






A qualitative review of social media sharing and the 2022 monkeypox outbreak: did early labelling help to curb misinformation or fuel the fire?

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ABSTRACT

Background. Misinformation, defined as a claim that is false or misleading, considers information that is both shared with the intention of causing harm, and information that is false with no ill intent. Early attempts to downplay the risk of monkeypox (mpox) by singling out men who have sex with men (MSM) may have had the ill effect of stigmatising this group in discussions online. The aim of this study was to evaluate themes present on Instagram related to the 2022 mpox outbreak under #monkeypox. Specifically, this study sought to determine if the pervasive narratives surrounding the coronavirus disease 2019 (COVID-19) pandemic, particularly related to government mistrust and conspiracy, were penetrating discussions about mpox. **Methods.** A total of 255 posts under #monkeypox (the top 85 posts per day, every 10 days in July 2022) were collected on Instagram. A content analysis approach, which seeks to quantify themes present, was utilised to evaluate themes present in posts under #monkeypox. **Results.** Contrary to previous research investigating public health misinformation online, the majority of posts under #monkeypox were categorised as accurate information (85.9%). Moreover, a surprising number of posts were classified as anti-misinformation (32.9%), whereby users actively worked to debunk false information being shared online related to mpox. **Conclusions.** We hypothesise that early labelling of the disease as one that strictly affects online MSM communities has resulted in the digital community coming together to fact-check and debunk misinformation under #monkeypox on Instagram.

Keywords: anti-misinformation, homophobia, misinformation, monkeypox, mpox, mythbusting, sexual health, social media.

Introduction

Misinformation, defined as a claim that is false or misleading, considers information that is both shared with the intention of causing harm, and information that is false with no ill intent.¹ The propagation and rapid increase of misinformation online resulted in the World Health Organization (WHO) declaring an ‘infodemic’, or (mis)information pandemic, in 2020.² The 2022 monkeypox (mpox) outbreak, alongside the ongoing coronavirus disease 2019 (COVID-19) pandemic, has resulted in renewed discussions surrounding the infodemic, and whether its definition should now consider misinformation related to other conditions or current events such as Zika virus, antivax sentiments, anti-Jewish rhetoric, or ongoing conflicts. The COVID-19 pandemic has fuelled online misinformation, leading to polarising views, the spread of inaccurate information, and harm to specific communities. The mpox outbreak was initially reported as a cluster of cases in the United Kingdom following travel to the African continent.³ Early attempts to downplay the risk of mpox by singling out men who have sex with men (MSM), with a focus on the condition as a sexually transmitted disease, may have had the ill effect of stigmatising this group. Indeed, the WHO was among the first to brand the disease as one that strictly affects MSM with many X (Twitter) users, both within and external to the MSM community, focusing on this aspect when discussing public health measures related to the outbreak.

Social media is a tool to share information and opinions and provides users with unrestricted access to wide range of sentiments and information, both true and untrue. The ability to share information with little restriction has resulted in an increase in misinformation shared in posts across several social media platforms.² While most social media companies have created algorithms to detect, flag, and delete these posts, users adopt ever-changing hashtags to share their opinion, making it possible to evade these algorithms and publish inaccurate content.⁴ While social media plays a key role in communication and voluntary connection online, it can also be used to share dangerous misinformation resulting in damaging actions – be it ignoring public health measures or in more extreme cases, damage to infrastructure or attacks against specific groups.⁵ For example, efforts to label COVID-19 as the ‘Asian Flu’ resulted in several racially motivated attacks on individuals from the Asian community.^{6,7}

The aim of this study was to evaluate themes present on Instagram related to the 2022 mpox outbreak under #monkeypox. Speciality, the aim was to determine if the pervasive narratives surrounding the COVID-19 pandemic, particularly related to government mistrust and conspiracy, were penetrating discussions about mpox. While misinformation is shared across all platforms, previous work has highlighted the pervasive presence of misinformation on Instagram, and an inability for the algorithm to flag and identify it.⁴ Understanding how misinformation spreads is key in developing tools and related interventions to stop the propagation of misinformation online. False information can undermine the work of public health and government officials, devalue their expertise and result in increased negative outcomes.⁸

