



#COVID-19:

Identities in a pandemic

A social media analysis

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Executive Summary

The *#COVID-19: Identities in a pandemic* report is a thematic social media analysis of COVID-19 related tweets from January 2020- December 2020; the monumental year where a novel coronavirus discovered in China amalgamated into a pandemic creating mass social chaos, outrage and confusion. Data was derived from two publicly available datasets on tweets during the study period. A supplementary dataset from Altmetrics was also extracted to support the interpretation of findings from the tweets.

Key Findings:

- **Tweets were categorised into 8 themes; Discrimination, Satire & Media, Cases & Prevention, Diagnostics & Therapeutics, Politics, Travel, Other, Random.**
- **Tweets related to Cases & Prevention were most common and popular, followed by content related to Satire & Media in Dataset 1. Whereas, in Dataset 2- tweets related to Satire & Media were most popular with 37 out of 100 tweets. This was followed by tweets related to Cases & Prevention.**
- **While there were a few discriminatory posts that gained popularity in the beginning of the pandemic (January 2020), this was not the case in the height of the pandemic (April, 2020). Whereas, in Dataset 2 the tweets that fell into the Discrimination theme were anti-discriminatory.**
- **Social media discourse related to COVID-19 was dominated by users in the global north, with the US in lead (>40,000 tweets).**
- **The most popular research articles related to COVID-19 from January 2020- December 2020 were related to clinical symptoms with 3/10 papers involving epidemiological analysis of airborne transmission, school closures or asymptomatic cases. Twitter was the most popular tool for dissemination of research, followed by news articles, blogs and facebook/policy mentions.**

Limitations and Future Research

This is a brief qualitative analysis of tweets in 2020 to provide a broad insight, with limitations in the completeness of datasets and the level of detail of the tweets available for analysis. Future research could look into a more mixed methods approach to avoid the subjectivity of qualitative research and also, look into temporal trends from month to month to understand the patterns in social media use.

Background

The Internet is a novel source of contextualized health data that has enabled an explosion of user-driven innovations for monitoring disease trends in populations. Every minute, people around the world are publicly sharing large volumes of personal information about their health and the health of their communities. Thus, social media can be a helpful tool in the study of diseases and risky public health behaviours by shortening the length of time it takes to detect disease outbreaks and improve responses, allowing clinical and public health agencies to engage and communicate with the population more directly. Also, it's very useful for unpicking how sentiments and rumours spread in order to engage with the appropriate public health messages and interventions (Kass-Hout and Al Hinnawi, 2013). Furthermore, social media's impact during large threats to health has been realised with the new ECDC epitweetr tool developed in October last year (ECDC, 2020). Therefore, it is clear that the role of media in the 21st century is key in deciphering public opinion, misinformation and where health communication has been effective/ineffective during this time. Given the great anxiety and uncertainty surrounding the current pandemic, the importance of investigating reactions to the COVID-19 response requires even more attention (MacGregor, 2020).

On the national level, this can be seen when analysing China's experience as the first detectors of the SARS-COV-2 virus (which causes COVID-19). One of the first studies on the 2019 coronavirus strain was carried out by Huang et al (2020), where they preliminarily penned the virus as, 2019-nCov. A 34 year old ophthalmologist, named Li Wenliang was ostracized by Wuhan authorities when he warned of the emergence of a severe, novel coronavirus in December 2019. He later died from the disease himself. It was only through social media dissemination that this story was told and spread throughout China and outside (BBC, 2021; Green, 2020). Moreover, while comparisons between the 2003 SARS outbreak and the current one have been common across disciplines, Peckham (2020), argued that it's the unstable political situation in China; the recent protests in Hong Kong and unlawful detainment of Uyghurs led to increasing public distrust in the government, further propagating the spread of disease there. This highlights the importance of social/public awareness and trust in authorities for effective outbreak preparedness. An analysis from 182 countries found that only about 50% of these politically unstable countries had resources in place for an effective response to a health emergency, like the current COVID-19 crisis (Kandel et al., 2020).

When the first confirmed case in the USA was reported on the 20th January 2020 (Holshue et al., 2020), the WHO declared this new virus as a Public Health Emergency of International Concern. Professor Lynteris (2020), from the University of St Andrew, emphasised the neglect in the "lived experience of the historical impact of epidemics on the ground" in mainstream global health and infectious disease discourse. He argues that "the historicist framing of events of immense sociological and biological complexity into digestible and repeatable cautionary



tales is rooted in colonial tropes of rendering other people's suffering into lessons for 'improvement' under western tutelage". This echoes a lot of Benton's work (2020), which emphasized the recognition of "pathogenic relations that are racialised, gendered, sexualised and economized" as a typical occurrence in times of unknown epidemics. In this racialisation of diseases and bodies, the global play of white epidemiologists as epidemic heroics is problematic and further feeds into a post-colonial narrative damaging for the world and global health.

Recently, there has also been growing evidence (Ruprecht et al., 2021), that marginalised populations, specifically ethnic minorities, are at higher risk of COVID-19 incidence and severity. With increasing political inconsistency and societal questions about life during and after a pandemic of this proportion, more needs to be done to understand the current situation and public discourse.

Social media and identities during the pandemic

Kabir and Madria (2020), developed a live dataset of tweets (5th March 2020- 2nd July 2020) from states in the USA to generate spatial analysis on topics, subjectivity and human emotions; significant differences between the sentiments tweeted from Georgia and New York were found. Babvey et al (2020), investigated the impact of lockdown on childhood exposure to violence both from stressed out family members and increased internet usage- they found violence-related subreddits had the greatest growth after the outbreak. Others found how social media is influencing increased vaccine hesitancy, globally (Wilson and Wiysonge, 2020).

