

The association between Japanese-language videos on YouTube regarding COVID-19 and Internet searches in Japan.

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The association between Japanese-language videos on YouTube regarding COVID-19 and Internet searches in Japan.

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Abstract

Background: Serious public health problems, such as the COVID-19 pandemic, can cause an infodemic. Sources of information that may cause an infodemic include Internet searches and social networking services; YouTube, which consists of content created and uploaded by individuals, is one such source.

Objective: To survey the relationship between YouTube regarding COVID-19 and Internet searches in Japan.

Methods: We used Google Trends to survey the relationship between YouTube regarding COVID-19 and Internet searches in Japan. YouTube searches were performed on March 6, 2020 (before the state of emergency), April 14 (during the state of emergency), and May 27 (after the state of emergency was lifted), with 136, 113, and 140 sample videos evaluated, respectively. The Google Trends search was conducted from January 22nd to May 23rd, 2020. The main outcome measures were: (1) The characteristics of each video and (2) uploaded video and Google Trends.

Results: Of the videos evaluated over the three periods, the total number of videos after removing duplicates was 331. Content related to COVID-19 was present in 23.3% of videos, content related to preventing the spread of infection in 20.5%, content related to treatment in 2.1%, and the other category represented 54.1% of videos. Only 9.1% of the videos were uploaded by healthcare professionals. In the periods before and after the state of emergency, with 7 April as the point of reference, there were 2.9 per day and 2.4 per day uploads before and after the state of emergency, respectively. Regarding Google Trends, before and after the state of emergency, there were 29.5 per day and 54.9 per day total searches, respectively. There were more videos of content related to COVID-19 in March than in April or May ($p = .03$, $p = .03$).

Conclusions: The information on COVID-19 did not indicate a relationship between the number of YouTube uploads and the number of Internet searches. Most of the videos on COVID-19 were created and uploaded by individuals. Therefore, people need to take great care when obtaining information from YouTube before or early in a pandemic, during which time scientific evidence is scarce.

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Original Manuscript

Original Paper

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Abstract

Background: Serious public health problems, such as the COVID-19 pandemic, can cause an *infodemic*. Sources of information that may cause an *infodemic* include Internet searches and social networking services; YouTube, which consists of content created and uploaded by individuals, is one such source.

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Keywords: novel coronavirus; COVID-19; YouTube; social media; Internet search

Introduction

The 2019 coronavirus disease (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), presents itself in a variety of forms, from asymptomatic to severe respiratory failure. A novel coronavirus, SARS-CoV-2, emerged in December 2019 in Wuhan, China. In Japan, the first Japanese case of COVID-19 occurred in late January 2020, while the outbreak at the Diamond Princess cruise ship in February received global attention. In a constantly changing

situation, many Japanese persons are exposed to a variety of information about COVID-19. On 11 March 2020, the World Health Organization (WHO) announced that COVID-19 had evolved into a pandemic, and on 7 April 2020, the Japanese government declared a state of emergency in Japan. As of April 19, 2020, COVID-19 has infected millions of people worldwide. [1]

Currently, there are no vaccines for COVID-19; thus, evidence-based precautions against it are important. Meanwhile, the World Health Organization (WHO) has warned of an *infodemic*, defined as a sizable amount of misinformation and fake news regarding COVID-19. [2] Sources of information that may cause such an *infodemic* include the Internet and social networking services (SNS), such as Twitter. [3] On SNS, false news, which includes non-scientific and fake information, diffuses significantly faster and more broadly than does authentic news. [4,5] However, the Internet and SNS have become powerful sources of healthcare information. Therefore, it is necessary to improve health literacy, which refers to the skill required to collect, understand, evaluate, and utilize highly reliable information. However, it has been reported that Japan has lower health literacy than other countries. [6]

