



## Assessing Google Searches for Toothache during COVID-19 Lockdowns

Ahmad Sofi-Mahmudi<sup>1</sup>, Erfan Shamsoddin<sup>1\*</sup>, Peyman Ghasemi<sup>2</sup>, Mona Nasser<sup>3</sup>, Bita Mesgarpour<sup>1</sup>

Received: 17 Apr 2021

Published: 11 Apr 2023

### Abstract

**Background:** Lockdowns due to the coronavirus disease 2019 (COVID-19) pandemic forced many dental offices to be closed. This study aims to investigate the association between COVID-19 imposed lockdowns and online searches for toothache using Google Trends (GT).

**Methods:** We investigated GT online searches for the term “toothache” within the past 5 years. The time frame for data gathering was considered as the initiation and end dates of national/regional lockdowns in each country. We used 1-way analysis of variance to identify statistical differences in relative search volumes (RSVs) between 2020 and 2016–2019 for each country.

**Results:** Overall, 16 countries were included in our analyses. Among all countries, Indonesia (n = 100), Jamaica (n = 56), Philippines (n = 56), Iran (n = 52), and Turkey (47) had the highest RSVs for toothache in the specified period. Compared with the previous 4 years, higher RSVs were seen in the world (as a whole) (2020 RSVs, 94.4; vs 2019 RSVs, 77.8 [ $P < 0.001$ ]) and 13 countries (81.3% of the included countries).

**Conclusion:** Generally, searching for the term “toothache” showed an increase during the COVID-19 lockdowns in 2020 compared with the past 4 years. This can imply the importance of dental care as urgent medical care during public health emergencies such as COVID-19.

**Keywords:** Toothache, COVID-19, Google Trends, Health Care Seeking Behaviour, Lockdown

**Conflicts of Interest:** None declared

**Funding:** None

\*This work has been published under CC BY-NC-SA 1.0 license.

Copyright© Iran University of Medical Sciences

**Cite this article as:** Sofi-Mahmudi A, Shamsoddin E, Ghasemi P, Nasser M, Mesgarpour B. Assessing Google Searches for Toothache during COVID-19 Lockdowns. *Med J Islam Repub Iran.* 2023 (11 Apr);37:36. <https://doi.org/10.47176/mjiri.37.36>

### Introduction

Since December 2019, a soaring pandemic of the coronavirus disease 2019 (COVID-19) has paved its way through the world. Nearly 1 month later, the disease was announced as a public health emergency of international concern by the World Health Organization (WHO) (1). Devastating consequences of COVID-19 go beyond clinical symptoms, and other deteriorations have been addressed in the literature as well. These could be of various types, including health care provision problems (2). One of the leading health issues among the public is dental pain. Dental pain

or toothache can affect the quality of life and disrupt individual and/or social life (3). Toothache is the most common complaint expressed by individuals according to several studies (4). Irreversible pulpal/apical pathology was the most common diagnosis in a tertiary hospital located in the UK's COVID-19 pandemic epicenter, according to a study evaluating the quality of the institution's services (63.4% of all diagnoses) (5). Accordingly, immediate access to a reliable pain relief source seems to be necessary.

This can be of even more concern when people cannot

**Corresponding author:** Dr Erfan Shamsoddin, [Shamsoddin@research.ac.ir](mailto:Shamsoddin@research.ac.ir)

<sup>1</sup> Cochrane Iran Associate Centre, National Institute for Medical Research Development, Tehran, Iran

<sup>2</sup> Department of Health Economics, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran

<sup>3</sup> Peninsula Dental School, Plymouth University Peninsula Schools of Medicine and Dentistry, Plymouth, UK

#### ↑What is “already known” in this topic:

During the first lockdown due to the COVID-19 pandemic, many dental offices around the world stopped operating to help contain the spread of the virus. As a result, accessibility of dental care diminished significantly.

#### →What this article adds:

During the first lockdown, people in the majority of countries searched for toothache more than ever, which can mean that people sought dental care online; thus, such care should be taken into consideration in health plans in emergencies.

easily access their dental practitioners. In several countries, dental offices have been closed or restricted in terms of practice hours because of the pandemic, and triage systems have been put in place in many to reduce nonemergency and aerosol-generating procedures (6). Issuance of several clinical guidelines and restrictive protocols by major regulatory organisations might be another cause for limited access to dentists during this outbreak (7). Even in communities that these restrictions were not implemented, little public transports might have lowered individuals' chances of seeing their dentists.

Google Trends (GT) can be used to assess implicit consequences of COVID-19 or any other possible public health emergencies. GT uses the Google Search queries by all people around the world and provides the summary statistics of the searches for each word or word combination globally, nationally, and subnationally. This platform has already been proven as a reliable public surveillance tool for epidemiological studies (8). It was used as an indicator of influenza outbreak and has been similarly applicable for predicting national COVID-19 outbreaks (9).

Obtaining the most comprehensive results is an essential step while searching through the GT service. While certain nations at this time had restricted access to dental care and emergency treatment, toothaches are still seen as a condition that should be given immediate attention and care in all nations. We realised that there is a range of search terms used to describe dental problems, for example, toothache, tooth pain, tooth decay, dental caries, and et cetera. We intended to use 1 term to minimize variations in the choice of search. Knowing that toothache and tooth pain are the most common symptoms in dental patients and could cause some major complications in habitual and/or working activities, they were considered the main representatives for dental needs (4). Thus, we considered the term "toothache" as a suitable keyword to assess the online GT search queries related to dental pain among the public. Similar studies regarding different aspects of oral health during the COVID-19 pandemic has been published (10, 11).

This study sought to assess the association between the lockdowns due to COVID-19 and online searches for toothache using GT. This can be used as a surrogate outcome for dental needs of the people during the lockdowns. Our research question was as follows:

Considering the disparities in internet access between the included nations, did differences in relative search volumes (RSVs) for toothache rise during COVID-19 lockdowns in comparison to the same period in the previous 4 years in those countries?

## Methods

Using GT, we looked into internet search behavior during the COVID-19 pandemic lockdowns. This web service determines the proportion of searches for a user-specified term among all searches performed on Google Search. It then provides a relative search volume (RSV), which is the query share of a particular term for a given location and period, normalized by the highest query share of that term over the time series and presented on a scale from 0 to 100 (12), with 100 indicating the highest searches for a specific

time and 0 no searches in that specific time. RSV is shown as the "interest" value on the GT website.

We selected "toothache" as a "topic" in the GT search box. After that, we gathered worldwide RSVs for toothache in the GT platform. Turning to a country-level search, from 187 countries that reported data regarding the COVID-19 death tolls, we included the ones that fell in the highest 10% of the deaths per 100,000 due to COVID-19 (till July 14, 2020, data retrieved from: [worldometers.info/coronavirus](http://worldometers.info/coronavirus)) (N = 18). We gathered RSVs data for each country in the past 5 years and segregated it into 3 consequent months from the date of national lockdown due to COVID-19 onwards (12 weeks) (13).

Given that the lockdowns commenced on March 15, 2020, in most countries, we considered the same date as the initiating point of the "time range" in GT searches. From 2016 to 2019, we conducted the same search using a comparable time frame. We also checked RSVs for all countries in the world in this period and plotted a heat world map using Excel 2019.

We normalized the data based on each country's reported internet penetration rate from 2016 to 2020 because internet access has likely changed over the past 5 years. We plotted the trend of "toothache" for each country from 5 years ago till the end of lockdowns in 2020. A 1-way analysis of variance was then performed to identify whether there was a statistical difference for RSV scores between the year 2020 and 2016-2019 for each country. Statistical analyses were done using Python Version 3.6.7 (2018-10-20) (Python Software Foundation <http://www.python.org>) on Google Colab.