Materials and methods

Data collection

It is estimated that Instagram users spend approximately 30 min per day on the platform and 25–30 s on each post,⁹ equivalent to ~65 posts viewed. Thus, data collection efforts focused on collecting the top 85 (unique) posts under the hashtag (#monkeypox) every 10 days, from 4 July to 24 July 2022 (total number of posts collected, $n = 255$). Data were collected using a new account to limit bias from the platform’s algorithm, and this account was not accessed by the research team outside of data collection days (4 July, 14 July, 24 July). Screen captures were reviewed and basic information was recorded for each post, including the caption, hashtags, and number of views, likes, and comments. On Instagram, the ranking of a post is based on engagement (likes and comments), the popularity of the hashtag overall, and how quickly a given post received its engagement.¹⁰ Utilised in previous content analysis of misinformation on social media, this method allows for an evaluation of narrative

being shared online versus simple engagement or usage metrics.^{1,2}

Content analysis and coding

Content analysis allows for both description and interpretation of a dataset from both a deductive and inductive lens.^{1,2} In this case, the aim was to evaluate whether misinformation related to COVID-19, specifically conspiracy and government mistrust, had permeated social media posts related to mpox. Content analysis not only useful in the interpretation of themes from codes but also provides the capacity to quantify data.¹¹ One particular concern regarding the use of this method is the possibility of coders missing context or deriving themes strictly based on the frequency of codes.¹ Given the requirement for rigorous data familiarisation under this method, themes were generated by the two coders in a deductive manner and guided by previous work in the field of misinformation.⁴ Following coding themes were derived from not only the quantity of codes in the dataset, but also based on the subjective importance of each aspect. In our case, accurate information was defined as factual information upon inspection by coders (who are graduate students in health-related programs) with comparison between coders important in making the determination. Following initial analysis, themes were reviewed by co-authors and further refined to ensure accuracy in data representation and contextualised within the current body of knowledge on misinformation. In the spirit of reflexivity, the team recognises their position as heteronormative, educated and primarily white researchers, and the impact this position may have on the interpretation of data during the coding process.

The codebook was generated prior to analysis and updated based on themes that were not anticipated *a priori*. Most themes/nodes referenced the overarching themes highlighted by previous research on misinformation and current dialogues on Twitter observed by the research team.⁴ Codes were assigned to each post based on both the visual content, and the caption, including hashtags, attributed to the post. There was no limit on the number of codes that could be assigned to any individual post. While coding was completed independently by two coders, any discrepancies were resolved between the coders via discussion surrounding coding choices and interpretation of post content. Outstanding discrepancies were resolved by a third coder, if necessary.

Results

A total of 255 posts ($n = 255$) were collected under #monkeypox from 4 July to 24 July 2022.

Most content posted on Instagram under #monkeypox fell under a broad category of accurate information (~86% of posts, $n = 219$), with a small number of posts classified as satire (~8.6% of posts, $n = 22$), general mistrust (~17.6%

of posts, $n = 45$) or conspiracies ($\sim 2.4\%$ of posts, $n = 6$) (Table 1, Fig. 1). Of the posts categorised as representing accurate information, the majority were related to either news coverage (68.2%, $n = 174$) or non-governmental organisation (NGO)/government releases (54.9%, $n = 140$). An example of a post classified as accurate information is a news release by WPXI, a Pittsburgh media outlet with the following caption (Post 4, 4 July 2023):

BREAKING: The first case of monkeypox in pittsburgh has been reported. Details in-app and online #localnews #pittsburgh #pittsburghnews #monkeypox #monkeypox-pittsburgh #channel11

Conversely posts classified as anti-misinformation include anecdotes from individuals infected with mpox sharing their

Table 1. Number of posts coded for each overarching theme and sub-nodes.