Discrimination and hate speech through social media was a more popular topic investigated. Ageist jokes were found in 14% of tweets during the beginning of the pandemic due to the ongoing narrative that it is the elderly who are most vulnerable to this disease (Soto-Perez-de-Celis, 2020). Newspaper analysis from Australia found that, during the early months of the pandemic, "explicit examples of blame were rare but commonly implied based on the causal origin of the virus" implying the rise in anti-asian sentiments (Thomas et al., 2020). A questionnaire (Yang et al., 2020) of over 100 Asians/Asian-Americans in the USA found that in some instance, social media use was a coping mechanism for the rise in discrimination and othering towards these groups in 2020.

Jaspal and Nerlich (2020), were one of the few researchers to highlight the importance of identity theories within individual responses and understandings of the pandemic and subsequent lockdown. That many may be dealing with a plethora of identity threats as a result of the routine changes, affected interpersonal relationships, disconnect from usual spaces and anxiety regarding a looming global threat making future prospects harder to grasp. Those who resist the lockdown rules could face social stigmatisation as a result, creating more discomfort in one's own sense of identity. Others (Alcover et al., 2020; Cruwys et al., 2020) have highlighted how feelings of belonging in an individual's social group is what determines the extent to which risk perception and behaviour of COVID-19 plays out. The professional identity(Cullum et al.,



2020) of medical students and healthcare professionals has also come under threat with the lockdown rules. Much of the previous twitter analysis related to COVID-19 involved quantitative analysis using data mining and machine learning methods- no papers were found that had explored the tweets via a qualitative thematic analysis.

Aims and Objectives

The aim of this report is to provide a greater global insight into the discourses and personal experiences related to the COVID-19 pandemic throughout 2020, through twitter use.

Objectives:

1. To conduct a thematic analysis of two publicly available twitter datasets of COVID-19 tweets in 2020.
2. To extract an altmetric extract of twitter mentions, demographics and top research articles related to COVID-19 in 2020.

Methods

A thematic analysis was conducted based on the widely cited approach developed by psychologists Virginia Braun and Victoria Clarke (2006). Given the fact that this research was heavily reliant on themes, this paper's methodology, and part of the results section, was strongly based and similar to the six different phases of conducting a thematic analysis- see Table 1.

Table 1: Braun and Clarke's 6 stages of conducting a thematic analysis (Braun and Clarke, 2006).

Phase	Example
1. Familiarisation	Transcribing data: reading and re-reading: noting down initial codes
2. Generating Initial Codes	Coding interesting features in the data in a systematic fashion; collecting data relevant to each code
3. Searching for Themes	Collating codes into potential themes; gathering all data relevant to each theme
4. Involved Reviewing Themes	Checking if the themes work in relation to coded extracts
5. Defining and Naming Themes	Ongoing analysis to refine the specifics for each theme; generation of clear names for each theme
6. Producing the Report	Final opportunity for analysis selecting appropriate extracts; discussion of analysis; relate back to the research question or literature; produce report



Search Strategy

Dataset 1

The first dataset was extracted from a publicly posted Twitter dataset of the global top 55 posts for the months of January and April 2020 (Tweet Binder, 2020). The keywords “*Coronavirus*” and “*Covid-19*” were used to collect the most popular tweets, which were distinguished using the average number of likes and retweets. A thematic analysis was conducted for the months on both months to analyse the discourse surrounding COVID-19. We were only able to extract the top 55 posts through this dataset,

Dataset 2

Using the same keywords as above, the second dataset was extracted from a publicly posted Harvard University dataset of the top global 100 twitter posts from the whole year of 2020 (Firoj et al, 2021). The number of likes/retweets were not posted in this dataset, meaning they could not be taken into account, given that it was pre-collected by the original authors to select the most popular tweets of the year. A thematic analysis was also conducted to gain a better understanding of the most relevant themes and discourse of the year.

Comparisons

The months of January and April 2020 in dataset 1 were chosen for specific reasons. Firstly, both of these months represented two different points of the year, suggesting that each represented a different scenario in terms of the virus’ outbreak. For example, January was one of the first months in which COVID-19 began to gain global attention, following a number of outbreaks in Wuhan, China, in December of 2019 (BBC, 2021). This brought a global sense of moral panic, intense media coverage and unfamiliarity with the virus at this particular point in time (BBC, 2020). Secondly, April was chosen as this was a point in which many countries around the world were affected with many cases of COVID-19, quarantines and lockdowns, rising hospital cases and intense travel restrictions. Dataset 2 was also extracted as it helped gain a better picture of the timeline of the outbreak throughout the year, while also providing more information on the later months of the year, which covered second waves, more lockdowns, challenges and travel restrictions, and the wider discourse surrounding availability and distribution of vaccines in a global perspective. For these reasons, this report analysed the differences and similarities between the two datasets.

Altmetric Extract

Altmetrics is a data science company that monitors where published research is mentioned online. For supplementary analysis, an extract was pulled from the Clarivate Altmetrics database (Altmetrics, 2021), to determine twitter demographics and interactions with popular research articles throughout 2020 using the query “Covid-19” or “coronavirus” published between the 1st January to the 31st December 2020.

Results

Following the thematic analysis, the following eight themes were produced:

Table 2. The COVID-19 Tweet Themes

Theme	Topics included
1. Discrimination	Content related to or directly viewed as discriminating content, including racism, xenophobia and stereotypes of cultures or groups of people.
2. Satire & Media	Memes; jokes surrounding COVID-19; references to media/pop culture
3. Cases and Prevention	Information on how COVID-19 spreads; fear surrounding the spread; prevalence and incidence of the virus; government/organisational announcements and advice; prevention methods (e.g. wearing masks, social distancing, quarantining etc).
4. Diagnostics and Therapeutics	Information on vaccine development and distribution; diagnostic tools and treatments for COVID-19; hospital treatments
5. Politics	Tweets on US-China relations; political discourse on COVID-19 and the government/politicians of a country
6. Travel	Travel bans/restrictions; flights; post travelling quarantining rules etc.
7. Other	Mental health, faith/religion, essential workers and healthcare workers
8. Random	Unrelated tweets.