## Results

During this period of worldwide lockdown, Indonesia (n = 100), Jamaica (n = 56), Philippines (n = 56), Iran (n = 52), Turkey (n = 47), and Oman (n = 34) had the highest RSVs for toothache. Colombia (n = 3), South Korea (n = 3), Argentina (n = 4), Peru (n = 6), Japan (n = 6), and Finland (n = 6) had the lowest RSVs. Most African and central Asian countries did not provide any data (Figure 1).

San Marino and Andora did not have any GT data and were therefore omitted from our included countries. Thus, 16 countries remained in our analyses. Among our target countries, Belgium and Switzerland had the highest and lowest deaths/million, respectively (844.5 and 227.4, respectively). Only Sweden had not introduced any lockdowns in the given time range, whereas the other countries had lockdowns with different extents (city [n = 1], state [n = 3], national [n = 11]) and strategies (complete lockdown [n = 12], restriction [n = 2], intelligent lockdown [n = 1]). The median of the start and end date of the lockdowns were March 19, 2020, and May, 10, 2020, respectively. Full details of the characteristics of the included countries are shown in Appendix 1.

Thirteen nations, as well as the entire world, displayed higher RSV levels in 2020 when compared to the mean of the preceding 4 years (Table 1). Sweden, the Netherlands, and Ecuador showed lower RSVs in 2020 compared with the each of the previous years (Table 2). Figure 1 illustrates

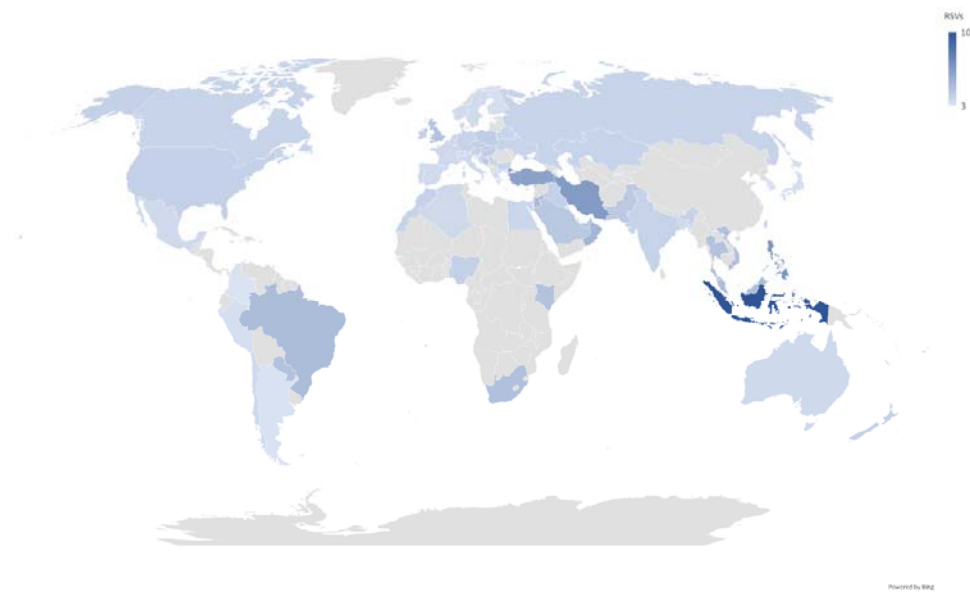


Figure 1. World heat map for toothache RSVs during 15/3/2020-7/6/2020.

Table 1. Results of the ANOVA test on the RSV values for the term “Toothache” in a worldwide scale and the included countries

Country	2020 with 2019-6		2020 with 2019		2020 with 2018		2020 with 2017		2020 with 2016	
	F	P	F	P	F	P	F	P	F	P
World	3243.9	<0.001	2380.5	<0.001	2565.8	<0.001	2948.2	<0.001	3328.2	<0.001
Belgium	3.9	0.053	1.8	0.194	1.2	0.289	2.5	0.129	5.2	0.033
UK	130.7	<0.001	55.5	<0.001	63.2	<0.001	105.8	<0.001	131.9	<0.001
Spain	54.0	<0.001	31.3	<0.001	27.5	<0.001	31.0	<0.001	12.2	0.002
Italy	204.0	<0.001	76.1	<0.001	70.2	<0.001	74.9	<0.001	85.4	<0.001
Sweden	0.4	0.519	0.1	0.704	3.9	0.059	0.2	0.640	<0.1	0.878
France	112.4	<0.001	55.5	<0.001	56.0	<0.001	84.3	<0.001	41.5	<0.001
USA	120.2	<0.001	62.8	<0.001	72.1	<0.001	105.3	<0.001	152.5	<0.001
Chile	6.0	0.017	3.1	0.094	9.7	0.005	1.5	0.239	7.3	0.012
Netherlands	0.2	0.673	0.2	0.648	1.9	0.187	<0.1	0.838	0.3	0.599
Ireland	7.9	0.007	2.0	0.174	3.9	0.060	4.6	0.044	6.6	0.017
Brazil	429.7	<0.001	552.2	<0.001	680.8	<0.001	739.4	<0.001	1198.4	<0.001
Ecuador	0.6	0.431	<0.1	0.915	1.2	0.280	<0.1	0.812	3.6	0.007
Mexico	36.9	<0.001	21.4	<0.001	22.8	<0.001	28.2	<0.001	14.0	0.001
Canada	38.0	<0.001	10.4	0.004	24.7	<0.001	23.3	<0.001	46.4	<0.001
Switzerland	2.1	0.154	1.9	0.185	3.4	0.079	<0.1	0.774	2.4	0.137
Armenia	26.8	<0.001	14.7	<0.001	26.2	<0.001	13.8	<0.001	33.3	<0.001
Portugal	5.4	0.023	3.9	0.062	3.4	0.078	0.4	0.534	4.9	0.037
Iran	99.2	<0.001	38.7	<0.001	34.6	<0.001	50.0	<0.001	99.0	<0.001
Germany	20.0	<0.001	22.5	<0.001	14.8	<0.001	10.9	0.003	7.8	0.010
Colombia	12.0	<0.001	2.5	0.126	6.9	0.015	7.6	0.012	7.7	0.011
Denmark	2.6	0.110	0.2	0.651	1.5	0.230	0.9	0.348	12.1	0.002
Romania	19.8	<0.001	7.0	0.014	8.1	0.009	6.8	0.016	9.3	0.006

RSV, relative search volume; F, F-value; P, P value.

the worldwide RSVs trend during 3 months after the lockdowns in 2020 and the same period in the past 4 years (see Appendix 2 for countries' trends in the same time range), and RSVs trend in the past 5 years is shown in Figure 2 (see Appendix 3 for countries' trends in the same time range). Figure 3 shows the global RSVs trend for the past five years before the pandemic.

### Discussion

Pandemic fear and death anxiety have already been suggested as major factors that negatively influence the pub-

lic's mental health during the COVID-19 era (14). Additionally, dentistry has widely been described as a high-risk medical profession for viral infections, including COVID-19 (15, 16). This idea may cause fear and anxiety, which will decrease the number of people seeking dental treatment and the number of dentists who can provide it (6). Moreover, in some countries, dental services are predominantly provided by the private sector (17, 18) and regulations also introduced restrictions to public services or both public and private services. There may be a vacuum in the availability of dental services in some places if private practitioners decide not to offer them during the pandemic (19).