Themes and sub-nodes	Number of posts (n)	Percentage of posts (%)
Includes link in bio	122	47.8
Accurate information		
News coverage	174	68.2
Non-governmental organisation/ government release	140	54.9
Infographics	29	11.4
Personal stories	22	8.6
Satirical messaging		
Racist images	1	0.4
'Memeing' ^A of issue	21	8.2
General mistrust		
Government lies	15	5.9
Media lies	11	4.3
Do your own research	5	2.0
Hoax	8	3.1
The resistance	6	2.4
Anti-misinformation		
Calling out misinformation	19	7.5
Misinformation prevention	78	30.6
Unrelated		
Opportunistic hashtagging	6	2.4
Conspiracies		
Human experimentation	4	1.6
Race war	1	0.4
New world order	1	0.4

In some cases, posts were coded for multiple themes when applicable. A total of 255 posts were collected under #monkeypox during the collection period ($n = 255$).

^AMemeing refers to the representation of content in a comical or humorous way, often related to pop culture.

stories and experience dealing with infection. For example, one user detailed their daily experience with monkeypox, on the second day of collection, with the following caption (Post 60, 14 July 2022):

My experience with monkeypox – Day 12...
#monkeypoxvirus #monkeypoxoutbreak #monkeypox
#monkeypoxnyc #monkeypoxlesion #instagay #nycgay
#nycgays #monkeypoxvaccine #healthynewyork

Of the posts that were not labelled as accurate information, 7.8% of posts ($n = 20$) were related to general mistrust (government lies, media lies, do your own research, hoax, or the resistant), and 2.4% of posts ($n = 6$) were labelled as conspiracy (human experimentation, race war or new world order). An example of a post classified as general mistrust includes the following caption (Post 81, 24 July 2023):

BS Train is operating at full speed #monkeypox
#pandemiclife #preppers

A large number of posts ($n = 97$) fell under the theme of anti-misinformation, as their messaging shared factual information targeted towards inflammatory narratives seen on other social media platforms related to the mpox outbreak (for example, posts debunking the notion of mpox being a sexually transmitted disease among MSM following the WHO's labelling as such). A total of 122 ($n = 122$) posts included a mention of additional information available on an external website or urged users to follow the 'link in bio'. Information shared via these links was not fact-checked and no conclusions can be drawn regarding the accuracy of information external to Instagram.

As expected, the most common hashtag for collected posts was #monkeypox; however, only 85.88% of posts included this hashtag, with several posts appearing under the hashtag without the hashtag actually being present in the caption.¹² As outlined in Table 2 the majority of additional hashtags, by frequency, were related to health topics, with the third most common theme present across hashtags related to LGBTQIA2S+ communities (Fig. 2).

There was limited co-branding of mpox content with COVID-19 rhetoric, with only 6.3% ($n = 16$) of posts meeting the criteria. The majority of content posted under #monkeypox was related solely to the disease, 98.4%, with little to no mention of other conditions or current affairs ($n = 251$).

Discussion

Themes

Contrary to previous research utilising qualitative analysis to investigate public health misinformation online, the majority of posts under #monkeypox were categorised as accurate

