COVID- 19 misinformation on the internet: The other epidemy

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Submitted to: JMIR Public Health and Surveillance
on: February 26, 2020

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Abstract

Background: The internet has become an important source of health information for users worldwide, the novel Wuhan virus caused a pandemic search for information with broad dissemination of false or misleading health information.

Objective: The aim of this study was to evaluate the quality and readability of online information about Wuhan Coronavirus (actually COVID-19), which was a trending topic in the net, using validated instruments and relate the quality of information to its readability.

Methods: The search was based on the term Wuhan Coronavirus on the Google website (6 February 2020). Critical analysis was performed on the first 110 hits using HON code, JAMA benchmark, DISCERN instrument, and Google rank.

Results: The Google search returned 309,000,000 hits, the first 110 websites were critically analyzed, only 1.81% of the websites had the HONE code seal. The JAMA benchmark showed that 43 websites did not have any of the categories required by this tool and only 11 of the websites had the four quality criteria required by JAMA. The DISCERN score showed that 51.81% of the websites were evaluated as very poor and 0.9% rated as excellent.

Conclusions: Users and the scientific community need to be aware of the quality of the information they read and produce respectively. The Wuhan Coronavirus health crisis misinformation was produced by the media and the misinformation the users obtain from the net. The use of the internet has a risk to public health and in cases like this, the trending topic time lasted while no quality information was available.

(JMIR Preprints 26/02/2020:18444)
DOI: https://doi.org/10.2196/preprints.18444

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Abstract

The internet has become an important source of health information for users worldwide. The novel Coronavirus caused a pandemic search for information with broad dissemination of false or misleading health information.

The aim of this study was to evaluate the quality and readability of online information about Wuhan Coronavirus (actually COVID-19), which was a trending topic in the net, using validated instruments and relate the quality of information to its readability.

The search was based on the term Wuhan Coronavirus on the Google website (6 February 2020). At the search time, the terms “COVID-19” or “SARS-CoV-2” did not exist yet. Critical analysis was performed on the first 110 hits using HON code, JAMA benchmark, DISCERN instrument, and Google rank.

The Google search returned 309,000,000 hits. The first 110 websites were critically

analyzed, and only 1.81% of the websites had the HON code seal. The JAMA benchmark showed that 39% of websites did not have any of the categories required by this tool and only 10% of the websites had the 4 quality criteria required by JAMA. The DISCERN score showed that 70% of the websites were evaluated as low score and none one was rated as high score.

Non-health personnel and the scientific community need to be aware of the quality of the information they read and produce respectively. The Wuhan Coronavirus health crisis misinformation was produced by the media and the misinformation the users obtain from the net. The use of the internet has a risk to public health and in cases like this; the governments should be developing strategies to regulate health information in the internet without censuring the population. By February 6, no quality information was available in the internet about COVID-19.

Key words: HON code, JAMA benchmarks, DISCERN instrument, Wuhan Coronavirus, COVID-19, SARS-CoV-2.

Introduction

The Coronavirus disease (COVID-19) is spreading globally from its epicenter in Hubei, China. The incidence and mortality rate has been difficult to calculate because milder cases are not being diagnosed; despite this, the World Health Organization (WHO) on March 5th declares that the latest global death rate for the disease was 3.4 %, and about 80 % of COVID-19 cases are mild disease. The cases are changing daily and can be tracked worldwide almost in real time by different websites like the one supported by Johns Hopkins University. [1]

This new disease is caused by a virus from the *Coronaviridae* family, identified in people exposed to seafood and wild animals in a local market. Researchers in the University in Guangzhou, China have suggested that pangolins, a mammal used in traditional Chinese medicine, could be the intermediate vector between bats and humans, because the SARS-CoV-2 genome sequence is 99% similar to bat-Coronavirus according Zhang T et al. [2]

In the Munich security Conference occurred on Feb 15, 2020, the general director of WHO commented “We´re not just fighting and epidemic; we´re fighting an infodemic”. It is clear that there is no way to prevent the expansion of the COVID-19 disease, but it is very

important to verify the information on the internet to prevent the panic and misinformation associated with the disease. The fake news spread faster than the virus. The internet is the main information source worldwide; currently two billion people have access to it. Online health information has grown since the 1990´s, becoming very popular among non-health personnel users, nevertheless, most of the information on internet is unregulated, and its quality remains questionable. For users with non-medical education, it is difficult to judge the reliability of the internet health information. Therefore, the need for critical evaluation has taken a new dimension and importance and indicators of quality of the content have been developed.