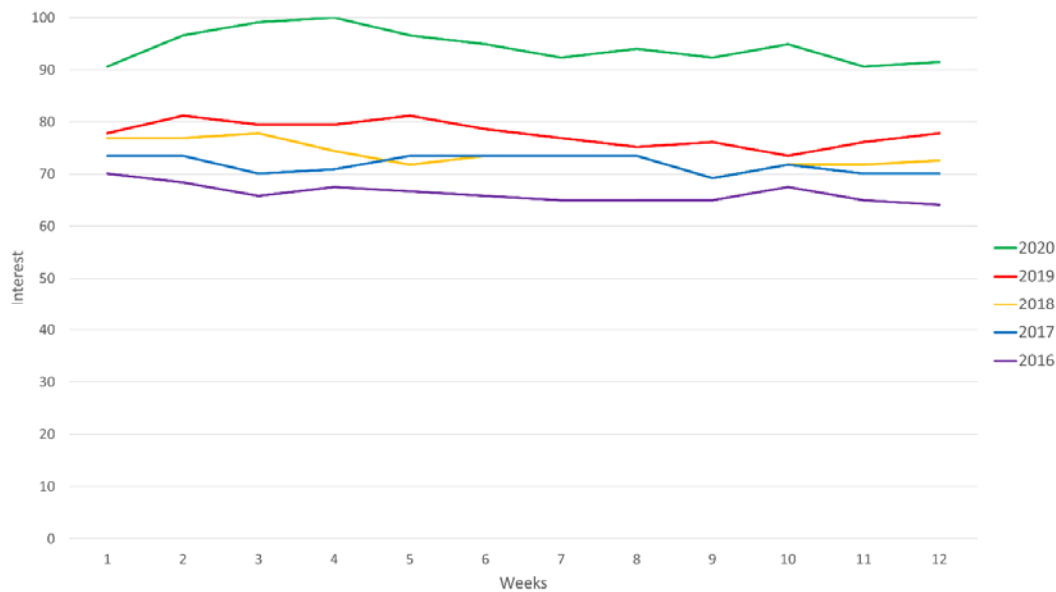


Figure 2. Worldwide RSVs trend in 3 months post lockdown in 2020 and the same time range in 2016-2019.

Table 2. Mean RSV Values for the Term “Toothache” by Country for Each Year Between 2016 and 2020

Country	2020	2019	2018	2017	2016
World	94.4	77.8	73.6	71.9	66.3
Belgium	32.4	30.2	30.5	26.8	24.4
UK	88.7	72	68.6	63.2	59.9
Spain	79.2	64.1	64.8	64.9	70.7
Italy	69.8	59.1	60.8	63	60.1
Sweden	51.2	52.5	45.9	52.6	56.2
France	81.1	65.6	66.7	61.4	70.3
USA	87.3	83.5	82.7	78.2	71.7
Chile	64.1	59.1	55.3	64.6	55.2
Netherlands	55.9	54.5	62.7	55.5	58.7
Ireland	69.7	67.7	63.3	61.9	61.3
Brazil	92.9	74	64.7	58	49.7
Ecuador	21	27.1	20.2	30.1	14.8
Mexico	21.2	18.3	18.5	18	19.2
Canada	85.5	78.5	69.8	71.6	62.8
Switzerland	43.4	41.8	36.8	45.7	39.1
Armenia	36.3	17	12.7	18.7	8.5
Portugal	43.6	39.1	39.2	48.8	37.3
Iran	78.5	68.9	68.7	61.6	49.1
Germany	68	65.3	67	68.9	69.9
Colombia	23.6	23.7	16.3	16.3	16.6
Denmark	34.3	32.8	29.8	30.1	23.8
Romania	52.3	46.8	45.9	47.8	43.6

RSV, relative search volume.

Regulatory restrictions to halt the viral spread could further limit and/or change access to dental services during the outbreak (20).

Since various restrictive health policies (social distancing, national lockdowns, restrictive professional protocols, etc) have been issued in response to the COVID-19 pandemic in different regions, the lockdowns have generally been of various types. Political position, cultural tendencies, economic resiliency, and health care system development have all been mentioned as major role players in determining the counteracts to COVID-19 in each country and/or region (21-24).

Through our literature review, very few studies were found to determine dental care-seeking behaviour (CSB) in patients during the COVID-19 pandemic. There were only

2 studies, one of which assessed dental challenges and needs of the population in some Western countries (11), and the other was limited to Iran (10). Another study assessed the internet search trends of Filipinos’ oral health-seeking behaviour from 2010 to 2020 (25). According to their results, the Philippines’ most prevalent oral health problems were dental caries and edentulism. Obtaining clinical answers from a user-friendly platform like Google was emphasized in our study. Another assessment of online search trends for common oral problems reported the term “toothache” to be the highest-searched query in GT between 2004 and 2014 (26). All in all, the term “toothache” has already been considered to be a suitable keyword to assess the online CSB for dental issues among the public.

Our study aimed to evaluate the association between

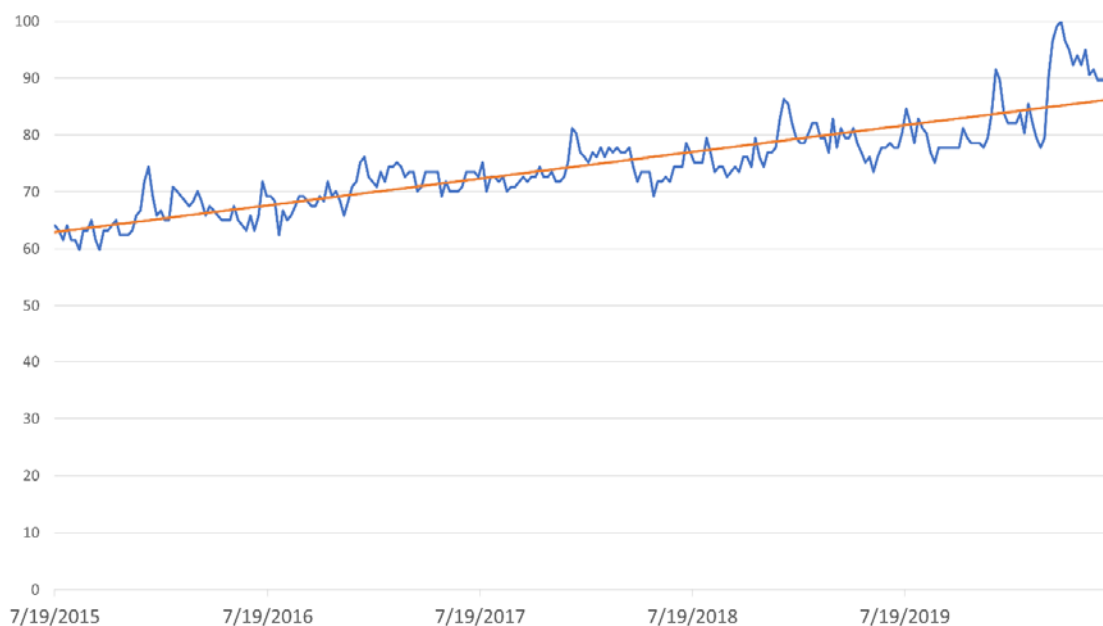


Figure 3. Worldwide RSVs trend for past 5 years (equation:  $y = 0.0129x - 480.09$ ).

COVID-19 imposed lockdowns and global online searches for toothache using the GT platform. Among the 16 primary countries in our analyses, 13 presented higher RSV values (for the keyword “toothache”) in 2020 compared with the mean RSVs in the past 4 years. These results partly reinforce our hypothesis about the major role of the COVID-19 pandemic on accessibility to dental service during the government-imposed curfews and lockdowns. This also has been investigated in a previous study that examined online searches for toothache in Iran during the COVID-19 pandemic lockdown (10).