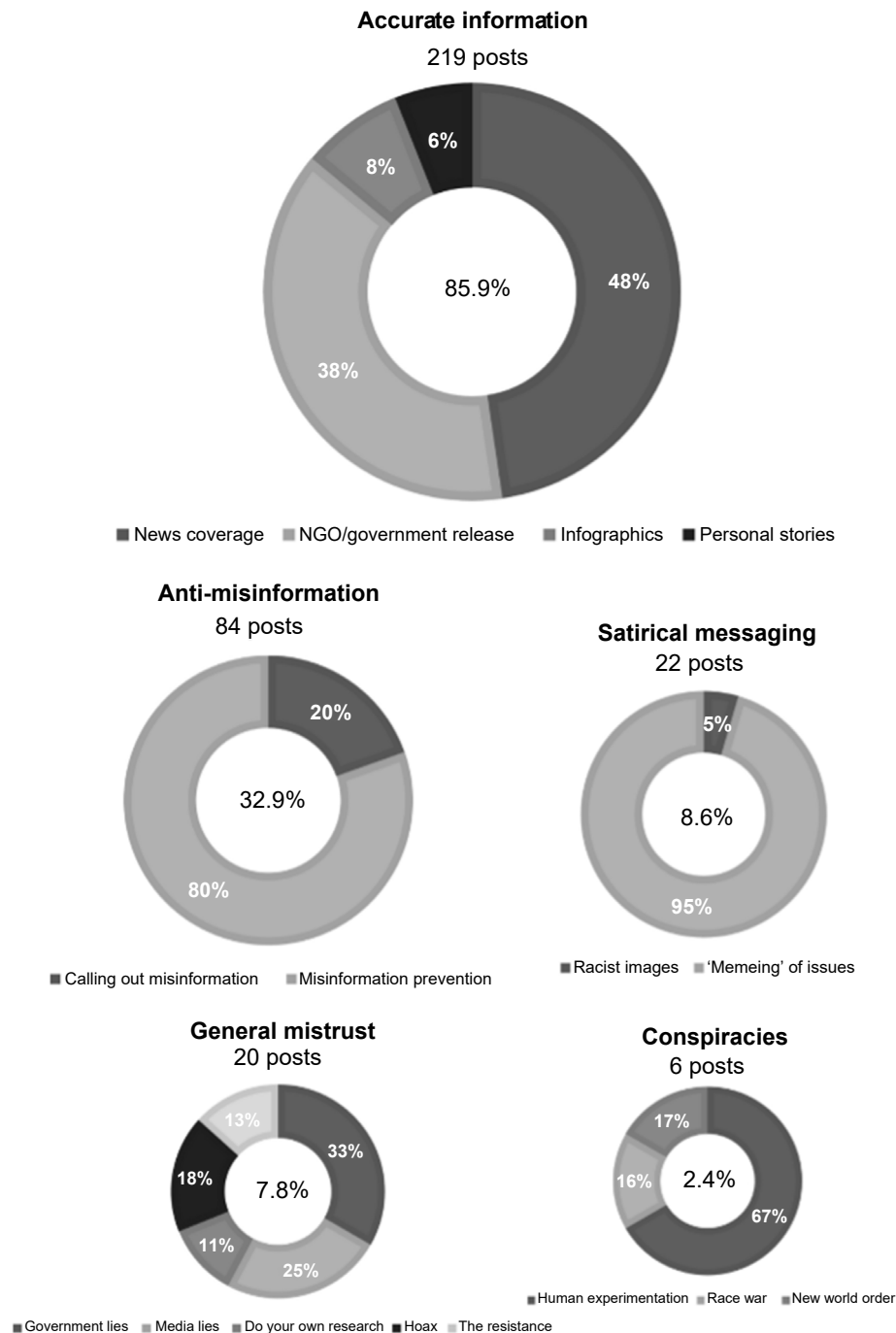


Fig. 1. Breakdown of broad themes by sub-themes and post count. Not shown: 'unrelated', which accounts for six posts (2.4%).

information (85.9%) or anti-misinformation (32.9%), with a small number ($n = 26$) classified as misinformation (i.e. conspiracy, or general mistrust). Accurate information is defined as factual information and is assigned this code upon inspection by coders, with coders utilising their existing knowledge of health topics to make this determination. While the lack of misinformation related to the 2022 mpox outbreak present on Instagram may be indicative of the

algorithm's effectiveness in detecting misinformation, we wonder if instead, users have become more adept at masking misinformation online, or if early branding of the condition as one primarily affecting MSM impacted the way information was shared. There was confusion online related to the populations affected by mpox following the branding of the disease as one primarily impacting members of the LGBT community and MSM at the outset of the outbreak.¹³ Existing

Table 2. Frequency of the top 10 hashtags for posts collected under #monkeypox on Instagram.