An extra theme (other) was added once we started to analyse the data further, in order to fit in a very limited amount of tweets that did not fit into other categories. Examples of this included tweets surrounding mental health, faith/religion and essential workers. The section below presents the final results and themes from each dataset in detail. To begin, we present the results of the thematic analysis for dataset 1 (January 2020 vs April 2020), followed by dataset 2 (top tweets of the whole year).

Dataset 1 (Tweet Binder, 2020)

Discrimination

Of the top 55 posts in January, only two were selected for the theme of discrimination. While this seems to be a small number, both had very high engagement. One tweet read: *“When you eat bats and bamboo rats and s*** and call it a “Chinese delicacy”, why y’all be acting surprised*



when diseases like #coronavirus appear?”, while the other read *“A SARS-like #coronavirus is rapidly spreading in China and potentially abroad because some people in Wuhan were obsessed with eating wild animals. (If you read in Chinese you'll see the menu has a whole ZOO.) Not a teleologist but it does seem nature is taking its revenge.”*. As of February 2021, the former tweet has 10664 retweets and 11997 like; while the latter has 7890 retweets and 9726 likes. Out of the top 55 posts of April, there were 0 tweets that were selected for this theme.

Satire & Media

Of the top 55 posts in January, there were a total of 8 tweets that fell into this theme. All tweets in this theme involved satire/comedy in the format of creating or sharing ‘memes’- an expression of digital participatory culture, or made references to pop culture in the media (Norstrom et al 2020). One tweet involved a comparison between COVID-19 and other infectious disease outbreaks, which they stated occurred every 100 years, while another made reference to the similarity of this pandemic to the Korean movie “The Flu” (2013). Both tweets had a high engagement of likes and retweets. For April, there were a total of 9 tweets that fell into this theme. Of these, one expressed frustration over the COVID-19 lockdown using satire, which was beginning to become evident in many parts of the UK, Europe and the USA. Another tweet also similarly mentioned the lockdown, but expressed disappointment in people who were not following the rules and regulations set in place. One other tweet showed happy expressions towards Fox News being sued for their “spread of coronavirus lies”, while another used the hashtag #TogetherAtHome and mentioned the WHO in order to encourage users to join in on their virtual webtalks surrounding the virus and pandemic.

Cases & Prevention

This was the most popular theme of January 2020, with a total of 32 tweets falling into this theme. Tweets mainly discussed the rises of cases in China and in Wuhan specifically, while many others involved updates on the number of confirmed Covid-19 cases spreading to other countries. It was clear that discourse surrounding the number of cases became more apparent as this point in the general public, along with the media, as a range of twitter accounts were used to tweet about this theme. Prevention was also a very popular part of this theme, with several tweets telling users to wash their hands, stay home and discussing the effectiveness of face masks. The most popular tweet of the month with a total of 104,666 likes and 82,164 retweets, instructed users on how to wear a mask. The second most popular tweet informed people on the seriousness of the outbreak, letting people know “it’s not a joke, guys” while the third most popular tweet involved the symptoms of covid and how to prevent it.

As the spread of cases increased to the majority of the world by April 2020, this theme was no longer the most popular of the month. Surprisingly, only 15 tweets fell into this theme. The content of the tweets also changed considerably, mainly focusing on the encouragement of quarantining and social distancing, which could be seen in several European countries and throughout many states in the USA. Some tweets still contained the number of cases in the world and in countries such as the USA, while others spoke about personal experiences of COVID-19, such as individuals and/or their loved ones catching the virus or passing away. The



top tweets during this time were mainly from politicians, famous businesses and celebrities, and therefore had an overall higher engagement level. For example, 6 of the top tweets had over 90,000 likes, the most popular of which had 137,447 likes and 31,579 retweets and encouraged people to #stayathome.

Diagnostics & Therapeutics

Only two posts in January 2020 fell in this theme. Of these, one tweeted on the rapid building of hospitals for COVID-19 in China, while the other tweet was from a local resident in Wuhan letting users know of the current situation, while urging more help from the WHO. April 2020 saw an increase in this theme, with 5 posts falling in this category. Of these, all tweeted about the work of scientists and the vaccine trials for the virus.

Politics

There were only 4 tweets in January 2020 which fell into this theme. Of these, all discussed the Chinese government and their handling of the outbreak. The most popular tweet in this category was from Donald Trump, letting users know of his appreciation towards the Chinese government for trying to maintain the spread. The tweet had 22,592 retweets and 123,369 likes. By April 2020, tweets in this category increased rapidly, with a total of 24 tweets falling into this category, making it the most popular theme of April 2020. Tweets were mainly from various politicians, including Barack Obama, Donald Trump, Bernie Sanders, Hilarie Clinton, and famous journalists, such as Piers Morgan. As such, many tweets involved criticisms and opinions of how different governments and actors were handling the situation around the world. The most popular tweet, with 123,862 likes and 34,591 retweets was from Barack Obama tweeting about the level of misinformation surrounding the pandemic on social media, and what can be done about it.

Travel

Out of the top 55 tweets of January 2020, 3 tweets fell in the theme of travel. All these tweets criticised the lack of travel restrictions from China to Malaysia.