Lower online search RSVs for toothache in 3 countries (Sweden, Netherlands, and Ecuador) out of 16 could be related to CSB alterations among the population. As we stated in the results, Sweden was among the countries that did not introduce any lockdowns. In Sweden, it has been demonstrated that CSB is related to a number of sociodemographic characteristics, including income, educational attainment, and type of dwelling (27). Accordingly, whether an individual seeks information from online databases (using GT) generally differs among various regions and individuals. A possible explanation for the lower RSVs for toothache in 2020 in all these countries could be that the public might have answered their clinical questions using other resources, for instance, asking their dentists by phone or even attending a public dental emergency centre to receive the dental care (28, 29). The mean use of Google Search Engine is reported to be above 95% for all these countries (data from: <https://gs.statcounter.com/search-engine-market-share>). Accordingly, the difference in search engine market share cannot be suggested as a possible cause for this issue.

We tried to utilize a comprehensive and pragmatic methodology so that the least number of online searches would be neglected. By selecting “toothache” as a “topic” in GT, we ensured to cover any lexical, semantic, and grammatical

nuances during translation and language alterations. The population that made up the data sample cannot be precisely defined, hence data produced from GT should be interpreted with caution. Prompt fluctuations in searching trend can also occur due to media and news agendas (locally or broader aspects). Additionally, it can never be traced if one had searched a term out of curiosity or to address their personal health needs. The internet accessibility bias, which essentially relates to differences in internet access across various social groups, is another inherent bias (based on their demographic status, namely literacy level, socioeconomic status, age, etc.).

### Conclusion

When compared to the previous 4 years, online searches for the term “toothache” increased in more than 80% of the countries we chose to study during the COVID-19 lockdowns in 2020, which may be a sign that more people will worry about their dental needs during the pandemic era when many dental clinics were forced to close their doors to treat the patients. Accordingly, addressing dental health care as a highly-sought-after medical need is of utter importance during public health emergencies like COVID-19. To do so, health policymakers should be informed about the importance of dental care and be prepared for situations like lockdowns.

### Abbreviations

COVID-19: coronavirus disease-2019; WHO: World Health Organization; CSB: Care seeking behaviour; GT: Google Trends; RSV: relative search volume.

### Availability of Data and Materials

The datasets generated during the current study are available in the figshare repository, <https://doi.org/10.6084/m9.figshare.13142558>.

### Authors' Contributions

A.S-M. wrote and revised the manuscript and interpreted the data. E.S. conceived, designed, conducted, and supervised the study, interpreted the data, and wrote and revised the manuscript. P.G. interpreted the data and revised the manuscript. M.N. wrote and revised the manuscript. B.M. wrote and revised the manuscript.

### Acknowledgements

None.

### Conflict of Interests

The authors declare that they have no competing interests.

### References

- Wu YC, Chen CS, Chan YJ. The outbreak of COVID-19: An overview. *J Chin Med Assoc.* 2020;83(3):217-20.
- Tanne JH, Hayasaki E, Zastrow M, Pulla P, Smith P, Rada AG. Covid-19: how doctors and healthcare systems are tackling coronavirus worldwide. *BMJ.* 2020;368:m1090.
- Spanemberg JC, Cardoso JA, Slob E, López-López J. Quality of life related to oral health and its impact in adults. *J Stomatol Oral Maxillofac Surg.* 2019;120(3):234-9.
- Maheswaran T, Ramesh V, Krishnan A, Joseph J. Common chief complaints of patients seeking treatment in the government dental institution of Puducherry, India. *J Indian Acad Dent Spec Res.* 2015;2:55-8.
- Grossman S, Sandhu P, Sproat C, Patel V. Provision of dental services at a single institution in the UK's epicenter during the COVID-19 pandemic. *Br Dent J.* 2020;228(12):964-70.
- Guo H, Zhou Y, Liu X, Tan J. The impact of the COVID-19 epidemic on the utilization of emergency dental services. *J Dent Sci.* 2020;15(4):564-7.
- CDC. Guidance for Dental Settings USA: CDC; 2020 [Available from: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/dental-settings.html>].
- Nuti SV, Wayda B, Ranasinghe I, Wang S, Dreyer RP, Chen SI, et al. The Use of Google Trends in Health Care Research: A Systematic Review. *PloS One.* 2014;9(10).
- 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;95:221-3.
- Sofi-Mahmudi A, Shamsoddin E, Ghasemi P, Mehrabi Bahar A, Shaban Azzad M, Sadeghi G. Association of COVID-19-imposed lockdown and online searches for toothache in Iran. *BMC Oral Health.* 2021;21(1):69.
- Sycinska-Dziarnowska M, Paradowska-Stankiewicz I. Dental Challenges and the Needs of the Population during the Covid-19 Pandemic Period. Real-Time Surveillance Using Google Trends. *Int J Environ Res Public Health.* 2020;17(23).
- Nuti SV, Wayda B, Ranasinghe I, Wang S, Dreyer RP, Chen SI, et al. The use of google trends in health care research: a systematic review. *PloS One.* 2014;9(10):e109583.
- Wikipedia. COVID-19 pandemic lockdowns: Wikimedia Foundation; 2020 [updated 7/23/2020. Available from: [https://en.wikipedia.org/wiki/COVID-19\\_pandemic\\_lockdowns](https://en.wikipedia.org/wiki/COVID-19_pandemic_lockdowns)].
- Ornell F, Schuch JB, Sordi AO, Kessler FHP. "Pandemic fear" and COVID-19: mental health burden and strategies. *Rev Bras de Psiquiatr.* 2020;42(3):232-5.
- Dave M, Seoudi N, Coulthard P. Urgent dental care for patients during the COVID-19 pandemic. *Lancet.* 2020;395(10232):1257.
- Shamsoddin E. Substantial Aspects of Health Equity During and After COVID-19 Pandemic: A Critical Review. *International Network for Government Science Advice (INGSA)(2020), Policies for Equitable Access to Health (PEAH) (2020).* 2020.
- Cascaes AM, Camargo MBJd, Castilhos EDd, Barros AJ. Private dental insurance expenditure in Brazil. *Rev Saude Publica.* 2018;52:24.
- Mertz E, O'Neil E. The growing challenge of providing oral health care services to all Americans. *Health Affairs.* 2002;21(5):65-77.
- Moraes RR, Correa MB, Queiroz AB, Daneris Â, Lopes JP, Pereira-Cenci T, et al. COVID-19 challenges to dentistry in the new pandemic epicenter: Brazil. *PloS One.* 2020;15(11):e0242251.
- Sinjari B, Rexhepi I, Santilli M, G DA, Chiacchiaretta P, Di Carlo P, et al. The Impact of COVID-19 Related Lockdown on Dental Practice in Central Italy-Outcomes of A Survey. *Int J Environ Res Public Health.* 2020;17(16).
- Painter M, Qiu T. Political beliefs affect compliance with covid-19 social distancing orders. Available at SSRN 3569098. 2020.
- Grossman G, Kim S, Rexer J, Thirumurthy H. Political partisanship influences behavioral responses to governors' recommendations for COVID-19 prevention in the United States. Available at SSRN 3578695. 2020.
- Figari F, Fiorio CV. Welfare resilience in the immediate aftermath of the covid-19 outbreak in italy. *EUROMOD at the Institute for Social and Economic Research, Tech Rep.* 2020.
- Grasselli G, Pesenti A, Cecconi M. Critical care utilization for the COVID-19 outbreak in Lombardy, Italy: early experience and forecast during an emergency response. *Jama.* 2020;323(16):1545-6.
- Dalanon J, Matsuka Y. A 10-Year Analysis of Internet Search Trends of the Oral Health-Seeking Behavior of Filipinos. *Poverty Public Policy.* 2020;12(2):175-87.
- Harorlı O, Harorlı H. Evaluation of internet search trends of some common oral problems, 2004 to 2014. *Community Dent Health.* 2014;31:188-92.
- Liu L, Zhang Y, Wu W, Cheng R. Characteristics of dental care-seeking behavior and related sociodemographic factors in a middle-aged and elderly population in northeast China. *BMC Oral Health.* 2015;15:66.
- Javanparast S, Roeger L, Kwok H, Reed R. The Experience of Australian General Practice Patients at High Risk of Poor Health Outcomes with Telehealth during the COVID-19 Pandemic: A Qualitative Study. *BMC Fam Pract.* 2021 Apr 8;22(1):69.
- Langella J, Magnuson B, Finkelman MD, Amato R. Clinical Response to COVID-19 and Utilization of an Emergency Dental Clinic in an Academic Institution. *J Endod.* 2021 Apr;47(4):566-571.