The likelihood that a person will view a particular website is influenced by its order of appearance on major search engines and in some cases, this can also be influenced if they are paid sites. It has been shown by many authors that most of the users do not go beyond the first two pages of citations (20-40 links) that they find. [3] The most popular search engine worldwide is Google, and it ranks its search results, based on link popularity, which means that for any website, the number of hyperlinks pointing to it from other web pages will improve its rank in Google search. [4]

Due to the importance of internet health search nowadays for health personnel and non-health personnel, scoring systems or quality evaluation tools have been developed as a set of indicators applied to a website in order to provide a quality score. The most used scoring systems nowadays are the Health On the Net code (HON code), the Journal of the American Medical Association benchmarks (JAMA benchmarks) and the DISCERN instrument. [5-7]. Eysenbach et al., reported that 70% of websites presenting care information had significant quality issues. The greatest problem of the internet health information is finding valid and reliable information. [8]

The HHON code is a non-profit and nongovernmental organization that promotes transparent and reliable health information online. It is a certification of the websites based on an “ethical standard aimed at offering quality health information”. The HON code was founded under the auspices of the Geneva Department of Employment, Social Affairs and Health, in 1995. It is a code used and approved by the Economic and Social Council (ECOSOC) and the WHO. Also, it is one of the first Uniform Resource Locator used as a guide to reliable sources of healthcare information on the internet. The HON code consists of a minimum mechanism to provide quality, objective and transparent medical information to the internet users. The website may display the HON code seal if they agree to comply with the standards listed, and they are subjected to random audits for compliance. [9]

The JAMA benchmarks were published in 1997. According to Silberg et al., it is a set of four criteria designed to assess and evaluate the quality of health information on the internet. These benchmarks are namely: authorship, attribution, disclosure and currency. [10] This tool lets the reader easily decide if the site has the basic components like transparency and reliability. [11]

The DISCERN instrument is a valid and reliable tool to evaluate health information. It is the first standardized quality index, it was created by the Division of Public Health and Primary Health Care at Oxford University, London. It is a valid and reliable 16-point questionnaire to aid health consumers and information providers in evaluating the quality of health information on any website. [12]

The Google rank or Page rank, is an algorithm developed in 2002, used by Google to give a numeric value to websites depending on the number of times that other websites are directed to a particular site, and that determines how important a webpage is. This was one of the first tools used by Google to define the importance of websites and currently the algorithms are public. [11]

Currently, Coronavirus has been trending topic worldwide. Around January 10, 2020 most of the news around the world talked about a new Coronavirus strain that started in China and was spreading very fast. This created an avalanche of search for information on the internet called “infodemic”. In a few days, the network was filled with information; sometimes with accurate content and sometimes with fake content that pointed towards the possibility of becoming infected even after receiving regular mail from China. [13] By the end of January 2020 (20 days later), this infodemic wakens up by the new disease had been turned to a trending topic with the maximum search for a term reported by Google according to Google Trends, especially after the WHO declared Coronavirus as a Global Health Emergency on January 31th (Figure 1). [14]

In this work, we evaluate the quality of online health information that the internet users found about Coronavirus at the beginning of epidemic from January until February 6. The search was done using “Wuhan” and “Coronavirus” as keywords because at that moment were the most popular key words and the objective was to evaluate what non health personnel users found on the network. By February 6, the names COVID-19 or SARS-CoV-2 were still not established.

Methods

Search Strategy

The search term ‘Coronavirus’ and ‘Wuhan’ was used (6th February 2020) on the Google search engine (www.google.com). The search was done using an updated browser of Google Chrome version 79.0.3945.130. We accessed to Google from the University Anáhuac Puebla at Tlaxcalancingo, Puebla, México

Before the search, all existing cookies were deleted from the browser, and the Google settings were used to establish the English language as a condition.

We performed one search and the first 110 websites obtained were shared with the observers, who worked with each website. Websites that were not on English or Spanish language were excluded. All the instruments were assessed by four independent observers for each website and any disagreements were resolved by consensus prior to the final analysis.