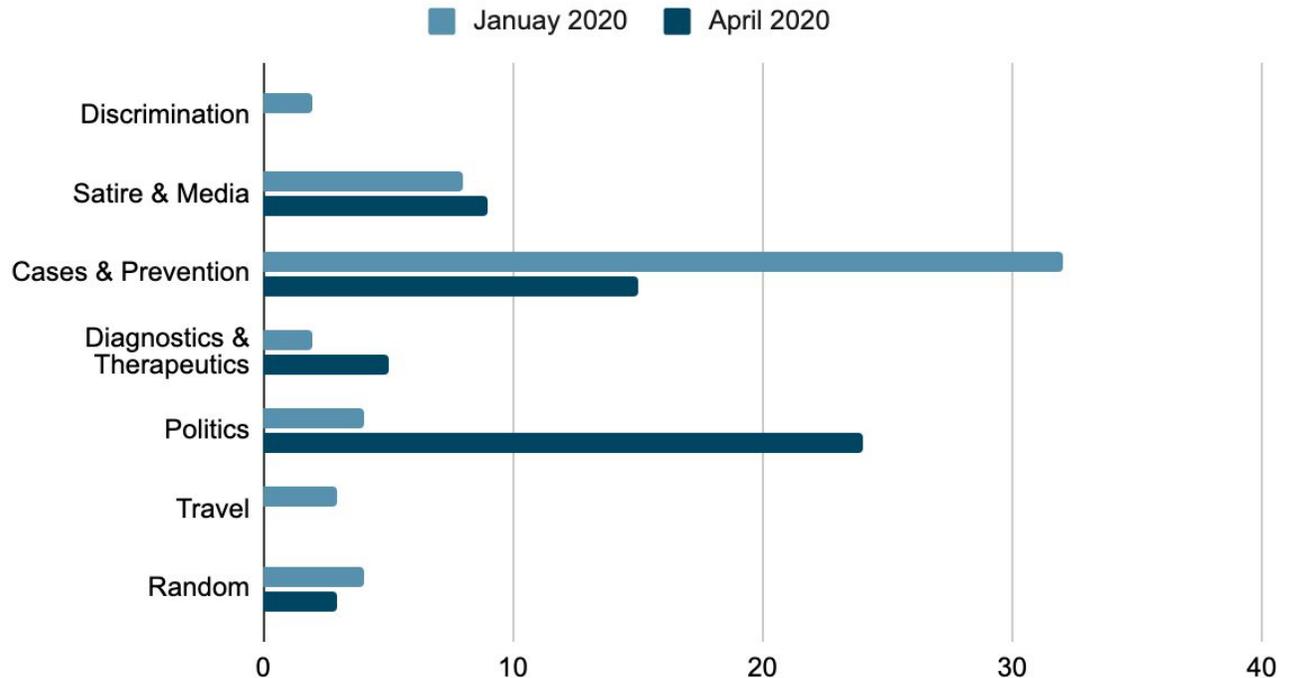
There were 0 tweets about travel in the top 55 tweets of April 2020.

Random

4 tweets from January 2020 and 3 from the month of April 2020 fell into this theme, marked as irrelevant to the topic of COVID-19.

Figure 1: most popular themes on Twitter in January 2020 vs April 2020 (Dataset 1)

Database 1 themes: Jan vs April



Dataset 2 (Firoj et al, 2021)

As opposed to the top 55 from the above dataset, this dataset looked at the top 100 tweets of 2020 as a whole, also from a global perspective. The theme “other” was added after analysing this dataset as we found that there were a number of topics (but with very few quantities) in Dataset 2, we did not find in Dataset 1. This included tweets related to mental health, key workers and faith/religion in relation to the pandemic. Dataset 2 could not provide us with engagement levels of likes and retweets, so this could not be commented on.

Discrimination

Like the previous dataset, only two tweets fell into this theme. However, unlike the previous dataset, both these tweets contained criticisms towards those who were calling the virus “the Chinese virus” instead of COVID-19. One tweet mentioned “Yes, it originated in China, but the technical term is COVID-19”. The other criticised how people were blaming China for the spread of the virus, stating that many other viruses and diseases have emerged from various countries in the West as well. It appears as though the top tweets relating to discrimination were therefore more anti-discriminatory.

Satire & Media

This theme was the most popular of the dataset, with a total of 37 tweets falling into this theme. The content of these tweets varied significantly, but were chosen as they related to comedic relief, “meme” culture, or to other popular culture. The tweets included topics such as the unrealistic expectation of the pandemic ending before the summer; missing pre-covid life; opinions on celebrities providing entertainment from home and the increase of use of social media and streaming platforms such as TikTok, Netflix and Disney+; and general content on life and hobbies throughout quarantine. 31 out of the 37 tweets contained “meme”/joke or sarcastic content, while the rest contained individual opinions on the pandemic.

Cases & Prevention

This theme had the second highest number of tweets, with a total of 25 out of the 100 tweets falling into this theme. Similar to satire & media, this theme also contained a range of topics, including deaths and cases in particular regions of the world (including news reports/articles covering cases/deaths); updates from the WHO (such as one announcement aimed at young people claiming that they are no invincible to this virus) and people urging others to follow government's rules and regulations, such as social distancing, wearing a mask and staying home. The top tweets in this dataset seemed to have more personal tweets such as people discussing their own or their relatives/friends/colleagues COVID-19 symptoms and experiences.

Diagnostics & Therapeutics

7 of the top 100 posts fell into this theme. Of these, four criticised the level of testing provided in certain regions when compared to countries such as Korea, Iceland and Germany. Others blamed the authorities for lack of testing and poor response to providing COVID-19 care, with one tweet letting people know of the negative effects of taking hydroxychloroquine and Azithromycin together for the treatment of COVID-19, without authorization from a doctor.

Politics

The number of tweets falling into this theme were 8, which is far less than Dataset 1. Of these 8 tweets, five blamed politicians in the USA for their response to the pandemic, especially aimed at Donald Trump. Others involved references to politicians trading stocks, voting against the COVID-19 bill, with one tweet mentioning the importance of understanding tenants who are unable to pay their landlords during this time, following the UK Prime Minister Boris Johnson's announcement on payment holidays for those who could not afford to pay rent.

