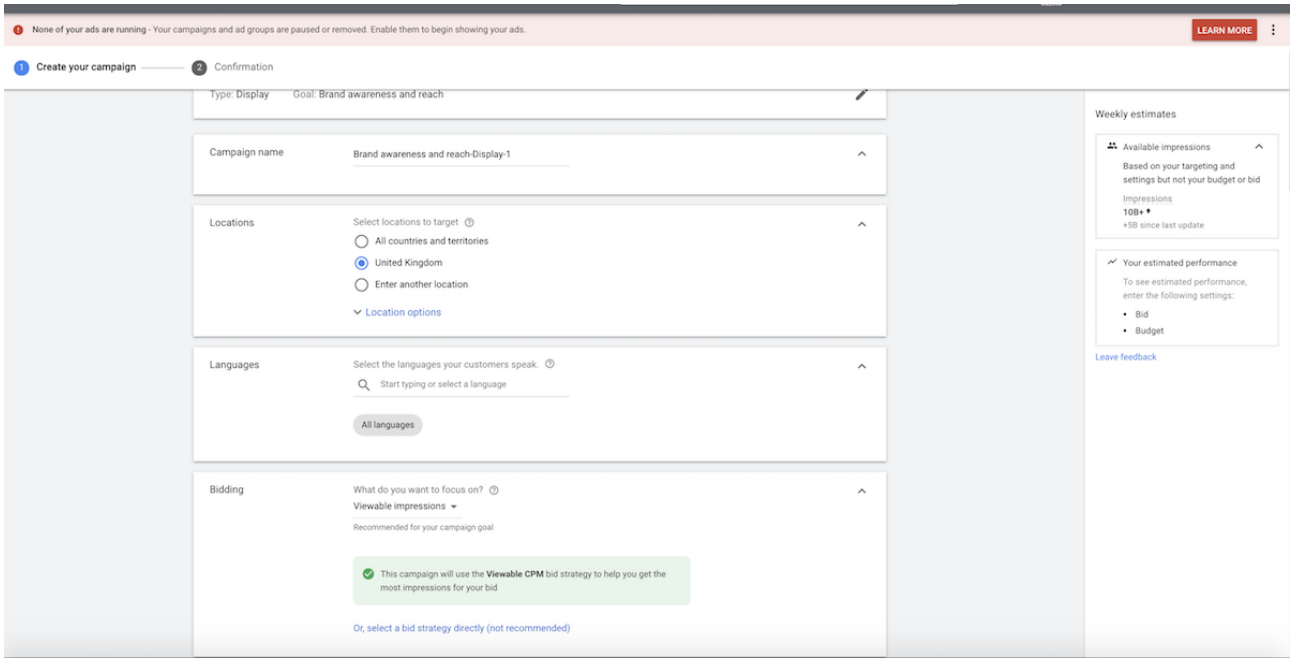
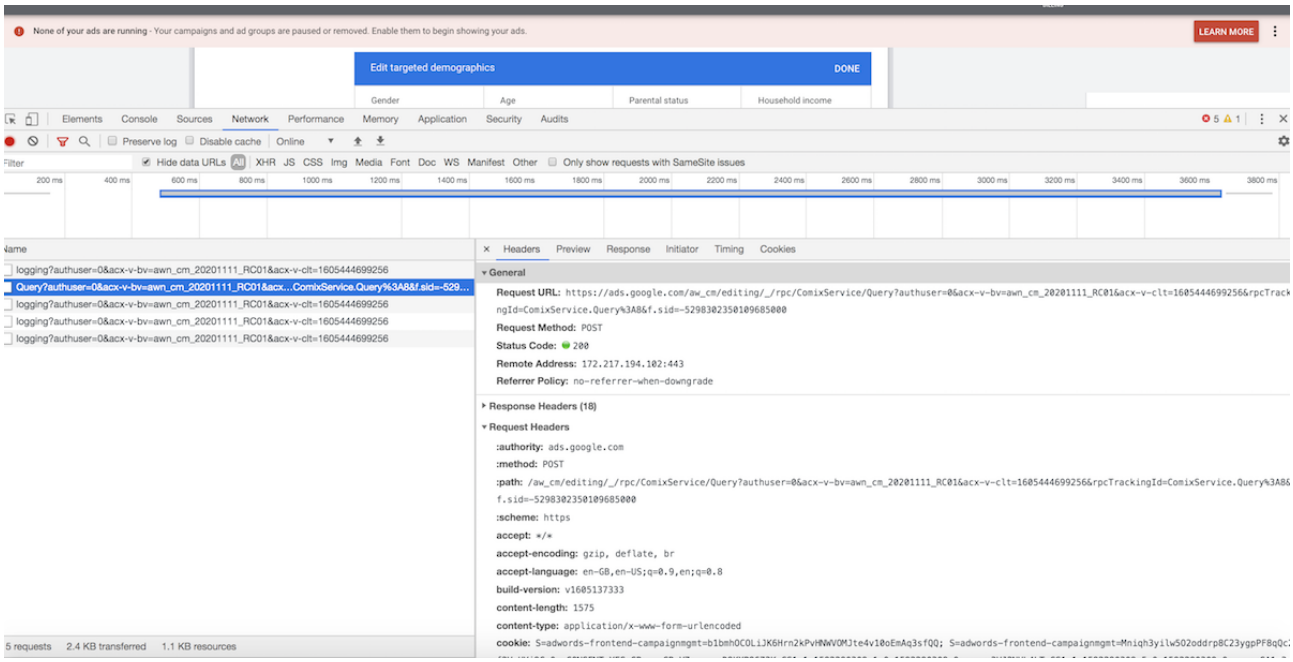