YouTube is a popular social media site for information retrieval. YouTube videos may be created and uploaded by individuals who are not professionals or experts, and therefore some videos may not be consistent with scientific evidence. Nevertheless, inaccurate uploaded videos may attract the attention of social media users. Consequently, there is a risk of upsetting the public and compromising public health. Prior studies have analyzed YouTube videos as a source of information regarding infectious diseases such as Ebola, [7,8] West Nile virus, [9] and Zika virus. [10] These reports have revealed that YouTube videos may contain misleading information and influence viewer behavior. Recent reports have addressed YouTube videos as a source of COVID-19 information, [11-14] but there are currently no reports on Japanese language YouTube videos. In addition, Japanese persons typically exhibit lower health literacy than do persons from other countries, [6] and the number of YouTube viewers is increasing in Japan. With the COVID-19 pandemic and state of emergency, the public is more likely to increase its use of digital tools such as Internet searches and SNS to gather information. Therefore, we used Google Trends to survey the relationship between YouTube regarding COVID-19 and Internet searches in Japan.

Methods

On 6 March 2020—a date prior to the declaration of a state of emergency in Japan—we searched YouTube using the Japanese equivalent of the keywords “novel coronavirus pneumonia,” “coronavirus,” and “corona,” with “corona” comprising the highest number of videos. Thus, in this study, the inclusion criteria comprised videos using the keyword “corona,” with a total of 100,000 or more views using the filter function of YouTube, and the videos must have been uploaded between 14 April 2020 (during the state of emergency) and 27 May 2020 (after the state of emergency was lifted). The exclusion criteria included videos with a duration of 20 minutes or longer using the filter function of YouTube, and news from news agencies or videos recorded as part of journalistic reporting.

The Internet search data was obtained through use of Google Trends, a product provided by Google. We included geography and time range in the Google Trends search terms. Search results were shown on a scale ranging from 0 to 100, based on the ratio of searches on a given topic to searches on all topics. We chose a search term that was the Japanese equivalent of “corona.” We performed the search on October 1, 2020, using Google Trends between January 22 and May 23, 2020, in Japan. The survey items for YouTube included the title, upload date of video, number of views, and

distribution source. In addition, the content of the video was organized into four categories, based on a past report [12]: content related to COVID-19 (e.g., SARS-CoV-2 prevalence, clinical symptoms, diagnosis, clinical outcomes), content related to preventing the spread of infection (e.g., mechanism of transmission, personal protective equipment, hand hygiene, and disinfectants), content related to treatment (e.g., medication, vaccine), and other content. In the 100 most widely viewed YouTube videos, we evaluated the changes in video content according to the four categories, and the association between public health information and survey items on 6 March 2020 (before the state of emergency), 14 April 2020 (during the state of emergency), and 27 May 2020 (after the state of emergency was lifted).

The Mann-Whitney U test and Fisher's exact test were used for continuous and categorical variables, respectively. All statistical analyses were performed using EZR. [15] All analyses were two-tailed, and p -values $< .05$ were considered statistically significant.

Human	participant	compliance	statement
No data were collected from human participants in the course of this study.			

Results

The number of videos identified by YouTube search increased in March ($n = 210$), April ($n = 253$), and May ($n = 271$). The number of sample videos that met the inclusion criteria was 136 in March, 113 in April, and 140 in May. Videos over 20 minutes in duration that met the exclusion criteria increased every month, with the greatest number of news videos being uploaded during the state of emergency (Figure 1). Of the videos evaluated over the three periods, the total number of videos after removing duplicates was 331 (Figure 1). For the 331 videos, the number of median views was 269,837 (IQR: 153,416–519,787). Content related to COVID-19 was present in 23.3% of videos ($n = 77$), content related to preventing the spread of infection in 20.5% ($n = 68$), content related to treatment in 2.1% ($n = 7$), and the other category represented 54.1% of videos ($n = 179$). Moreover, 90% ($n = 299$) of the video sources were individuals, while 9.1% ($n = 30$) were healthcare professionals, with only two videos from national institutions.