## Appendix 1. Full details of the characteristics of the included countries

Countries	SDI	GDPPerCapita	Population	Deaths	LDSCOPE	YLD	DentistsDensity
Belgium	High	46116.7	11,589,623	844	National	288.8	10.47
UK	High	42300.27	67,886,011	660	National	234.3	4.49
Spain	High-middle	29613.67	46,754,778	608	National	201.3	2.64
Italy	High	33189.57	60,461,826	578	National	182.2	7.82
Sweden	High	51610.07	10,099,265	548	Non national	246.1	7.9
France	High	40493.93	65,273,511	460	National	210.8	6.57
USA	High	65280.68	331,002,651	418	Non national	213.3	4.77
Chile	High-middle	14896.45	19,116,201	367	Non national	278.1	0.006
Netherlands	High	52447.83	17,134,872	358	National	271.1	4.1
Ireland	High	78660.96	4,937,786	353	National	270.4	5.02
Brazil	Middle	8717.186	212,559,417	343	Non national	345.5	11.17
Ecuador	High-middle	6183.824	17,643,054	287	National	328.2	1.41
Mexico	High-middle	9863.073	128,932,753	275	National	339.5	0.94
Canada	High	46194.73	37,742,154	233	Non national	217.8	6.39
Switzerland	High	81993.73	8,654,622	227	National	218	4.78
Armenia	High-middle	4622.733	2,963,243	196	National	344.5	1.69
North Macedonia	High-middle	6093.148	2,083,374	185	National	247.6	
Portugal	High-middle	23145.04	10,196,709	163	National	234	10.12
Iran	Middle	5520.311	83,992,949	157	National	228.9	1.35
Germany	High	46258.88	83,783,942	109	National	248.1	6.65
Colombia	High-middle	6432.388	50,882,891	107	National	337.5	5.07
Denmark	High	59822.09	5,792,202	105	National	293.3	7.44
Romania	High-middle	12919.53	19,237,691	100	National	261.4	3.19

Countries	Estimated Individual Internet Access at 2020	Density	FertilityRate	MediumAge	Migrants	UrbanPercent	avg2016	avg2017	avg2018
Belgium	91.007	383	1.7	42	48,000	98	24.41667	26.79167	30.54167
UK	96.6467	281	1.8	40	260,650	83	59.88333	63.20833	68.625
Spain	88.5826	94	1.3	45	40,000	80	70.65833	64.94167	64.79167
Italy	70.5736	206	1.3	47	148,943	69	60.08333	62.99167	60.825
Sweden	92.9088	25	1.9	41	40,000	88	56.15833	52.575	45.93333
France	82.0961	119	1.9	42	36,527	82	70.325	61.375	66.675
USA	87.22	36	1.8	38	954,806	83	71.73333	78.18333	82.69167
Chile	90.9688	26	1.7	35	111,708	85	55.16667	64.58333	55.25
Netherlands	99.1698	508	1.7	43	16,000	92	58.66667	55.53333	62.73333
Ireland	89.4875	72	1.8	38	23,604	63	61.25	61.93333	63.325
Brazil	75.2077	25	1.7	33	21,200	88	49.74167	57.99167	64.69167
Ecuador	75.5527	71	2.4	28	36,400	63	14.83333	30.08333	20.16667
Mexico	74.3396	66	2.1	29	-60,000	84	19.18333	17.95833	18.53333
Canada	94.3148	4	1.5	41	242,032	81	62.83333	71.55	69.79167
Switzerland	91.2909	219	1.5	43	52,000	74	39.14167	45.66667	36.825
Armenia	86.7075	104	1.8	35	-4,998	63	8.5	18.66667	12.66667
North Macedonia	83.1972	83	1.5	39	-1,000	59	9.166667	25.26667	14.01667
Portugal	79.7982	111	1.3	46	-6,000	66	37.25	48.75	39.16667
Iran	78.7289	52	2.2	32	-55,000	76	49.13333	61.64167	68.675
Germany	88.9143	240	1.6	46	543,822	76	69.90833	68.875	66.98333
Colombia	71.2225	46	1.8	31	204,796	80	16.58333	16.25	16.33333
Denmark	98.7987	137	1.8	42	15,200	88	23.75	30.08333	29.83333
Romania	74.4037	84	1.6	43	-73,999	55	43.59167	47.79167	45.90833

## Searches for Toothache during COVID-19

### Appendix 1. Continued

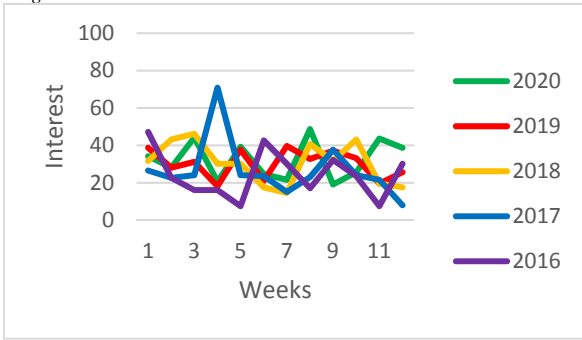
Countries	avg2019	avg2020	Search Ratio	Sex ratio	Education Index-2015	AverageIncome	LD duration	DentalExpenditure PerCapita
Belgium	30.24167	32.35833	1.155741	0.97	0.841	45,870	48	202.28
UK	71.95	88.70833	1.345765	0.99	0.896	41,790	104	220.59
Spain	64.075	79.175	1.197504	0.98	0.818	29,300	57	105.31
Italy	59.05	69.79167	1.14907	0.93	0.814	33,740	71	293.66
Sweden	52.45	51.18333	0.988493	1	0.855	55,540	0	321.16
France	65.65	81.06667	1.228167	0.96	0.839	41,090	56	169.78
USA	83.46667	87.29167	1.104696	0.97	0.9	63,170	118	370.47
Chile	59.08333	64.08333	1.095052	0.97	0.784	14,670	118	6.27
Netherlands	54.53333	55.86667	0.965438	0.98	0.897	51,260	124	221.67
Ireland	67.71667	69.65	1.09588	1	0.91	61,210	68	293.64
Brazil	74.00833	92.90833	1.508048	0.97	0.681	9,080	55	2.34
Ecuador	27.08333	21	0.911392	0.99	0.665	6,110	16	1.62
Mexico	18.31667	21.15833	1.143823	0.96	0.655	9,180	71	2.55
Canada	78.525	85.49167	1.209645	0.98	0.991	44,950	49	338.38
Switzerland	41.78333	43.43333	1.063131	0.98	0.891	84,450	37	70.47
Armenia	17	36.25	2.55132	0.95	0.73		41	5.04
North Macedonia	20.85	16.625	0.959596	0.99	0.673		66	11.05
Portugal	39.08333	43.58333	1.06139	0.9	0.756	21,980	14	75.94
Iran	68.9	78.525	1.264747	1.03	0.704	5,470	37	41.47
Germany	65.325	68.00833	1.003474	0.96	0.914	47,110	48	473.5
Colombia	23.66667	23.58333	1.295195	0.98	0.63	6,180	97	3.68
Denmark	32.75	34.33333	1.179671	0.99	0.923	60,170	31	169.7
Romania	46.8	52.31667	1.136753	0.95	0.769	11,300	48	15.85