Hashtag	Frequency	Percentage of posts (%)
#monkeypox	219	85.9
#cdc	32	12.6
#health	29	11.4
#monkeypoxvirus	27	10.6
#plague	17	6.7
#pestilence	16	6.3
#virus	16	6.3
#science	12	4.7
#lgbtq	11	4.3
#endtimes	11	4.3
#publichealth	11	4.3

Note: the percentage of posts with #monkeypox does not equal 100% due to an algorithm quirk where posts with similar or relevant content/captions are sorted under a specific hashtag. For example, a post with the word 'monkeypox' in the caption may appear under #monkeypox due to similarity deemed by the app's algorithm.

research shows that mpox does not selectively infect MSM, nor is it entirely sexually transmitted, and the labelling as such by the WHO and other organisations online may have led to a desire to correct emerging information on social media. Compared to the COVID-19 pandemic, the mpox outbreak occurred on a smaller geographical scale and did not impact all individuals equally, with discussions focused primarily on those who were most at risk. We hypothesise that misinformation related to mpox was less prevalent, when compared to the COVID-19 pandemic, as the disease impacted a much smaller group of individuals and was not blown out of proportion online.

Given the high percentage of posts categorised as anti-misinformation, we hypothesise that early branding of mpox as a disease related to MSM may have been key to the unexpected presence of accurate and anti-misinformation

posts. One common explanation for the sharing of misinformation is the propensity for individuals to engage with information that validates their point of view or ideals. The desire to validate one's position is an attempt to gain control over often uncontrollable situations, and in some cases, place blame on a specific group of people.¹⁴ For example, early discussions about mpox on social platforms such as Twitter, and in media more broadly, labelled the condition as a disease impacting MSM with the WHO still offering public health advice primarily to gay, bisexual, or other MSM on their website.¹⁵ Perhaps this sharing led to increased pushback against this inaccurate portrayal resulting in more posts combating this narrative online. Comparatively, falsehoods related to COVID-19 were typically pedalled further on social media contributing to further misinformation spread.⁴ Hashtags related to LGBTQIA2S+ groups, particularly gay men, were the third most common theme among hashtags (Fig. 2), with the majority of posts in this realm sharing personal stories, or mythbusting stereotypes about the disease whereby users self-disclosed their membership in the LGBTQIA2S+ community.

While 85.9% ($n = 219$) posts were labelled as ‘accurate information’, many included mentions of a ‘link in bio’ (47.8%, $n = 122$) pointing users to visit their site external to Instagram. Since these websites are external to Instagram’s platform, they were excluded from the coding analysis. However, it is important to note that this information could be false, inaccurate or conflict with the information posted on Instagram. Beyond this, some posts also included conspiracy-related hashtags in their caption. In these cases, we wonder if this intentional co-branding of anti-misinformation under such hashtags is combating misinformation, or instead driving more traffic to conspiracy, suggesting the need to investigate this aspect further. While there is a substantial body of knowledge surrounding the amplification of misinformation and its impacts on risk communication using the social amplification of risk framework, this finding presents a unique opportunity to investigate amplification from this lens.^{16,17}



Fig. 2 Word cloud of the most common hashtags ($n = 50$) for posts collected under #monkeypox on Instagram.

An important consideration when conducting qualitative analysis on social media content is understanding, and remaining aware of context clues. While some content posted under a specific hashtag may not seem relevant to the topic, understanding current events proves important to understanding this manifestation. For example, on the surface, posts about the war on Ukraine appearing under #monkeypox may appear random; however, in understanding context clues, and the way in which posts manifest under a specific hashtag, we can explain their presence.