Other

As mentioned previously, this theme was added when Dataset 2 was analysed and included any tweets surrounding mental health, faith/religion and key workers. There were a total of 11 tweets which fell in this theme. Of these tweets, 3 praised the work of key workers for their help during the pandemic, with one emphasising that we must not ever look down on “low-skilled” jobs again. Another tweet told users to ask future employers during job interviews what they did to protect their employees during the pandemic. There were also 3 tweets regarding religion/faith and 4 tweets surrounding mental health. The latter mainly focused on individuals

who had experienced mental health effects such as anxiety, depression or suicide, regarding the stresses of the pandemic. One also addressed the fact that we are now living in a mental health epidemic, particularly with the rise in mental health problems due to the COVID-19 pandemic.

Travel

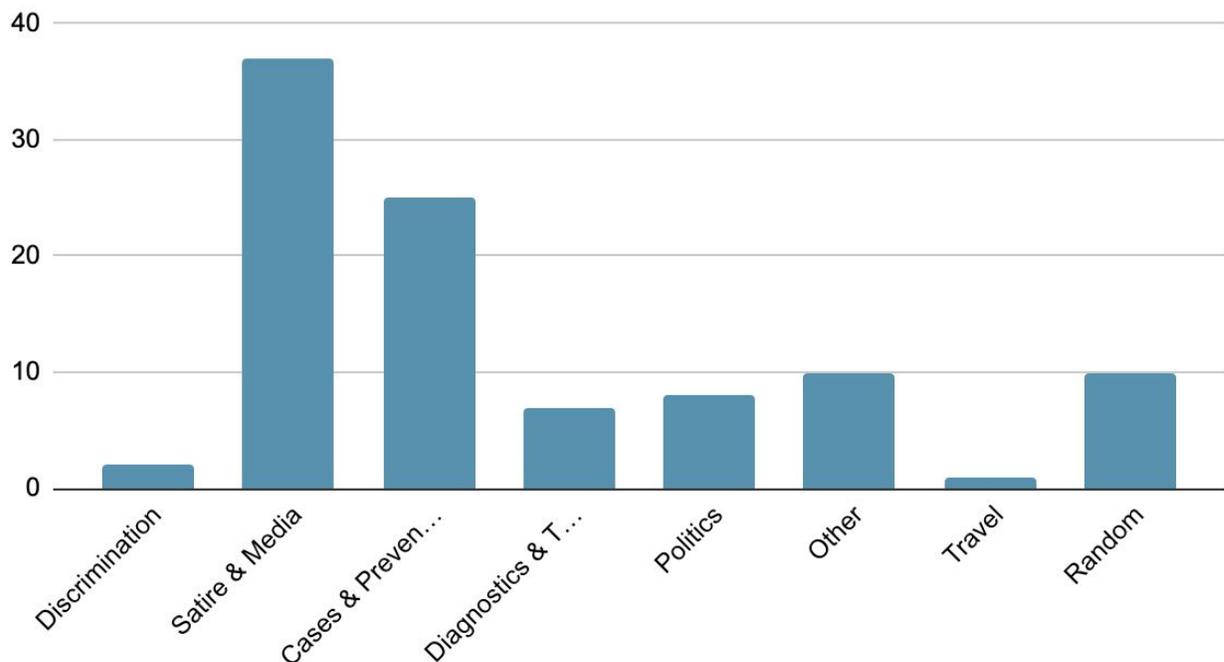
One tweet from the top 100 fell into this category. The tweet mentioned how the city of Miami in the US state of Florida were not considerate of the virus and blamed its residents for the rise of cases both within and outside of the state.

Random

10 tweets from the top 100 posts of the year fell into this theme, marked as irrelevant to the topic of COVID-19.

Figure 2: Most popular themes on Twitter throughout the year (dataset 2)

Top themes of 2020 (dataset 2)

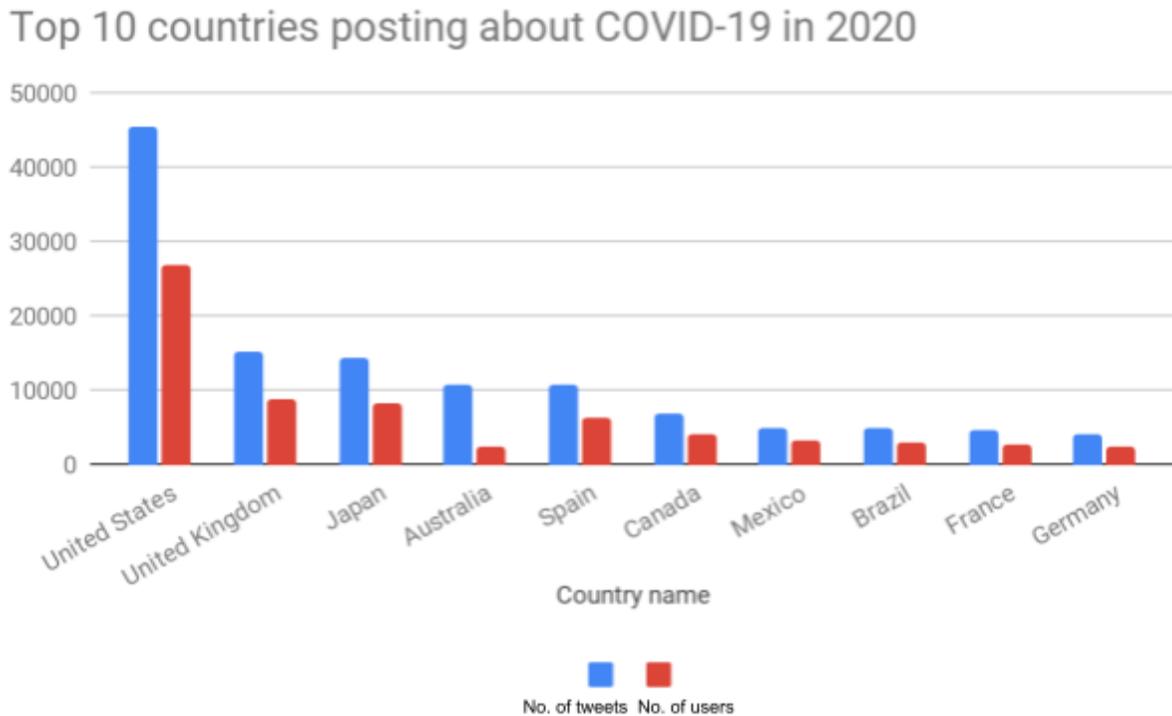


Altmetrics Results

From the Altmetrics extract, as expected, most of the social media discourse related to coronavirus was dominated by users in the global north, especially the US (>40,000 tweets) with other prominent inputs from two southern countries- Mexico and Brazil- see Figure 2. With the