Figure 2 presents the change in the distribution of the 331 videos and Google Trends searches from 22 January to 23 May 2020. The number of uploaded videos exhibit four peaks, around February 2, February 24, April 3, and May 7. On February 2, the greatest number of videos delivered was nine. Google Trends revealed three peaks—January 30, February 27, and April 9; of the three peaks, April 9 had the largest search volume of 100. In the periods before and after the state of emergency, with 7 April as the point of reference, there were 217 (2.9 per day) and 114 (2.4 per day) uploads before and after the state of emergency, respectively. Regarding Google Trends, before and after the state of emergency, there were 2,240 (29.5 per day) and 2,582 (54.9 per day) total searches, respectively.

The differences between the four categories of content for the top 100 most viewed YouTube videos in March and April, March and May, and April and May were analyzed using Fisher's exact test. There were more videos of content related to COVID-19 in March than in April or May ($p = .03$, $p = .03$; Figure 3). The number of videos on mask-related content related to preventing the spread of infection was 16 in March, 6 in April, and 8 in May. In addition, the number of videos on mask-related content in March was significantly higher than in April ($p = .001$, Fisher's exact test). Regarding content related to preventing the spread of infection, content related to mask-use accounted for 50% of the videos ($n = 34$).

Discussion

We analyzed the content of COVID-19 related videos that were found on YouTube using Japanese keywords, one means by which the general public can collect medical information. A state of emergency was enacted as a measure to prevent the spread of COVID-19 in Japan. Unlike in Western countries, the state of emergency did not involve a lockdown but rather a self-restraining lifestyle. The number of sample videos uploaded decreased before and after the state of emergency. Among the 100 most widely viewed YouTube videos, those with content related to COVID-19 *decreased* significantly during the state of emergency and after it was lifted compared to before the state of emergency. Of the 331 videos removed for being duplicates, only 30 (9%) were uploaded by healthcare professionals.

Frequent video delivery dates occurred in late January (i.e., when the first infected person in Japan was reported), in late February (i.e., when the COVID-19 outbreak on the cruise ship Diamond Princess occurred), and around the day of the commencement and lifting of the state of emergency. There were 2.9 and 2.4 uploads per day before and after the state of emergency, respectively, with little difference between before and after the state of emergency. During and after the state of emergency, the content of YouTube videos significantly shifted from containing COVID-19 information to non-COVID-19 information, such as the economy (Figure 3). Therefore, starting on 6 March, the Japanese population may have begun to express less interest in SARS-CoV-2 prevalence, clinical symptoms, diagnosis, and clinical outcomes. Conversely, search volume on Google Trends changed significantly (1.9-fold) before or after the state of emergency, with the largest volume on April 9, shortly after the state of emergency was announced.

On April 9, the Japanese government called for the closure of elementary, middle, and high schools. The study found no correlation between the number of YouTube uploads and the number of Internet searches. However, while the peaks in some YouTube uploads and Google Trends searches were similar, the days that exhibited the largest peaks were different. This could be due to the fact that the population watching YouTube and the population searching the Internet are different. Videos on mask-related content that included infection prevention were significantly higher in March before the WHO declared a pandemic. This may have contributed to the lack of masks, and could have been one of the reasons why awareness of wearing masks increased, thus leading to a lower spread of COVID-19 infections compared to in Western countries. Measures, including wearing masks, have recently been reported to be associated with significantly lower rates of SARS-CoV-2 positivity among health care workers. [16]

In the pandemic state of a new infectious disease, there is little reliable information; thus, fake news is easily transmitted, causing an *infodemic* that disrupts society. [2] In addition, healthcare professionals have experienced difficulty assessing the accuracy of published academic reports during the pandemic. [17] Therefore, it is important for the government and infectious disease experts to distribute information on correct infection prevention measures. However, only two videos were released by the government, and none of these videos were released by infectious disease experts based on our search. Similarly, in other countries, the number of videos delivered by the government and infectious disease experts was low. [12-14]