Figure 2. Network requests after inspecting elements on the web page.



Panic Buying Items

To capture items related to panic buying, we relied on Vox's printable guide for preparing to shelter at home during the outbreak [16]. These items include soap, a first aid kit, canned food, and ibuprofen. In addition, we captured items that are not directly related to panic buying, such as Education, Employment, Health, and Sports & Fitness (Table 1). Under the rubric of "what audiences are actively researching or planning" on Google Ads, we added each item as a targeting criterion. Although the unrelated items already existed under in-market audiences, we had to add the related items under custom intent audiences on Google Ads. The number of impressions has been retrieved for an audience's interest in items that are both related and unrelated to panic buying.

Table 1. Items related and unrelated to panic buying.

Type of item	Example items
Items related to panic buying (custom intent audiences)	Soap, Disposable gloves, Disinfectant wipes, Hand sanitizer, Canned food, Frozen food, First aid kit, Ibuprofen, Paracetamol, Thermometer, DayQuil/NyQuil/Sudafed, Rehydration, Cold and flu
Items unrelated to panic buying (in-market audiences)	Education, Employment, Health, Apparel & Accessories, Arts & Crafts Supplies, Beauty Products & Services, Autos & Vehicles, Business Services, Computers & Peripherals, Consumer Electronics, Event Tickets, Financial Services, Gifts & Occasions, Sports & Fitness, Travel

Country, Gender, and Parental Status

Following the selection of items related and unrelated to panic buying that audiences are actively researching or planning on the new Google Ads campaign page, the number of impressions was disaggregated by gender (female, male, and unknown gender) and parental status (parent, not a parent, unknown parental status). Further, the number of impressions was retrieved for audiences who speak any language and are located in the United States, the United Kingdom, and Canada.

Results

Our data collection is available as Multimedia Appendix 1 and we intend to update it on a monthly basis on GitHub [17]. The number of impressions is stored in folders that indicate the year and month of data retrieval from Google Ads (YEAR-MONTH). Accordingly, under each folder, there are two other folders (RELATED and UNRELATED). The first folder is to store impressions retrieved for items related to the audience's interest in panic buying, while the second folder is to store impressions retrieved for items unrelated to the audience's interest in panic buying. After accessing each item's folder (eg, Cold and flu), there are two CSV files that contain the number of impressions. The first CSV file (all gender categories) stores impressions disaggregated by country and gender, while the second CSV file (all parent categories) stores impressions disaggregated by country and parental status. Data collection has thus far produced a total of 4116 data points (1911 for items related to the audience's interest in panic buying and 2205 for items unrelated to the audience's interest in panic buying during the COVID-19 outbreak). The following equation illustrates how the data points have been calculated:

Total data points = (data points on gender + data points on parental status) × (number of items related or unrelated to panic buying) × (the number of months)

Discussion

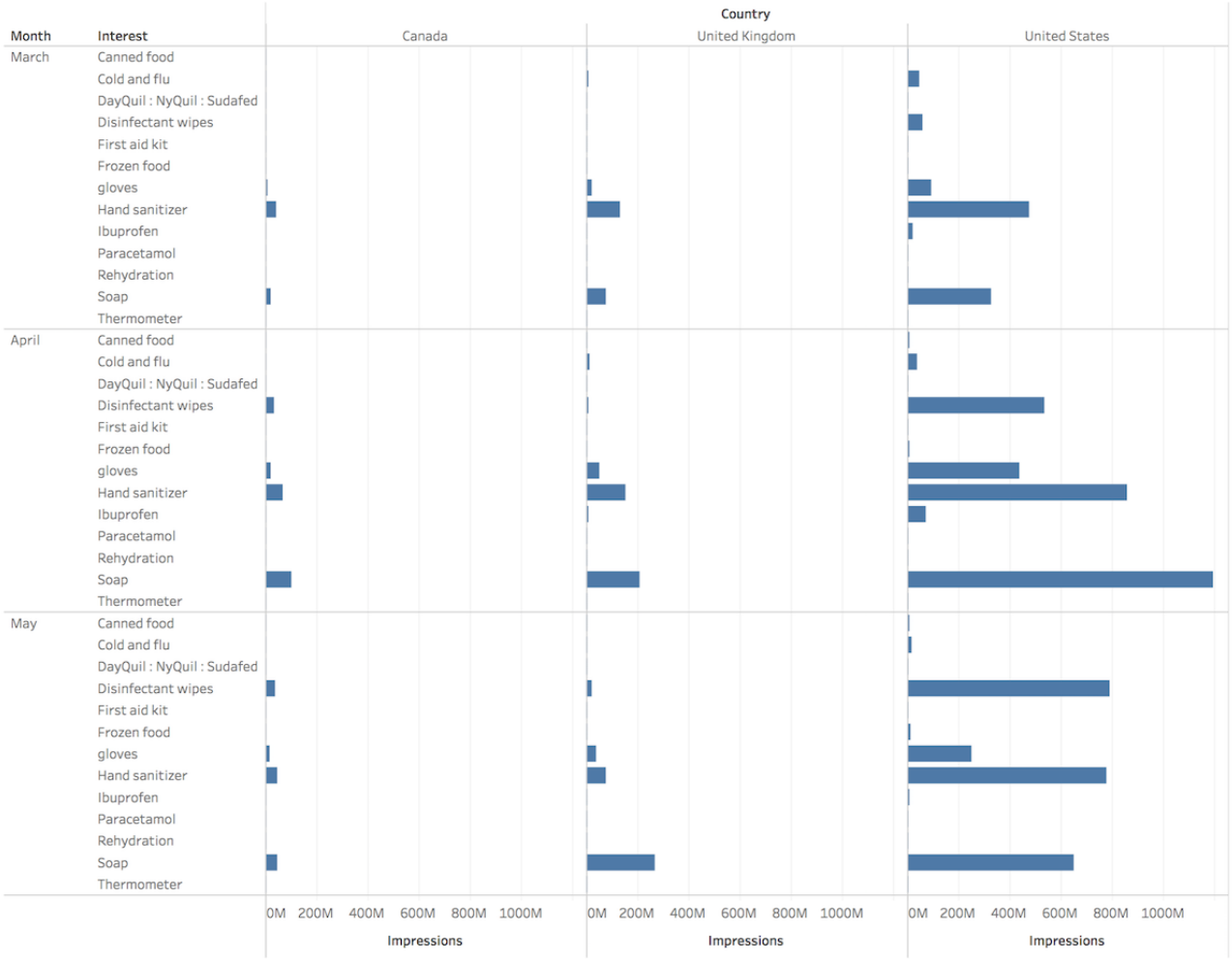
Overview

We present a preliminary analysis of changes in the number of impressions during the COVID-19 pandemic. The analysis shows the number of impressions related to the audience's interest in panic buying–related items during the COVID-19 pandemic across country, gender, parental status, and time. Our discussion is based on analysis done on impressions released in March, April, and May 2020.