Countries	DentalExpenditurePerCapitaPPP	NationalLockdown	HDI
Belgium	219	1	0.919
UK	203.38	1	0.92
Spain	139.6	1	0.893
Italy	293.66	1	0.883
Sweden	321.16	0	0.937
France	184.58	1	0.891
USA	370.47	0	0.92
Chile	6.27	0	0.847
Netherlands	241.59	1	0.933
Ireland	306.72	1	0.942
Brazil	4.24	0	0.761
Ecuador	3.03	1	0.758
Mexico	4.88	1	0.767
Canada	352.15	0	0.922
Switzerland	70.47	1	0.946
Armenia	10.45	1	0.76
North Macedonia	31.68	1	0.759
Portugal	110.5	1	0.85
Iran	140.82	1	0.797
Germany	473.5	1	0.939
Colombia	3.68	1	0.761
Denmark	149.99	1	0.93
Romania	36.94	1	0.816

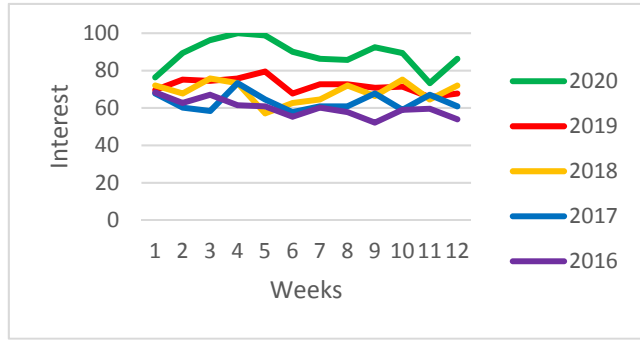


Appendix 2. RSVs trends for each country 2020-2016

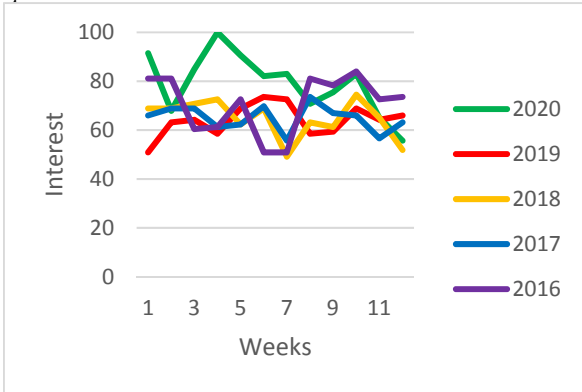
Belgium



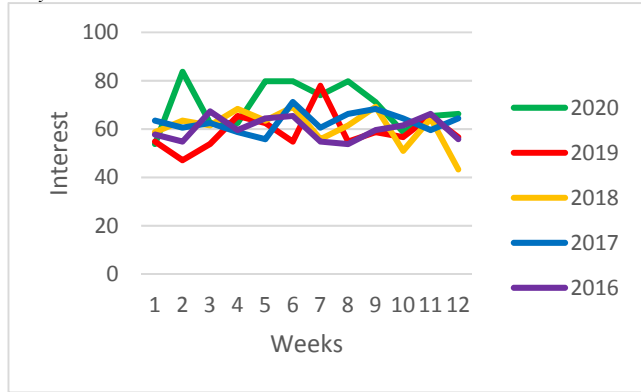
UK



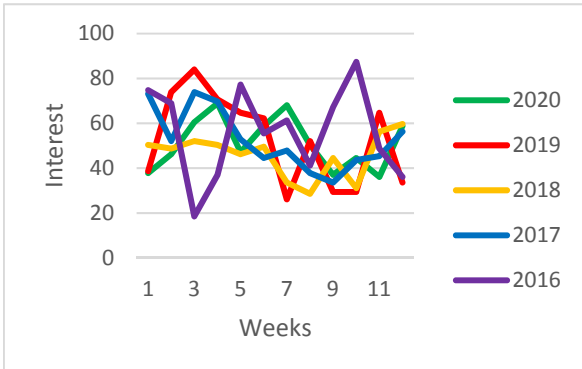
Spain



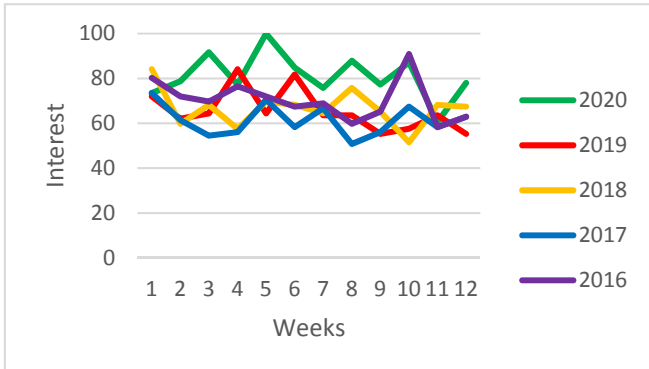
Italy



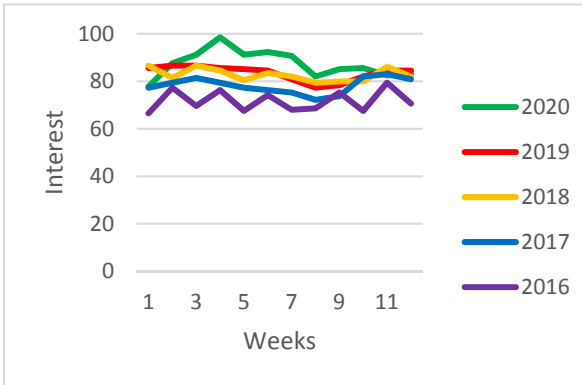
Sweden



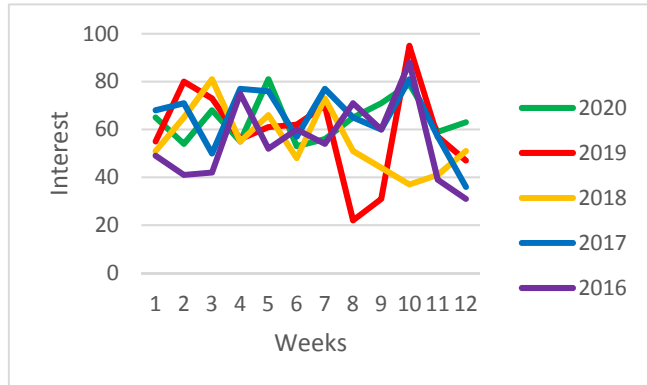
France



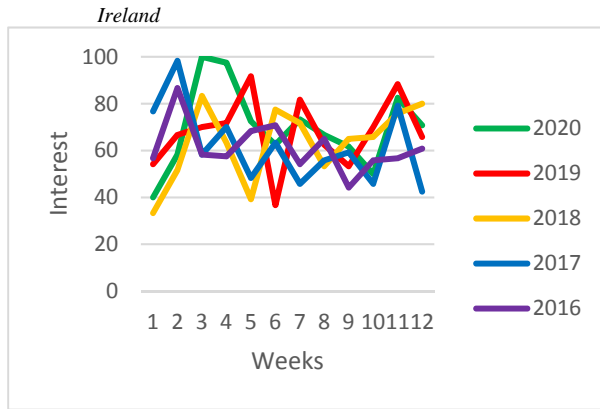
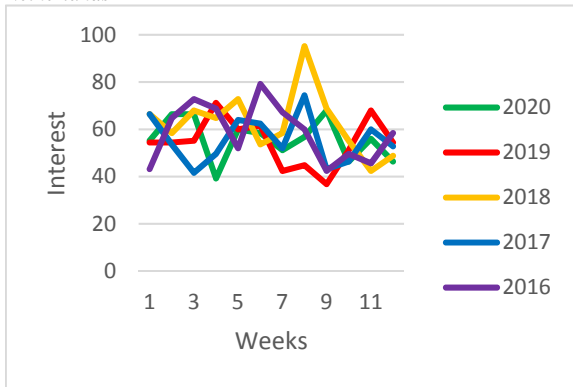
USA