Because there is no center for disease control and prevention in Japan, the distribution of information on infection prevention measures was limited in scope. Many non-healthcare professionals created and distributed videos based on unverified news and other information. In fact, among the videos

distributed by healthcare professionals, there was even a video that delivered misinformation about COVID-19. Since 20 May 2020, YouTube has announced a policy regarding misinformation about COVID-19, and measures are being taken to eliminate medical misinformation. Of the videos with obviously incorrect content during the applicable months of this survey (i.e., March and April), three videos were subject to YouTube policy and were removed from YouTube, as confirmed on 26 June 2020. Unfortunately, all three videos were sourced by healthcare professionals. Furthermore, several reports indicated that many YouTube videos contain misinformation and poor-quality information regarding the COVID-19 pandemic. [13,14] Therefore, it is necessary to watch YouTube videos critically, because misinformation can be easily distributed by individuals at the beginning of a pandemic, such as COVID-19. In contrast, YouTube is a platform that allows the general public to easily watch videos, and it could be an excellent educational tool for the prevention of the spread of COVID-19. In future, it would be useful for governments and infectious disease experts to use YouTube to provide the public with scientific information in an easy-to-understand format.

Limitations

Our study has some limitations. First, we evaluated videos with more than 100,000 views only from March to May 2020. Thus, we did not evaluate videos that were viewed relatively few times. Second, we only analyzed Japanese language videos. The content of YouTube videos can be affected by the ethnicity, culture, and customs of the creator. Because the Japanese population is generally less health literate than populations of other countries, the content may differ in Japanese versus non-Japanese videos, and the frequency of fake news affecting an *infodemic* may also differ. Additionally, video preferences and content expectations for videos may differ among people from other countries in comparison to Japanese persons.

Conclusions

The information on COVID-19 did not indicate a relationship between the number of YouTube uploads and the number of Google trends. The three categories of content associated with COVID-19 were frequently reported before the pandemic and then followed a downward trend. A major issue with YouTube is that most of the videos on COVID-19 were created and uploaded by individuals and not validated prior to release by authorized healthcare professionals. Therefore, people should take great care when obtaining information from YouTube before or early in a pandemic, during which time scientific evidence is scarce. Future studies should evaluate the differences between Japanese and non-Japanese persons in their consumption of YouTube video content and fake news.

Implications for policy & practice

- The development of health literacy is needed in Japan.
- People need to take great care when obtaining information from YouTube before or early in a pandemic, during which time scientific evidence is scarce.

Acknowledgements

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Conflicts of Interest

None declared

Abbreviations

COVID-19: 2019 coronavirus disease

SARS-CoV-2: severe acute respiratory syndrome coronavirus 2

WHO: World Health Organization

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Figure captions

Figure 1. Flow diagram for review of YouTube videos.

Figure 2. Trends in the number of uploaded YouTube videos and Google Trends search volume.

Figure 3. Changes in video content of the 100 most viewed YouTube videos, rated in four categories.