Country-Level Analysis

We tracked the number of impressions related to the audience's interest in panic buying–related items during the COVID-19 pandemic over time and across different countries (the United States, the United Kingdom, and Canada). As indicated in Figure 3, we can observe that the audience's interest in specific panic buying–related items generated a higher number of impressions that their interest in other items in the United States, the United Kingdom, and Canada. For example, the audience's interest in hand sanitizer produced a higher number of impressions than their interest in other items such as canned or frozen food. The number of impressions related to the audience's interest in hand sanitizer spiked in April and declined again in May. Unsurprisingly, given its population size, the United States had a higher number of impressions than the United Kingdom and Canada.

Figure 3. Number of impressions over time and across different countries.



Gender

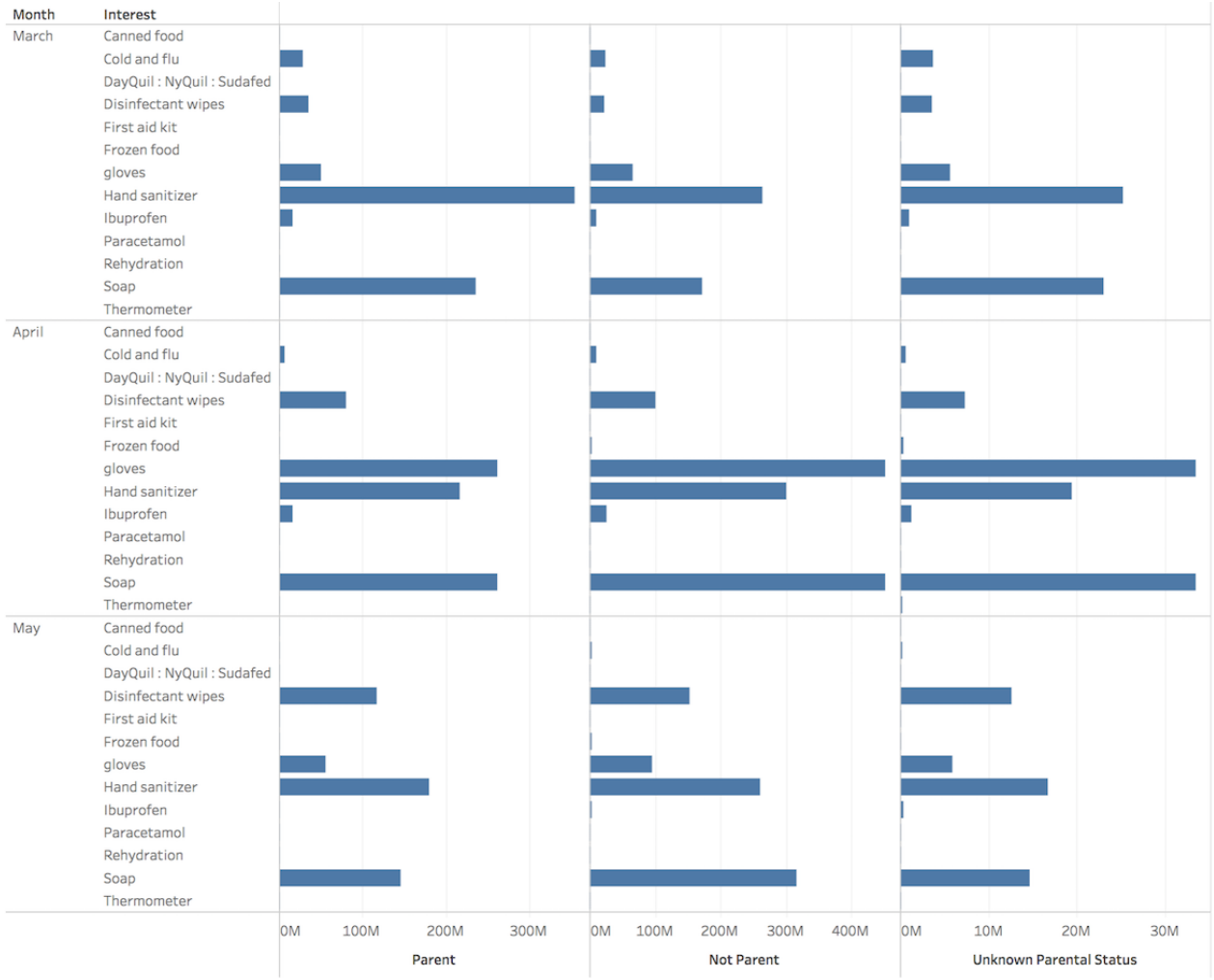
We then examined gender differences in panic buying–related impressions over time. In terms of panic buying of hand sanitizer and soap, the female audience on Google Ads had a higher number of impressions than the male audience in March, April, and May (Figure 4). However, in terms of panic buying of disposable gloves, the male audience on Google Ads had a higher number of impressions than the female audience in March, April, and May.