The Google search engine itself was evaluated as part of the critical assessment and not just the landing page of the Google search results. Therefore, if further information was obtained elsewhere on the website via subheadings, links, or leading pages, this information retrieved was obtained as a result of being directed to it, either directly or indirectly, via the ‘original’ Google search.

Quality Assessment Instruments

Quality evaluation tools have been developed in order to assess health information using various criteria. Amongst the tools available, we selected three different validated

evaluation tools, the HHON code, the JAMA benchmarks, and the DISCERN tool.

HON code

The HON code is based on an 8-point code of conduct comprising: authority, complementarily, confidentiality, attribution, justifiability, transparency of authorship, financial disclosure and advertising policy. Any website which complies with this code is granted permission to display the HON award-like badge on its website. The certificate is valid only for 1 year. The HON code is the oldest quality evaluation tool being used to date. [9] To evaluate the HON code we download its software and for each link we search for the seal.

JAMA Benchmarks

The JAMA benchmarks evaluate the following points: authorship (authors and contributors, their affiliations, and relevant credentials should be displayed), the attribution (clear references and sources for all content should be provided), the disclosure (ownership of the website, the sponsorship, the advertising, the underwriting, the commercial funding or support sources and any potential conflicts of interests) and currency (dates of initial posting and updating of the content should be noted). [10] For each criteria (Authorship, attribution, currency, disclosure) the website received one point, the range was from 0 to 4 points.

DISCERN Instrument

The DISCERN instrument comprised 3 sections, the first 2 accesses the reliability and the quality of the written information. The third section rates the publication as a whole. Each question is scored on a range from 1 (definite NO) to 5 (definite YES). A score of 2 and 4 is a range given in cases in which the criterion is partially met to some extent. The maximum total score is 80, and the quality of each website is classified as high (≥ 65 points), moderate (33–64 points), or low (16–32 points). [12] To evaluate the DISCERN score, we design a Microsoft excel page where a row was assigned to each question of the instrument, each website was evaluated, the value of each question was introduced manually into the corresponding cell, the score for each question was from 1 to 5. For the 16 question, the function of mode was used for the rows 1 to 15. The row 17 was the addition from 1 to 16 and that was the DISCERN value of the website.

Google Rank

Google Rank or Page Rank, uses the URL of the site and the keyword used, then the algorithm determines the position number of the website. In this study, two free-use rank sites were used: https://www.seoreviewtools.com/website-authority-checker/ and https://www.serprobot.com/serp-check.php [15,16]. They were used entering the URL of each one of the 110 sites and the same keywords that were used in the search "coronavirus" and "Wuhan".

Categorization

The websites reviewed were categorized based on affiliation (commercial, news, university/ medical center, a non-profit organization and governmental), content type (medical facts,

clinical trials, human interest stories, questions, and answers), and specialization of topic and content (website exclusively related to coronavirus or only part of the website).

Contrast to medical bibliography

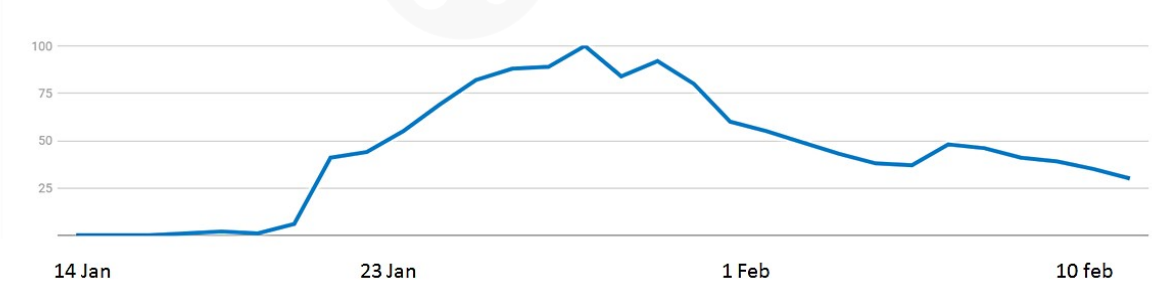
From the results, the main ideas of the first 50 websites were compared to the medical literature available on PubMed, considering main ideas as all the facts mentioned on a website (e.g. days between contagion and the onset of symptoms, genomic characteristics of the virus, recommendations to prevent contagion among others). The information was classified as true (if everything in the website was found in any published paper found in PubMed), partially true (if most of the information in the site was found in one or more papers published and found in PubMed, but there is still missing information), or false (if everything in the site was not found in any published article in PubMed). We avoided information on the number of cases and territorial virus expansion due to the fact that this information could quickly change. The websites in which there was no health information to discuss, non-free-access websites and websites considered medical literature were excluded.