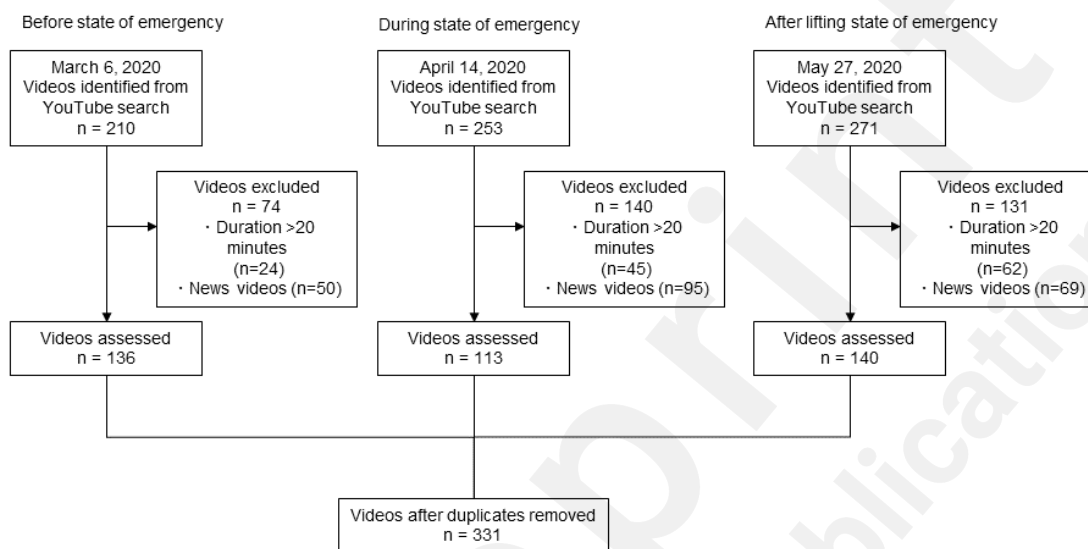


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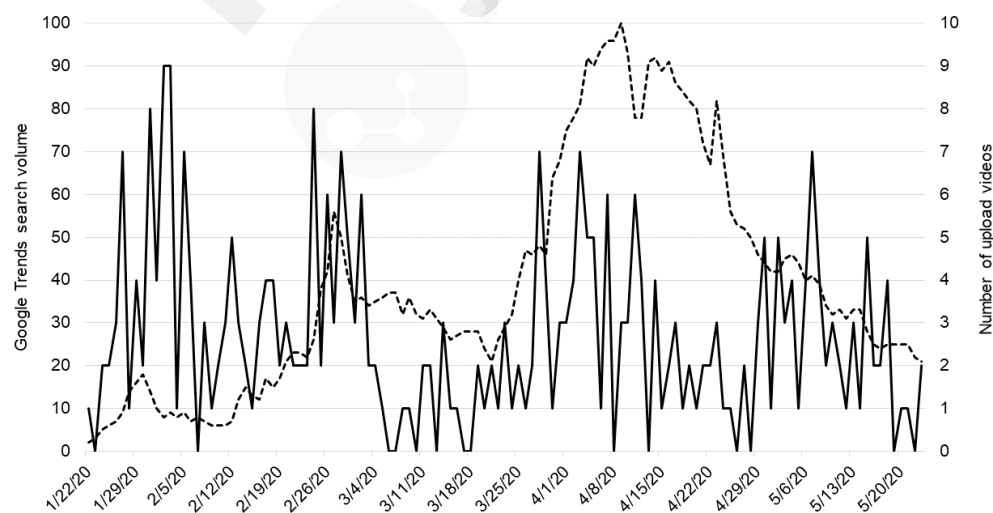


Figure 2. Trends in the number of uploaded YouTube videos and Google Trends search volume.