assumption that most users in the US and UK tweet in English, this may mean that we managed to capture the top global tweets (despite the anglophone bias in our dataset choices).

Figure 3. Bar chart of twitter demographics (Altmetrics, 2021)



The top 10 most popular (via altmetric standards) research articles related to the pandemic investigate key clinical and epidemiological questions regarding the pandemic with only one paper focusing on wider sociological questions related to the lockdown (published in *The Lancet Child & Adolescent Health*). When looking into the social media interactions with these research articles, it's clear to see that tweets are the most widely used method to disseminate research to wider audiences, followed by news mentions. However, the articles were disseminated differently to their altmetric scores with Article 5 related to airborne transmission of COVID-19 being the most mentioned in news sources. The same disconnect is found when looking at other mentions of the top 10 articles; where Article 2,3 and 6 were popular on facebook, 2 and 5 (more perspective overviews of the pandemic) were most mentioned in blogs and articles 2,3 and 4 were the most significant in policy discussions- for article details, please see Appendix.

Discussion

The theme of 'Cases & Prevention' was common in both datasets, but the discourses varied considerably between each month (Tweetbinder, 2020) and across 2020 (Firoj et al, 2021). We can see that within Dataset 1, this theme was the most popular in January 2020 and mainly

consisted of tweets discussing the rise of COVID-19 cases in China. Tweets also covered the number of daily cases in other countries as COVID-19 continued to spread, along with prevention methods (e.g. through wearing face masks, hand washing etc.) and discourse surrounding the transmission methods of the virus, and the symptoms presented in an infected individual. While studies on COVID-19 in social media have shown that misinformation on the transmission of the virus has been highly evident (Cuello-Garcia et al, 2021), we found that the tweets within this theme (with the most engagement) did not carry any misinformation. Rather, they seemed to be reflective of the information and prevention methods given by scientists, governments and the World Health Organisation at the time. By April, the content of the most popular tweets seemed to focus on the encouragement of quarantining and social distancing, particularly as many countries began to encourage shielding or going into strict national lockdowns (BBC, 2020). While some tweets still contained information on the number of cases within different countries, most seemed to have shifted to messages from individuals' personal experiences regarding catching COVID-19 or deaths of loved ones. Overall, this suggests that social media was heavily used during this pandemic to enhance information sharing and knowledge to users, while also providing a platform for communicatory utility. This is similar to the findings of Whiting and Williams (2013), who identified ten uses and gratifications for using social media, three of which included the above.

Another key finding is that there were fortunately, less discriminatory tweets than expected. Other recent studies found high levels of racism and discrimination within different social media platforms over the past year. For example, Croucher et al (2020), found social media platforms in the USA were used as a means to either discriminate against Asian Americans or to fight against prejudice. An example of one of their findings included 72,000 Instagram posts with the hashtag #WuhanVirus and 10,000 other posts with the hashtag #KungFlu (Croucher et al, 2020., Macguire, 2020). Yet, we only found two tweets in January 2020 with both a high engagement and discriminatory language used, the other two most popular tweets found in Dataset 2 contained criticism towards those who were using the term "the Chinese Virus" and other discriminatory language. Suggesting that, while social media was still used to post Anti-Asian sentiments, there were also cases in which Twitter was used as a platform to fight against this prejudice. Although we expected more tweets to fall into this theme, given the existing evidence shown in other social media analysis', it appears as though Twitter was not a platform for very high engagement within this theme, as opposed to other social media platforms and news outlets which are more likely to contribute to discrimination and xenophobia, by using misleading and incorrect headlines such as "Chinese virus pandemonium" (Croucher et al., 2020, Wen et al., 2020). Other studies have also found that platforms such as Twitter are more likely to be used as a platform to promote social and racial activism in recent years, including for the Black Lives Matter movement and #SayHerName (Chavez-Dueñas and Adames, 2018). While this may be the case, it is important to take into consideration that although discriminatory tweets were not heavily linked to the top 55 or top 100 tweets analysed, this does not suggest that tweets with discriminatory language were inexistent during the duration of the pandemic.

Moving on, tweets related to ‘Satire & Media’ were consistently common and popular throughout 2020. Existing research also reported the rise in use of comedy and/or memes across different platforms during this time- in various settings, including Spanish speaking countries, Poland, Singapore and Malaysia (Norstrom et al., 2021, Flecha Ortiz et al., 2020, Abidin, 2020). Our findings suggest the possibility that many individuals used Twitter as a form of escapism during the global outbreak of COVID-19- a phenomenon supported by Whiting and Williams (2013). A commentary by Macdonald (2020), also offers insight into the use of memes during the pandemic as a form of collectively bringing differing experiences and perspectives “into a contingent, shifting, and effectively constitutes public sphere” during times of deep uncertainty. While this use of social media can undeniably help with escapism during a difficult time, it is also likely that the increase of use of memes and comedic content may increase misinformation towards a health crisis, which already has many unanswered questions (Cuello-Garcia et al., 2020).