Statistics

Quantitative analysis of the database was done. Besides comparisons of the values obtained in JAMA and DISCERN score between the first 50 websites and the rest of it was determined using an unpaired T-test. The statistical analysis was performed using the GraphPad Prism software.

Results

As mentioned above, according to Google Trends, the search for Coronavirus in the last 30 days was observed as shown in Figure 1. It reached its maximum value on January 30, during this period of 30 days, the search was also a trending topic. The Google trends also showed the behavior on the map, where countries with the highest level of the search were highlighted. The more searched keywords according to Google trends were: “Coronavirus”, “outbreak epidemic”, “gross death rate”, “Coronavirus symptoms” and “Coronavirus and China”.



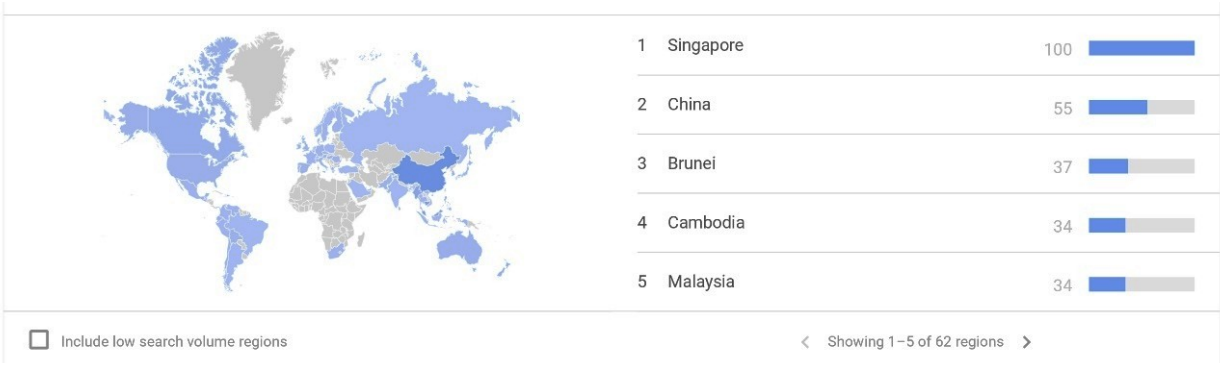


Figure 1.- Data obtained through the Google trends tool with the search words “Wuhan Coronavirus” between 14 January to 14 February. In the graph is possible to observe how the Coronavirus search was a trending topic, the highest search value was on January 30. The map shows, the world trend of the searched terms in the same dates by country. The highest trending topic was for Singapore, followed by China, and other Asian countries. Figures obtained from the Google trends tool.

The Google search for Wuhan Coronavirus retrieved 309,000,000 hits and the first 110 websites were critically analyzed. (Supplementary File 1)

HON code

The analysis of the HON code showed that from the 110 websites survey, only 1.81 % (2 websites) had the HON code seal. (Table 1)

JAMA benchmarks

The JAMA benchmark analysis showed that 39% (43 websites) did not fit any of the JAMA benchmark criteria, 23.63% (26 websites) achieved only 1 criterion, 17.27% (19 websites) achieved 2 criteria, 10% (11 websites) achieved 3 criteria and 10% (11 websites) achieved the four criteria. (Table 1)

On average, all the websites achieved 1.28 ± 1.34 criteria, the first half of websites achieved, 1.95 ± 1.35 and the second half achieved 0.68 ± 0.95 criteria. There was a significant difference between the first half and the second half (p <0.0001).

The 43 websites that did not achieve fit any of the JAMA benchmark criteria, 9 appeared on the first 50 websites. Also, from the 11 websites that achieved four criteria, 10 were found on the first 50 websites, suggesting that the quality of the information may reduce after the first 55 websites.