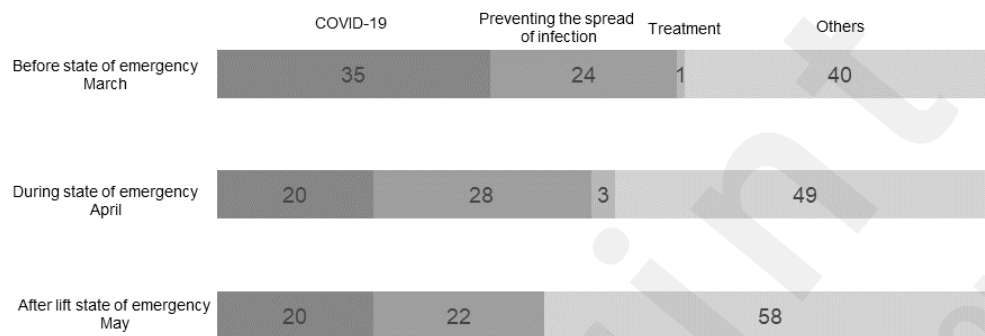
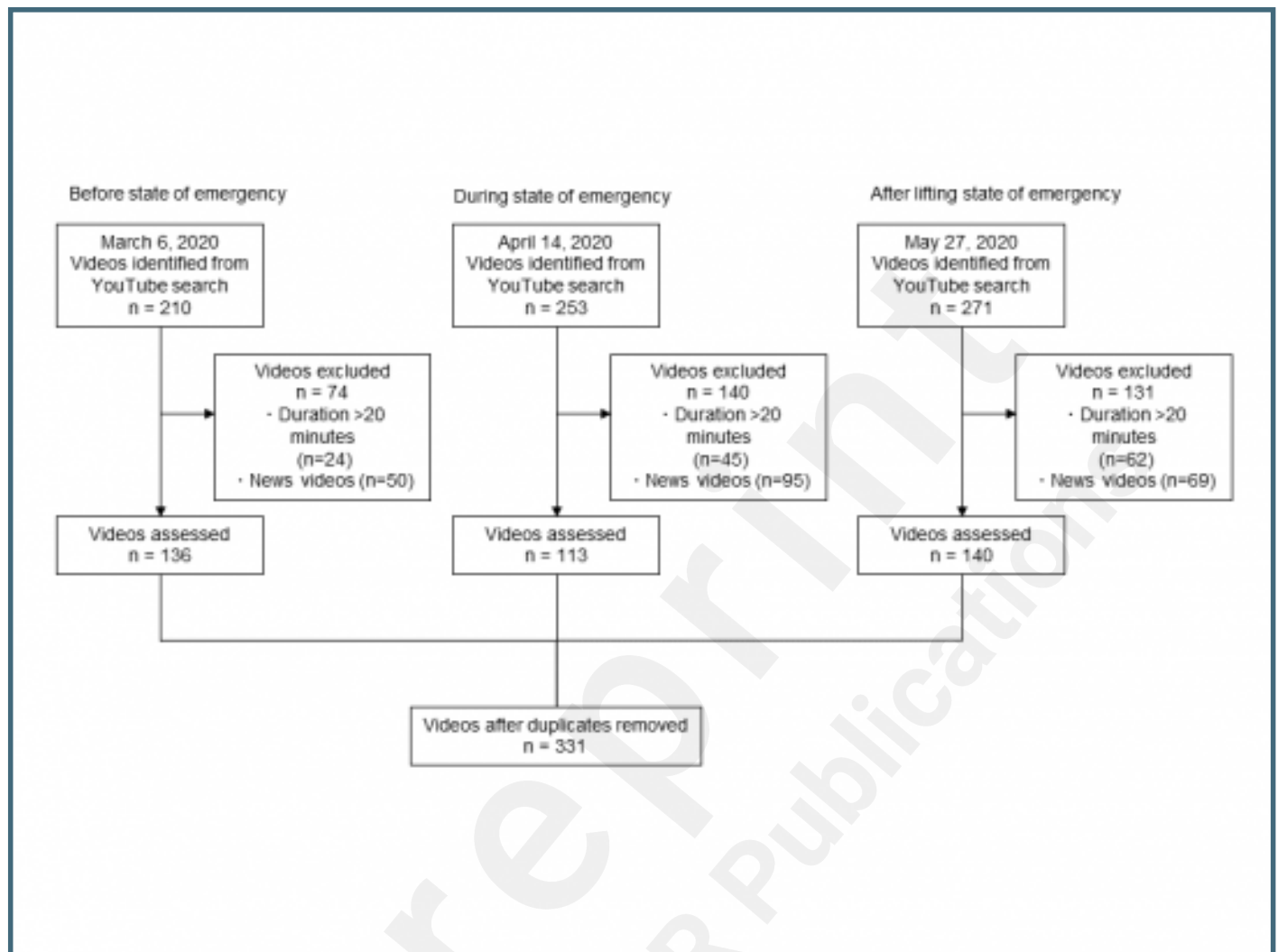


Figure 3. Changes in video content of the 100 most viewed YouTube videos, rated in four categories.