Lastly, we found that politics was also significantly common. Many individuals used Twitter as a platform to express their political views and criticisms towards various politicians and how they handled the pandemic, particularly towards politicians/policies in the USA and UK. Social media platforms such as Twitter provide direct access to an unprecedented amount of content which can “impact the construction of social perceptions and the framing of narratives, policy making and political communication” (Cinelli et al., 2020). Furthermore, other studies have found that platforms such as Twitter are used by politicians to spread either “far-left” or “far-right” political ideologies, particularly in response to a global pandemic (Adolph et al., 2020). Gupta et al (2021), carried out a more in-depth analysis of COVID-19 tweets, from the end of January 2020 to the beginning of January 2021- where they found that topics related to trump, china and india were the most common, with 55% of tweets having negative sentiments and 59% expressing anger, fear or sadness. Another study by Jaworsky and Qiaoan (2020), found the platform was used by politicians to create a narrative of blame between the USA and China. That as the pandemic continued to escalate, politicians such as Donald Trump blamed the global pandemic on China, a factor which shows how unsustainable and dangerous using social media is, for the escalation of fake news. They conclude the importance of recognition of this ‘narrative battle’ between different politicians and acknowledgement of its “performative function in the public sphere, which is the first step toward mutual understanding and dialogue” (Jaworsky and Qiaoan., 2020).

Data collected from the Qatar Computing Research Institute (QCRI) (OCHA, 2021), agrees with our demographic findings, where it is typically the US and Europe, with the exception of some south American states, dominating the COVID-19 narrative on twitter. However, their findings also show India as a significant demographic of COVID-19 tweeters which was not reflected in our findings. Interestingly, like the QCRI, Gupta et al’s research (2021), also found a strong demographic influence from India. But also from Australia, Canada, Pakistan and parts of Africa (Nigeria, South Africa and Kenya).



Limitations and future research

Overall, this report provides a broad insight into the global narrative on Twitter related to COVID-19 throughout 2020, whilst analysing some of the key discourses that were prevalent. The research is supported by previous literature on the topic but was also hard to compare with previous literature as no thematic analysis on tweets has been done, thus far.

One key limitation is our lack of focus on specific regions of interest or priority during this pandemic. However, after discovering live data sets like the COVID-19 Data Explorer developed by the UN OCHA (United Nations Office for the Coordination of Humanitarian Affairs, 2021), there is definitely room to do more focussed research and analysis on how the pandemic is affecting the most vulnerable regions and people in the world.

As we were only using publicly available datasets in excel form rather than code, we had limited access to the plethora of COVID-19 twitter datasets online. The change from the top 55 tweets (Dataset 1) to top 100 tweets (Dataset 2) created some inconsistency in our analysis, especially as Dataset 2 didn't include information on the number of likes and/or retweets for each of the top posts for engagement analysis. Within our analysis, our final theme 'Other' was useful but also reductionist- future research could look into the varying topics within 'Other' as well. Furthermore, within this analysis we couldn't filter for specific locations of the tweeters so had to take a more broader, global perspective. Future research could look into a more mixed methods approach and also investigate the temporal trends, to understand shifting use of tweets over the months of the pandemic.

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Appendix

Table 3. The Top 10 Most Popular Research Articles related to COVID-19 throughout 2020

Article Number	Altmetric Attention Score	Title	Journal/Collection Title
1	13864	Outcomes of Cardiovascular Magnetic Resonance Imaging in Patients Recently Recovered From Coronavirus Disease 2019 (COVID-19)	JAMA Cardiology
2	11489	Characteristics of and Important Lessons From the Coronavirus Disease 2019 (COVID-19) Outbreak in China	JAMA: Journal of the American Medical Association
3	11283	Severe Outcomes Among Patients with Coronavirus Disease 2019 (COVID-19) — United States, February 12–March 16, 2020	MMWR: Morbidity & Mortality Weekly Report
4	9406	The Incubation Period of Coronavirus Disease 2019 (COVID-19) From Publicly Reported Confirmed Cases: Estimation and Application	Annals of Internal Medicine
5	9294	It Is Time to Address Airborne Transmission of Coronavirus Disease 2019 (COVID-19)	Clinical Infectious Diseases
6	9230	Targets of T Cell Responses to SARS-CoV-2 Coronavirus in Humans with COVID-19 Disease and Unexposed Individuals	Cell
7	9033	Age-Related Differences in Nasopharyngeal Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Levels in Patients With Mild to Moderate Coronavirus Disease 2019 (COVID-19)	JAMA Pediatrics
8	5394	School closure and management practices during coronavirus outbreaks including COVID-19: a rapid systematic review	The Lancet Child & Adolescent Health
9	4788	Estimating the asymptomatic proportion of coronavirus disease 2019 (COVID-19) cases on board the Diamond Princess cruise ship, Yokohama, Japan, 2020	Eurosurveillance

10	4025	Pharmacologic Treatments for Coronavirus Disease 2019 (COVID-19)	JAMA: Journal of the American Medical Association
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Figure 4. Pie Chart of the Top 10 Most Popular Research Articles related to COVID-19 throughout 2020