DISCERN Score

The DISCERN score for the analyzed websites resulted as follows: High score (65 or more points) was not achieved by any of the websites, moderate score (from to 64), was achieved by 30% (n=33) of the websites, and a low score (from 16 to 32 points) was achieved by 70% (n= 77) of the websites. (Table 1)

On average, all websites achieved 28.91 ± 10.34. The first half of the websites achieved

24.36 ± 8.36 while the second half achieved 33.43 ± 10.21. There is a significant difference between the first half and the second half (P < 0.0001).

Google Rank

The Google rank yielded 7 websites with a ranking position for “Coronavirus” and 5 websites with a ranking position for “Wuhan”, only 2 websites had ranking for both keywords (website 1 and 28, on table 1). The best ranked website for the word Wuhan was the website 1 (Table 1), and for the keyword Coronavirus was the website 2, which was also ranked in the top 10 websites for Google rank. Only 9.09% of the visited websites had a position in Google rank for one or both keywords in the top 100 positions.

Website categorization

The analysis on the website categorization or affiliation showed that 56.36% of the information was on general news pages, 19.09% of the information was on commercial pages, 8.18% was on pages associated with a government instance, 7.27% was on pages considered non-profit organization and only the 0.90% of the presented information was in the pages associated with universities or medical websites.

Of the 110 websites reviewed, 44.54% of them presented exclusive information about Coronavirus while 55.45% presented it as part of the notes on the website.

Despite the fact that most of the sites were not specialized in medicine, 39.00% of the information presented was considered health information, the rest of the websites presented epidemiological data or stories about the patients or how people were living the epidemic.

Language analysis showed that 93% of the pages had English as their main language. (Table 1)

		Total
HONcode		
	Certified	2
	Not certified	108
	Total	110
JAMA benchmarks		
	0	43
	1	26
	2	19
	3	11

	4	11
	Total	110
DISCERN score		
	High (≥65)	0
	Moderate (33- 64)	33
	Low (16-32)	77
	Total	110
Categorization/Affiliation		
	News	61
	Commercial	21
	Non-profit organization	5
	Government	9
	University	0
	Medical center	1
	Non-profit organization/ Government	3
	University/Medical center	8
	News/Commercial	1
	University/Medical center/Non-profit organization	1
	Total	110
Exclusivity		
	Partly exclusive	61
	Exclusive	49
	Total	110
Subtype/ content		
	Medical facts	11
	Question and answer	10
	Human interest stories	43
	Clinical trials	0
	Medical facts/ Question and answers	5
	Medical facts/ Human interest stories/ Question and answer	5
	Medical fact/ Human interest stories	27
	Medical facts/ Clinical trial	3
	Human interest stories/ Question and answer	6
	Total	110
Language		
	English	103
	Spanish	7
	Total	110

Table 1.- Shows the results of the analysis of the 110 websites consulted, shows the data obtained by the quality information tools, as well as the analysis of the categorization, exclusivity (if it was only about COVID-19), language, and type of content.

Comparison to medical bibliography

The first 50 websites were analyzed in order to take from them the main ideas found in the text of the website to compare the information with the medical bibliography. Websites number 3, 10, 13, 22, 32, 33, 34, 39, 42, 43, 46 and 48 were excluded, since there were no main ideas to compare with the medical bibliography. Website number 18 was excluded since it was not free access. Website 26 was excluded because it was considered medical literature.

From the remaining 36 websites, 15 had main ideas considered “True”, 16 had main ideas considered “Partially true”, and 5 had main ideas considered “False” compared to the medical literature present in PubMed at that specific time. [17-24]

(Supplementary File 2)

Conclusion

Due to the novelty of the disease, it was a trending topic by February 6, 2020. Google trends reported it with a 100 factor, while the Coronavirus still did not have its final name COVID-19 or SARS-CoV-2. It was until Tuesday, February 20, that the WHO agency announced the official name as COVID-19. This name was chosen to avoid etiquette a geographical location, animal species or human ethnical group. [25]

Most of the information that the internet users got came from news, representing 56.36% of the websites returned by Google. At best, this news presented a summary interpretation of the statements of the health personnel involved in the treatment of the patients or information provided from health organizations like WHO. The infodemic at this time there was no information with clear scientific basis.

The evaluation of the quality of health information presented by the first 110 websites retrieved by the Google search engine showed that only 2 websites have the HON code, 11 websites achieved the four JAMA benchmark criteria, and none of the websites were evaluated as excellent with the DISCERN instrument.