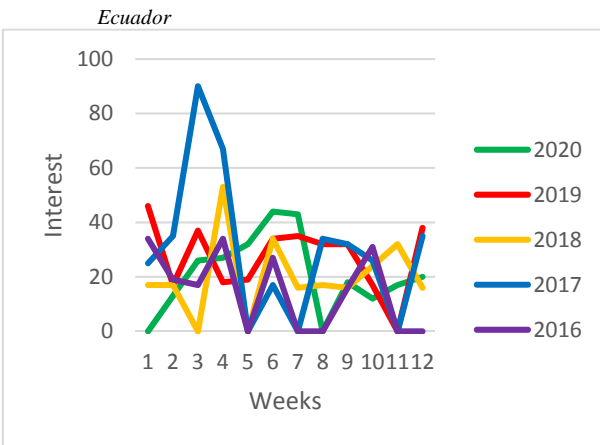
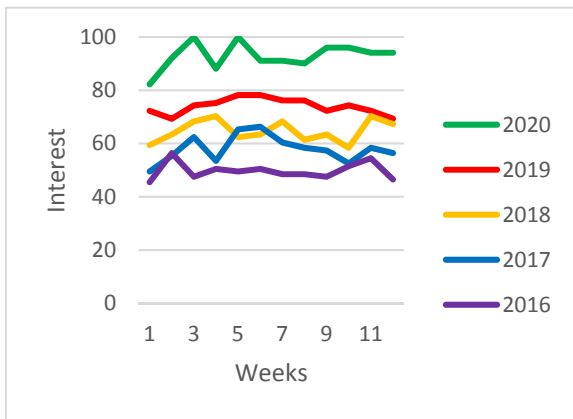
Chile



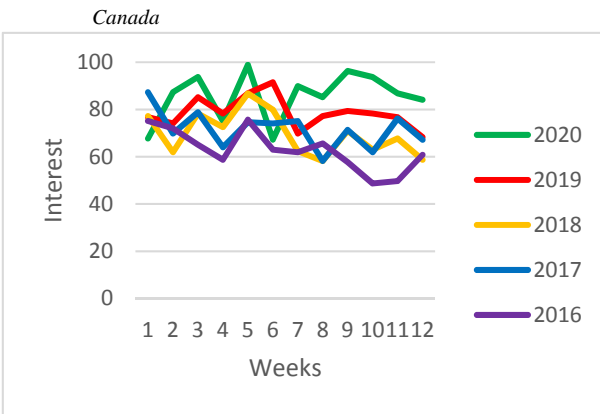
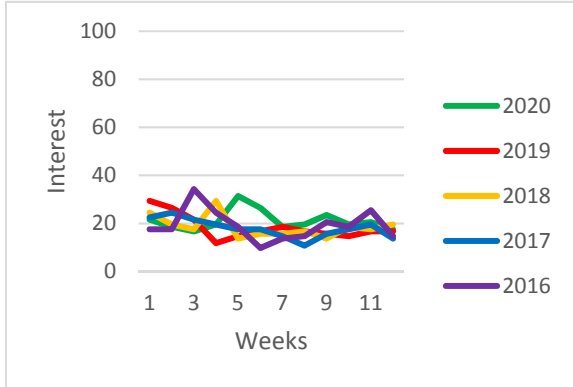
Appendix 2. Continued  
Netherlands