Figure 4. Gender differences in panic buying's related impressions over time.

Parental Status

We examined parental status differences in panic buying–related impressions over time. As shown in Figure 5, we can observe that the parent audience had a higher number of impressions related to panic buying of hand sanitizers and soap than the not parent audience in March. This changed in April and May, when the not parent audience tended to have a higher number of impressions related to panic buying of hand sanitizer and soap.

Figure 5. Parental status differences in panic buying's related impressions over time.



Google Ads Impressions Use Cases

The number of impressions related to panic buying is counted each time your ad is shown on sites on the Google Display Network. This indicates that the number of impressions in our data set can be used to look at exposure to or presentation of advertisements during the COVID-19 pandemic. As indicated, a higher number of impressions corresponds to more time spent browsing by the audience. This could lead to further studies that look at the impact of the number of impressions and time spent web browsing on health outcomes during the COVID-19 pandemic. This would build on previous studies that disclosed that time spent browsing the web is positively related to loneliness and negatively related to life satisfaction [18]. Given that the number of impressions in our data set is disaggregated by gender and parental status, this provides the opportunity to look at differences in time spent online and any resulting differences in health outcomes between the male and female audience as well as between the parent and not parent audience.

Limitations

There are several limitations to our data set. First, the number of impressions have been retrieved for three countries only (the United States, the United Kingdom, and Canada). Second, Google Ads does not provide documentation to explain how their algorithms estimate the number of impressions. For example, it is unclear whether the number of ads that are shown on specific web pages or the time people spent browsing specific pages influences what is counted as an impression. Similarly, it is unclear how long an attribute such as "actively researching or planning [something]" remains attributed to a user after they stop researching or planning. Third, our research considers only the English-speaking audience in Canada so more appropriate statistical evaluation is needed to compare the distributional similarity between French-speaking and English-speaking audiences in Canada. Fourth, our data collection started in late March 2020 and we therefore missed collecting impressions during major developments in January and February. Finally, this work does not observe daily fluctuations of impressions, given that the data collection was done on a monthly basis. Moreover, this research captures those who use Google, but it is very important to be aware that not everyone uses Google and these people would not be considered in this research.

Future Work

Despite the limitations of this work, we will continue collecting the number of impressions for additional countries beyond the United States, the United Kingdom, and Canada. Currently, we have set the language spoken to "all language." It would be useful to compare the number of impressions for different

languages spoken in each country in our data set. For instance, it would be useful to compare the number of impressions for the French language with the number of impressions for the English language in Canada.

Conflicts of Interest

None declared.