According to the Google rank, the most influential websites were in English and appear in the first 3 links displayed, although there was no direct relation between the position in Google rank and the site content´s quality, Google rank might be influenced by the fact that in the country where the search was performed (Mexico), COVID-19 was not present and people with no medical training looked in news sites. From the websites analysis of the health information quality at the search moment, it became clear that the information provided by the Google search engine did not have the quality standards required for health information, and it was not entirely reliable. The excess of poor-quality information without scientific support from the news and social media increased the interest in the information search, putting the world on alert for a possible pandemic that would cause many deaths, alerting users about an unknown virus and presenting cataclysmic images.

It is important to emphasize that the internet users are responsible for the quality of information they obtain from websites. Nowadays, misinformation is an important problem, people do not tend to critically assess the information they read and often they take important decisions regarding their lives and health. The misinformation is associated with panic shopping, buying medical supplies, or drugs and even worst taking them without medical prescription. The misinformation impact can be devastating, social media are trying to filter the fake news, but this has not stopped the conspiracy theory, swindlers and liars on the internet. The financial markets and governments are looking for avoiding panic. The scientific information about COVID flows freely in the networks like never before, but must be accompanied with a proper interpretation by the media and internet users. In countries where drugs are sold without a prescription, people read clinical trials on social media and go to the pharmacy to buy all the drugs in stock as if it were toilet paper.

The internet is the most powerful force disrupting the news, the internet changes shifts the power from governments to society, and is the society who is pressuring the governments to take decisions sometimes based in fake news. During COVID-19 pandemic it has been difficult for governments and search engines to control the flow of information and the quality of it, within the experiences that this pandemic will leave to the world, it is clear that governments as well as institutions like WHO must work together to create guidelines and control mechanisms over the information flow on the internet and establish global ethical codes under which health information can be published, since it also affects the politics and economy of the countries. It also important to consider that some part of the population may prefer to receive information by other methods than internet, such as radio, television, newspaper, among others. On 2019, It was estimated that worldwide only 53.9% of the population has internet access, leaving the rest without this tool of information search, mainly in the third world. [3]

To prevent inadequate responses and fears from the population, it is important that governments develop a strategy to teach their habitants how to verify the standards of quality of what they read, especially in the case of health information. Everyday, the number of users looking for their diagnosis and treatment on the internet increases, making internet a two-edged tool for the health sector. Government agencies should consider the use of regulatory mechanism to control false or misleading health information. False health information can cause significant social harm by feeding false concepts on disease. Also, health personnel must assume a role among the society, recommending 5 actions: 1) Don´t share information if its veracity has not been proven, 2) Participate on mass media programs to share legitimate information, 3) Promote hygiene actions and vaccination, 4) Educate patients to identify alarm symptoms and instruct them what to do if these symptoms appear, 5) Produce media contents and promote websites of academic institutions.

The governments and health organization like the WHO should take an active role on cases like COVID-19 pandemic information. Some of the actions that should be considered in order to spread correct and reliable information on internet amongst their population are: 1)

Share reliable information or suggest some sources of reliable information on government´s websites. 2) Subsidize more visibility of reliable information on massive search engines. 3) Subsidize scientific institutes or organizations in order to share reliable information. 4) Develop a tool where health personnel may assess the quality of information on websites and non-health personnel may use these assessments to find reliable information.

Contributors

Soto-Vega E: Idea and Conception, work design, analysis and interpretation, final approval. Guarantor of the article.

Cuan-Baltazar Y: Data acquisition, team organization, data interpretation and writing.

Muñoz-Pérez MJ: Google rank acquisition and evaluation, data interpretation and writing.

Robledo-Vega C: Literature search and information acquisition.

Pérez-Zepeda MF: Literature search and information acquisition.

Declaration of interest

All authors have red and understood the BMJ policy on declaration of interests and declare the following interests: none.