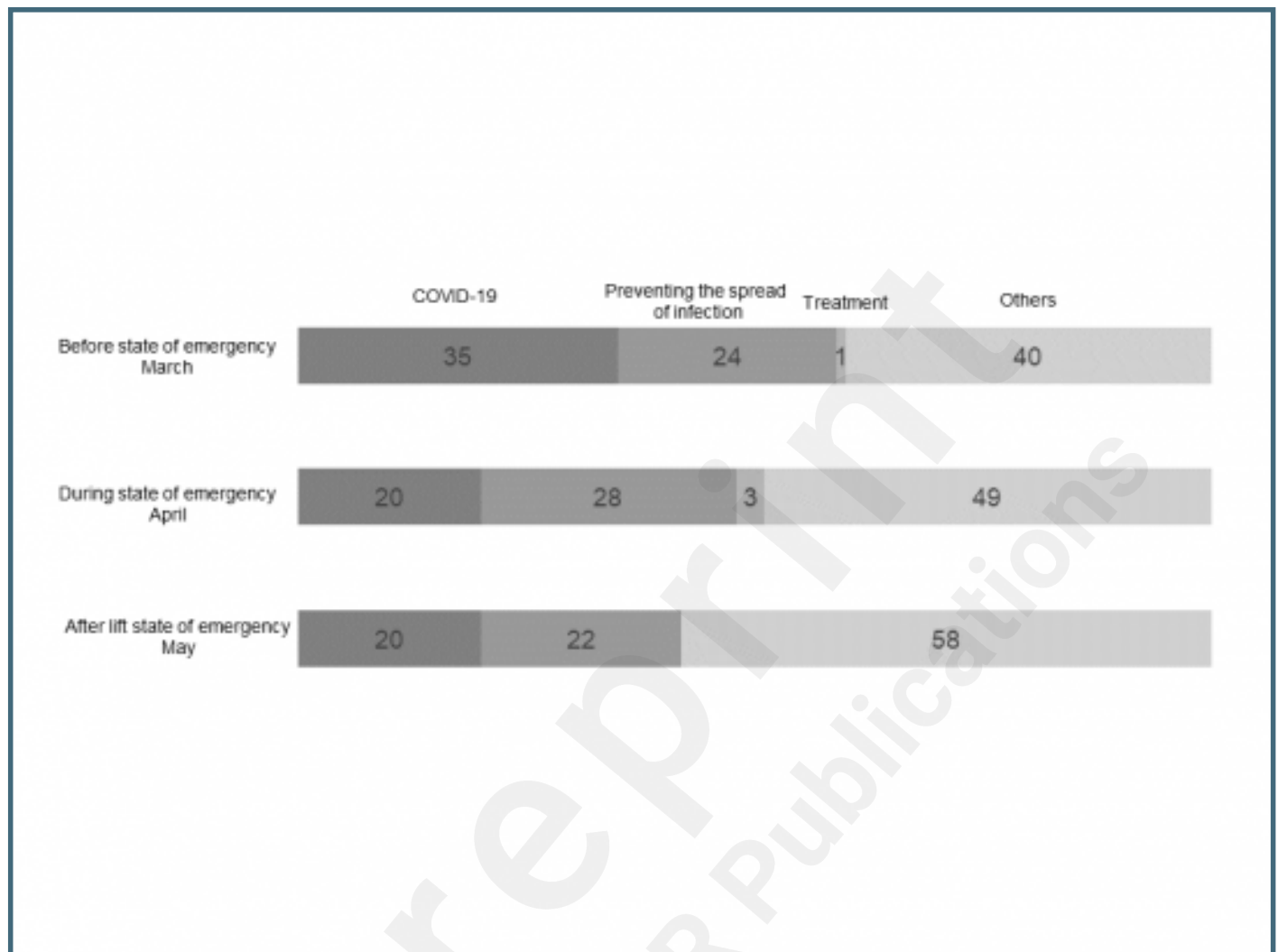
Supplementary Files

Figures

Flow diagram for review of YouTube videos.



Changes in video content of the 100 most viewed YouTube videos, rated in four categories.



Trends in the number of uploaded YouTube videos and Google Trends search volume. The straight line indicates the number of uploaded YouTube videos, the dashed line indicates the number of Google Trends search volume.