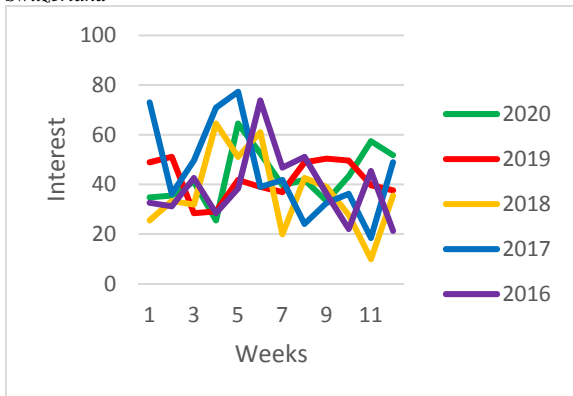
Brazil



Mexico

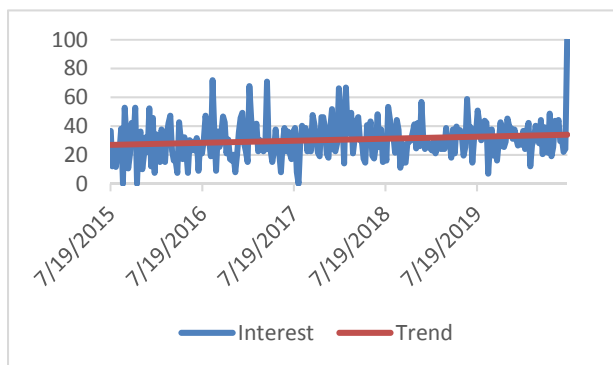


Switzerland

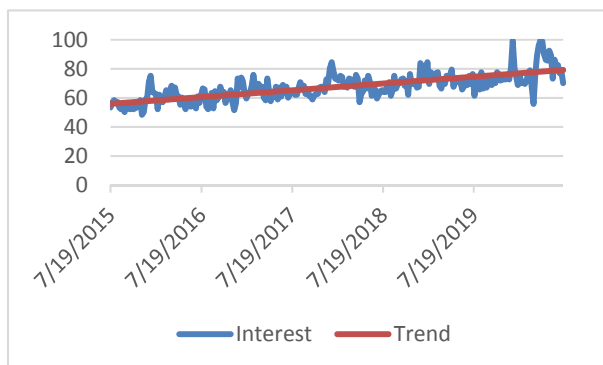


Appendix 3. RSVs trends for the past five years in each country 2020-2016

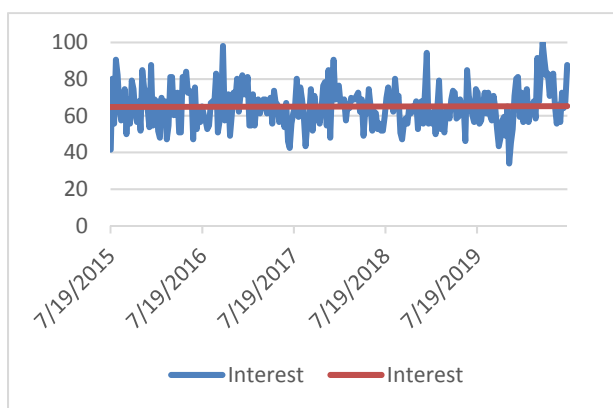
Belgium



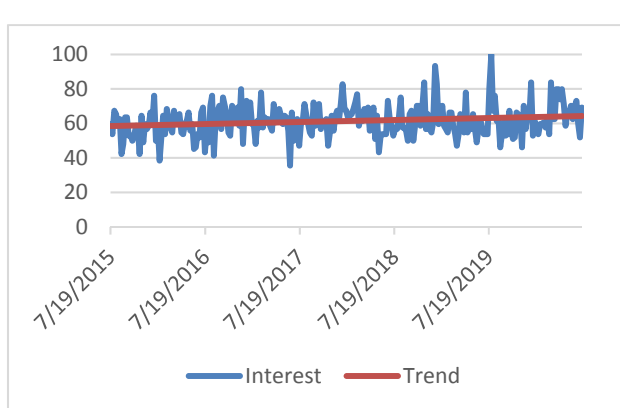
UK



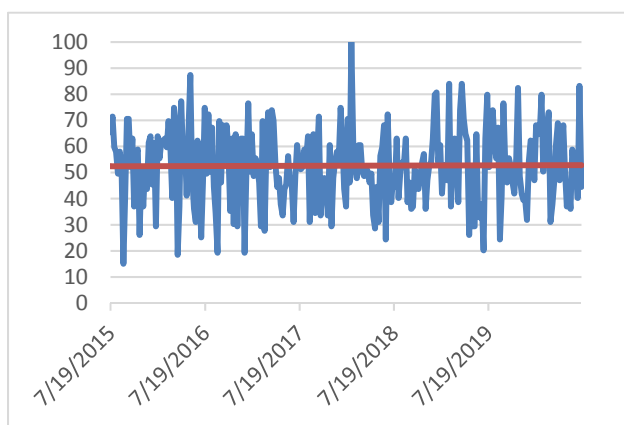
Spain



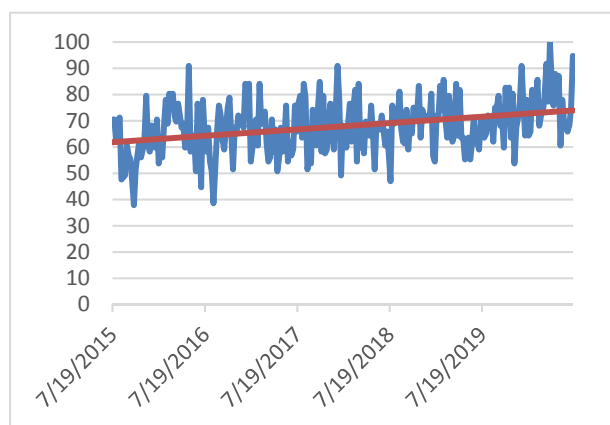
Italy



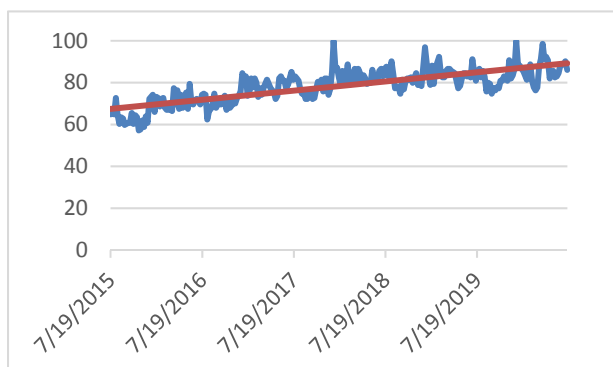
Sweden



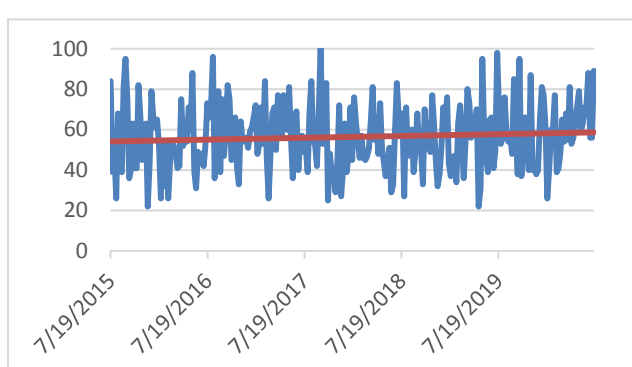
France



USA

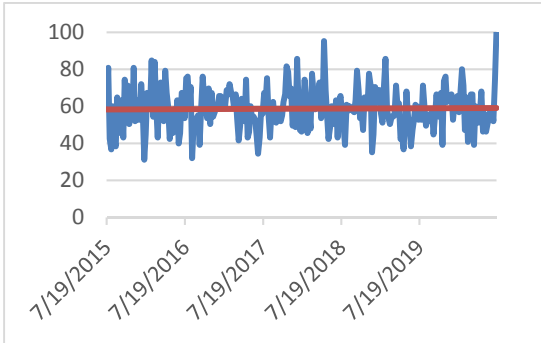


Chile

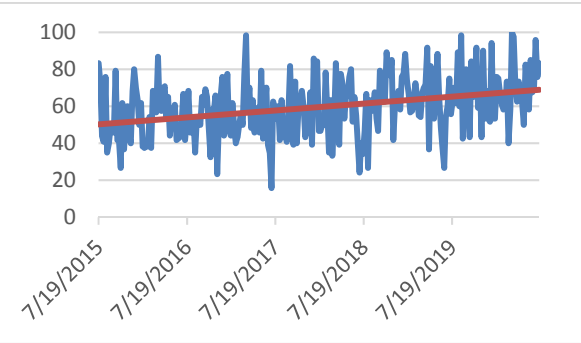


Appendix 3. Continued

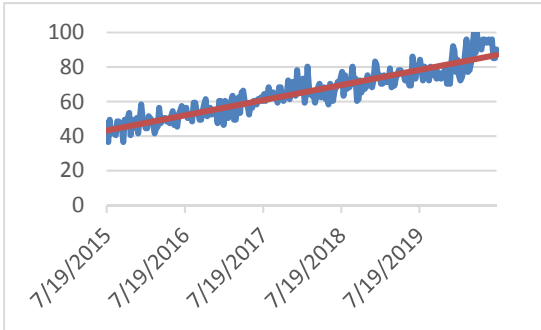
Netherlands



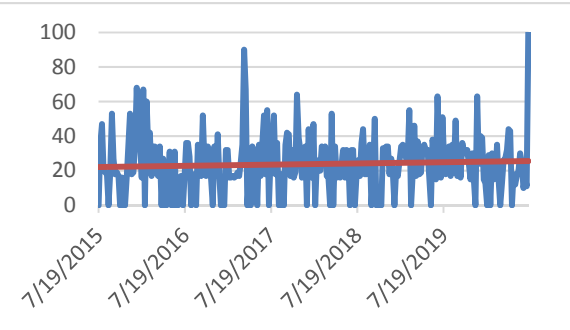
Ireland



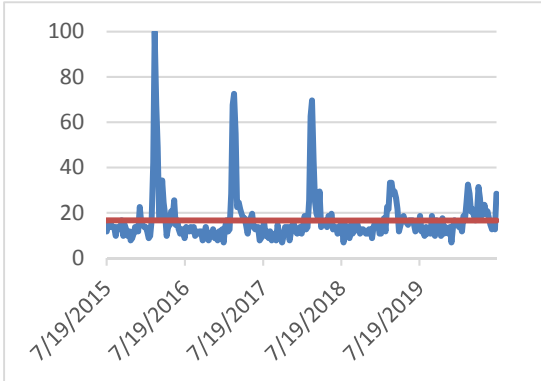
Brazil



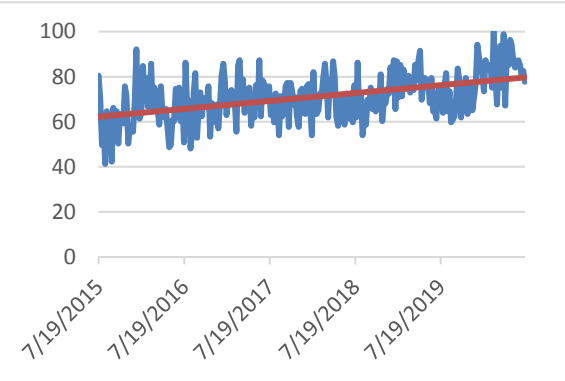
Ecuador



Mexico



Canada



Switzerland