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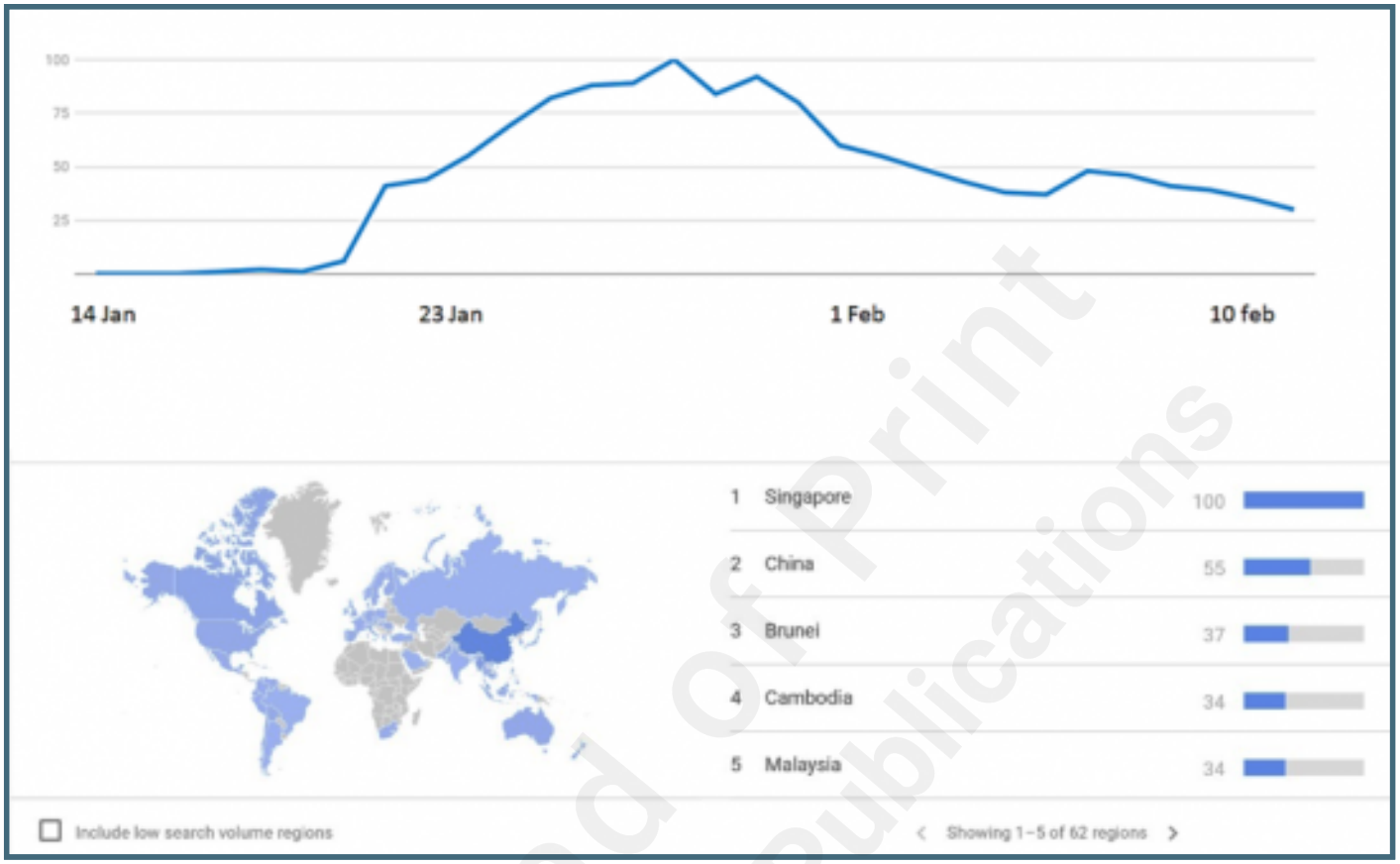
Supplementary Files

Figures

Data obtained through the Google Trends tool with the search term “Wuhan Coronavirus” between January 14 and February 14. The map shows the world trend of the searched terms on the same dates by country. Figures were obtained from Google Trends.



Multimedia Appendixes

Supplementary file 1.
URL: https://asset.jmir.pub/assets/e2c18b786c3d790ebd0b7a2b6c665be8.docx

Supplementary file 2.
URL: https://asset.jmir.pub/assets/bfe8fb875067c1893752d750646f46c8.docx

Other materials for editor/reviewers onlies

Cover letter.
URL: https://asset.jmir.pub/assets/0ffef3ce49c670cc27c56d9d0aa8178b.docx