Implications

Overall, nearly 90% of posts under #monkeypox on Instagram were categorised as accurate information or anti-misinformation, perhaps signalling a shift towards an algorithm that identifies and hides misinformation, or an increased desire for factual information sharing online. Perhaps, early labelling of the disease online resulted in the digital community coming together to fact-check and debunk misinformation online. Nonetheless, the absence of misinformation under this hashtag remains a shining star in a digital world crowded with fake news and conspiracy. There will never be complete consensus online regarding any specific event, condition, or opinion; however, the ability of algorithms and users alike to stamp out misinformation and hate, while sharing accurate information is an important achievement.

While the majority of posts (86%, $n = 219$) evaluated represented either accurate information or anti-misinformation, the early rhetoric of mpox being a sexually transmitted disease among MSM, and the downplay of its risk to those outside of this community, may possibly have been damaging to these groups regardless of posts combating misinformation.^{6,18} Even though we understand that the early stages of an outbreak may bring uncertainty due to a lack of scientific evidence, there is an existing body of knowledge outlining the populations at risk for mpox infection.^{18,19} As such, even in the face of uncertainty, the downplaying of risk, by saying something primarily affects a specific community, is a dangerous way for government bodies and jurisdictions to share public health information. Misinformation has the capacity to further stigmatise minority groups when inflammatory narratives are associated with the emergence of disease,⁶ as in this case. The COVID-19 pandemic highlighted how discrimination emerges following the co-branding of public health messaging with a specific group. For example, labelling COVID-19 as the 'Asian Flu' resulted in nearly 1400 acts of discrimination against Asian-Americans in March/April 2020.⁶ Misinformation, regardless of the intent, can have damaging consequences on groups, government and infrastructure.⁵ Prejudicial responses to specific groups, exacerbated by misinformation, can lead to micro-aggressions, discrimination and in some cases, violence.⁵ The branding of mpox as a disease transmitted strictly between MSM creates

a narrative that may expose this already at-risk group to additional discrimination and homophobia.²⁰

Limitations

Due to the high number of posts that included links, it was difficult to fully assess whether misinformation is still shared under the guise of factual information. It is recommended that future analysis investigate links when they are promoted through profiles and captions to ensure the content is consistent. While it may pose challenges, it would be beneficial for social media websites, such as Instagram, to fact-check promoted links (to better control the dissemination of misinformation online). Moreover, while data was collected on a new account, there exists the possibility that algorithmic bias may have occurred as the account interacted and solely viewed posts under this hashtag. While coders may have deemed posts as factual, there exists the possibility that personal bias may have impacted this determination. Reflexivity is key to understanding these biases, and the team recognises their privilege as primarily white, heteronormative researchers.

This study maintained a similar sample size to our previous social media studies (~100 posts).⁴ However, since the timing of data collection was closer to the declaration of a public health emergency, a longer sample period would be more representative to public perception of emerging diseases. Furthermore, although mpox trends in Canada peaked during the data collection in mid-July 2022, there were still a similar number of cases in the following month.^{3,19,21,22} A longer study period would be beneficial to monitor the public's perception of mpox as public health agencies provide updates and cases continue to decline. While not likely to substantially alter the study findings, there exists the possibility that posts were reordered during data collection leading to some posts not being captured in our sample (i.e. a post may have been ranked #99 on Instagram at the start of data collection on any given day and fall to #102 over the course of the ~1 h needed to screenshot the top 100 posts).

Conclusion

Our findings demonstrate a potential improvement in misinformation prevention for users of the Instagram platform during initial public conversation on emerging pandemics. However, the risk of being exposed to misinformation content may remain through the sharing of links outside of the platform. Future research should revisit or replicate this study and its methods to assess for changes, and new trends in the sharing of misinformation online. The flagging and removal of misinformation from social media platforms is vital in ensuring adherence to health guidance. This is especially important in the case of already stigmatised LGBTQIA2S+ groups who may experience further stigma as a result of misinformation spread online. Using knowledge

of the trends and spread of misinformation through social media can assist in steering the public towards reliable information and myth busting health information before it leads to poor outcomes.

Supplementary material

Supplementary material is available [online](#).

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Data availability. Access to collected data ($n = 255$) of Instagram posts under #monkeypox available upon request.

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