Most Popular Research Articles on COVID-19 in 2020

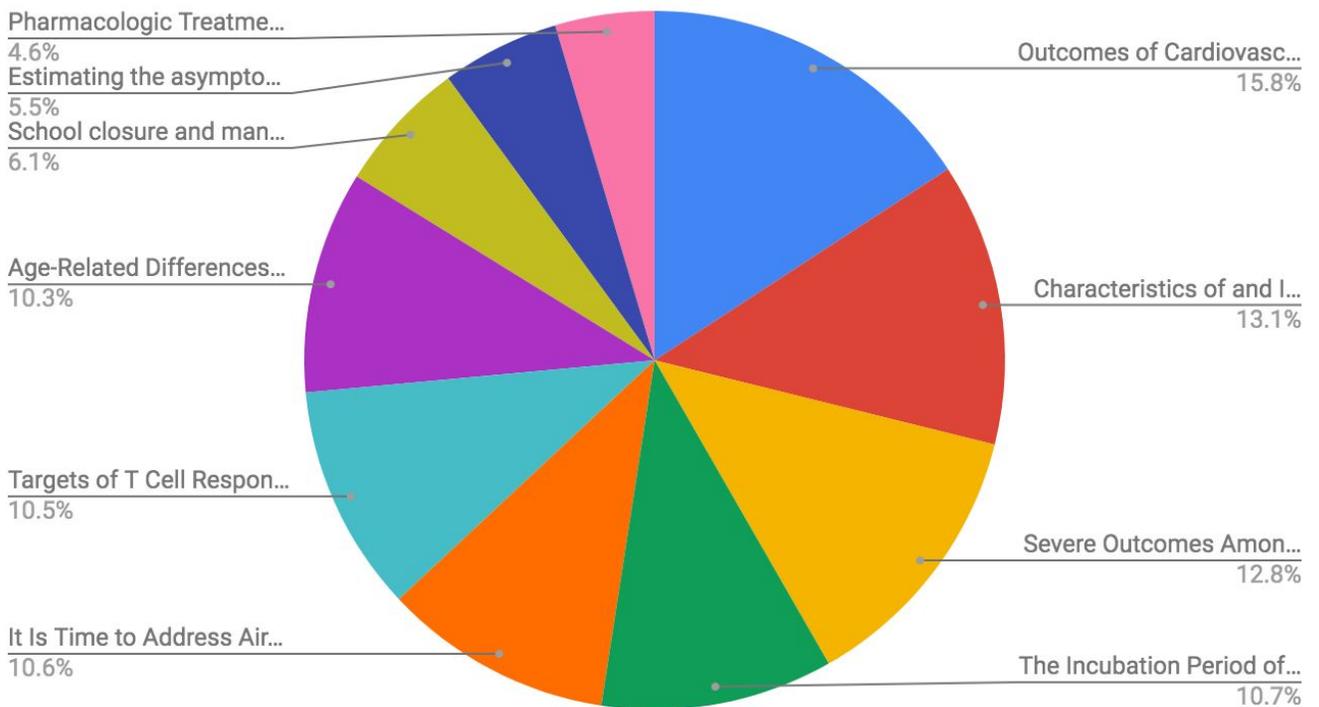


Figure 5. Twitter and News dissemination of the top 10 most popular articles related to COVID-19 throughout 2020

No. of Twitter and News mentions of the most popular research related to COVID-19 in 2020

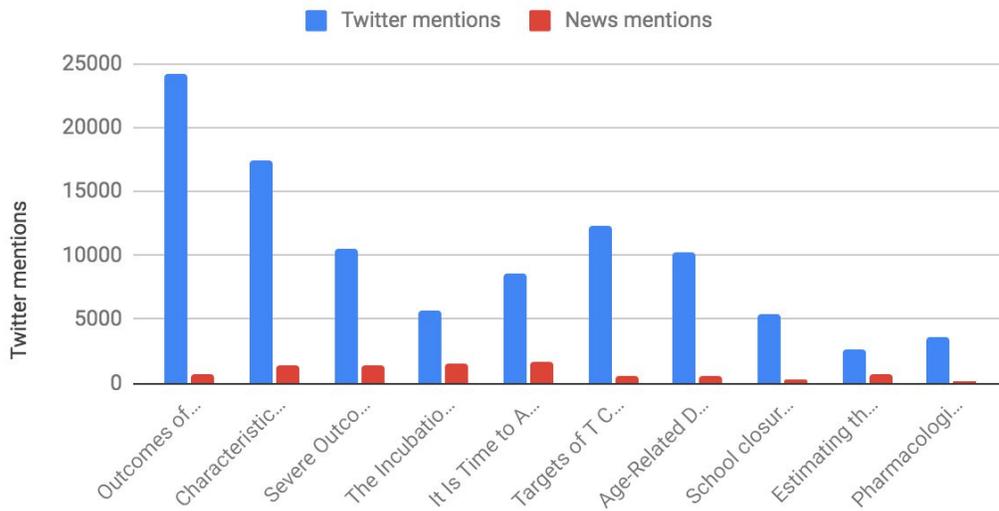
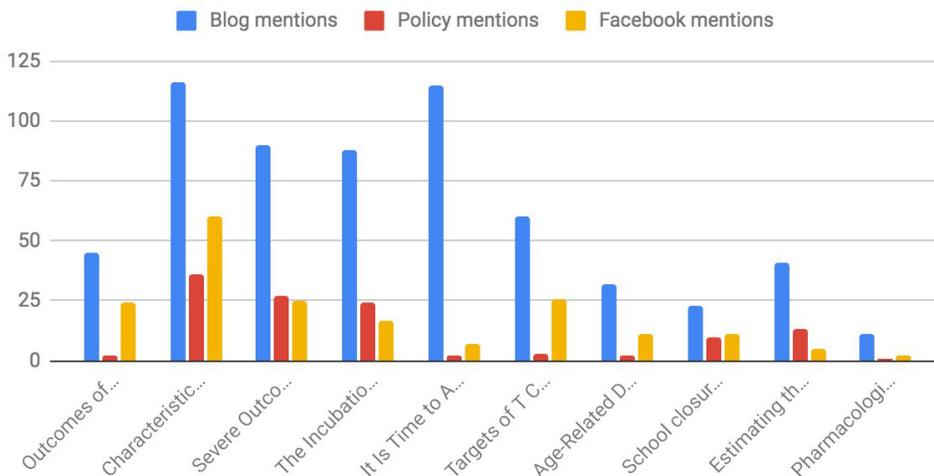


Figure 6. Other dissemination of the top 10 most popular articles related to COVID-19 throughout 2020

Other mentions of the most popular articles related to COVID-19 in 2020





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