Multimedia Appendix 1

AdWords dataset of the number of impressions for items related and unrelated to panic buying during Covid-19.
[ZIP File (Zip Archive), 815 KB-Multimedia Appendix 1]

References

1. Taylor DB. A Timeline of the Coronavirus Pandemic. The New York Times. 2020. URL: https://www.nytimes.com/article/coronavirus-timeline.html [accessed 2021-08-31]
2. COVID-19 Public Health Emergency of International Concern (PHEIC) Global research and innovation forum. World Health Organization. 2020. URL: https://www.who.int/who-documents-detail-redirect/covid-19-public-health-emergency-of-international-concern-(pheic)-global-research-and-innovation-forum [accessed 2020-06-09]
3. WHO Timeline - COVID-19. World Health Organization. 2020 Apr 27. URL: https://www.who.int/news-room/detail/27-04-2020-who-timeline---covid-19 [accessed 2020-06-09]
4. Regencia T, Siddiqui U, Uras U. US Coronavirus deaths top 110,000: Live updates. Al Jazeera. 2020 Jun 07. URL: https://www.aljazeera.com/news/2020/06/global-Coronavirus-death-toll-nears-400000-live-updates-200606234426549.html [accessed 2021-08-31]
5. Thornton J. Don’t panic but stay safe, says doctor who recovered from COVID-19. The Peninsula. 2020 May 27. URL: https://thepeninsulaqatar.com/article/27/05/2020/Don%E2%80%99t-panic-but-stay-safe,-says-doctor-who-recovered-from-COVID-19 [accessed 2021-08-31]
6. Zhou N. Off the chart: Australians were world leaders in panic buying, beating UK and Italy. The Guardian. 2020 Jun 03. URL: https://www.theguardian.com/world/2020/jun/03/off-the-chart-australians-were-world-leaders-in-panic-buying-beating-uk-and-italy [accessed 2020-06-09]
7. About audience targeting. Google Ads Help. URL: https://support.google.com/google-ads/answer/2497941?hl=en [accessed 2021-08-31]
8. Display Campaigns. Google Ads. URL: https://ads.google.com/home/campaigns/display-ads/ [accessed 2021-08-31]
9. Google Trends. URL: https://trends.google.com [accessed 2021-08-31]
10. Hu D, Lou X, Xu Z, Meng N, Xie Q, Zhang M, et al. More effective strategies are required to strengthen public awareness of COVID-19: Evidence from Google Trends. J Glob Health 2020 Jul;10(1):011003 [FREE Full text] [doi: 10.7189/jogh.10.011003] [Medline: 32373339]
11. Strzelecki A, Rizun M. Infodemiological Study Using Google Trends on Coronavirus Epidemic in Wuhan, China. iJOE 2020 Apr 08;16(04):139. [doi: 10.3991/ijoe.v16i04.13531]
12. Strzelecki A. The second worldwide wave of interest in coronavirus since the COVID-19 outbreaks in South Korea, Italy and Iran: A Google Trends study. Brain Behav Immun 2020 Aug;88:950-951 [FREE Full text] [doi: 10.1016/j.bbi.2020.04.042] [Medline: 32311493]
13. Husnayain A, Fuad A, Su EC. Applications of Google Search Trends for risk communication in infectious disease management: A case study of the COVID-19 outbreak in Taiwan. Int J Infect Dis 2020 Jul;95:221-223 [FREE Full text] [doi: 10.1016/j.ijid.2020.03.021] [Medline: 32173572]
14. Brodeur A, Clark A, Fleche S, Powdthavee N. Covid-19, Lockdowns and Well-Being: Evidence from Google Trends. SSRN 2020 May 14:13204 [FREE Full text] [doi: 10.1016/j.jpubeco.2020.104346]
15. Impressions: Definition. Google Ads Help. URL: https://support.google.com/google-ads/answer/6320?hl=en [accessed 2021-08-31]
16. Piper K. A one-page, printable guide for preparing to shelter at home. Vox. 2020 Mar 19. URL: https://www.vox.com/future-perfect/2020/3/19/21177527/Coronavirus-guide-shelter-at-home-preparedness [accessed 2020-06-09]
17. Altamime R, Weber I. Google Ads Covid-19 data set. GitHub. 2020. URL: https://github.com/raltamime/COVID-19- [accessed 2020-06-11]
18. Stepanikova I, Nie NH, He X. Time on the Internet at home, loneliness, and life satisfaction: Evidence from panel time-diary data. Computers in Human Behavior 2010 May;26(3):329-338. [doi: 10.1016/j.chb.2009.11.002]

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