


## Use of WeChat to gratify information needs of the Chinese community in Portugal during the COVID-19 outbreak

Cheng Cheng\*, Rita Espanha\*\*

\*  PhD candidate, Iscte-University Institute of Lisbon (ccggh@iscte-iul.pt)

\*\*  Qualified Assistant Professor, Iscte-University Institute of Lisbon (rita.espanha@iscte-iul.pt)

### Abstract

This paper seeks to characterize the main themes of COVID-19-related posts delivered by WeChat official accounts targeting Portuguese news and explore their subscribers' information needs and preferences. Furthermore, the current study set out to evaluate the influence of the coronavirus situation in Portugal on the number of posts, view frequency and total engagement on the WeChat platform. Following the selection of COVID-19-related posts published in 2021 by four official accounts targeting Portuguese news, Chi-square tests were conducted to quantitatively describe the differences between the four developmental stages of the COVID-19 pandemic in Portugal. Negative binomial regression was employed to establish an association between categorical variables and count data. Regression analysis was used to explore the relationship between COVID-19 infection cases in Portugal and the metrics of selected posts. A total of 3292 COVID-19-related posts remained. The posts regarding the latest epidemic situation in Portugal, COVID-19 vaccination and the economic news were more prevalent. However, the predominant posts were not consistent with followers' information demands, and the most in-demand information did not generate more engagement. In addition, thematic categories were found to be significantly associated with view frequency and total engagement. Furthermore, a significant difference in thematic categories was identified among the four developmental stages, which in turn was related to the overall engagement of posts. The COVID-19 official case counts in Portugal are predictive of post frequency, view frequency and total engagement. The results of this study support the view that social media provided diverse information sources for the Chinese community during the ongoing COVID-19 pandemic. However, it is evidently clear from the findings that communicators have to leverage the characteristics of social media not only for delivering real-time news but also to gratify public information needs and attract more followers.

Keywords: WeChat official accounts, information needs, COVID-19 pandemic dynamics, the Chinese community in Portugal

## Introduction

From when the novel coronavirus (COVID-19) was declared as a global public health emergency of international concern by the World Health Organization in 2020, until January 2022, there have been approximately 1.91 million confirmed cases of COVID-19 with more than nineteen thousand deaths in Portugal (WHO, 2022). In response to the pandemic, the Council of Ministers enacted the renewal of the state of emergency several times in Portugal. During the COVID-19 crisis, the main challenge faced by health authorities has been delivering effective health promotion campaigns to migrants and reducing their vulnerability to infection (Liem et al., 2020). As one of the largest immigrant groups in Portugal, in 2019, there were 27,839 Chinese migrants officially registered, and over 6,500 Chinese students studied in Portugal (Rocha-Trindade, 2020). In this context, one of the most significant current discussions in health communication is the provisions and requirements of COVID-19-related information via digital media among immigrant groups worldwide.

Coupled with the remarkable growth of COVID-19 cases all over the globe, the general public engaged with more digital content than ever to obtain real-time news and updated policies from health stakeholders (Wu et al., 2020; Wong et al., 2021). In particular, due to the absence of timely pandemic information in their native language, the migrants came to rely more heavily on the internet for subscribing to diverse news sources (Liem et al., 2021). In this context, it has been conclusively shown that social media is rapidly becoming a pivotal communication tool for conveying a continuous stream of information and improving epidemic prevention, given its real-time and multimedia nature.

As a consequence of the pandemic, several studies began to emerge linking the increased usage of social media not only among the general public but also among government, health agencies, vulnerable groups, and medical professionals, that focused on user-generated information characteristics in quantity, quality and content, users' engagement, health awareness, infodemic, public health outcomes and more (Cuello-Garcia et al., 2020; Padeiro et al., 2021; Tsao et al., 2021). On the one hand, several recent studies have attempted to characterize the predominant themes disseminated among social media users in order to capture heated discussions and monitor the trends of public opinions (e.g., [Chipidza et al., 2021](#); [Han et al., 2020](#)). In this regard, results from thematic analysis of social media posts demonstrated that the most common topics include containment measures, disease situation, vaccinations, economy, and politics. On the other hand, the research to date has been designed to evaluate the information behaviors of social media users under the context of COVID-19. As noted in previous studies, information consumers not only receive useful information through purposefully seeking and unintentionally scanning, but they also interact with online content, which is known as audience engagement (Broersma, 2019; Zhao & Zhang, 2017). In literature, social media engagement is typically manifested through three forms: a) the lowest form: reactions such as following and liking; b) the medium form: sharing and c) the highest form: commenting (Isip-Tan et al., 2020; Ma et al., 2020). From this perspective, all three forms can indicate the extent of public involvements in social media and reflect the users' preference and appreciation for the messages. Besides, existing literature has pointed out that view frequency can reflect which specific content users devoted their time to and how widely the topic was disseminated, thus showing users' demand or interest in a certain content (Park et al., 2016; Xi et al., 2021). Taken together, social media engagement has been

regarded as a crucial indicator for monitoring the users' information needs and also has the reference value for designing health campaigns during this ongoing pandemic.

As the usage of WeChat in China has proliferated in recent years, the total number of monthly active users reached over 1.26 billion in 2021, including over 70 million overseas users. WeChat has been described as a social interaction application with functions similar to WhatsApp, and WeChat official accounts are the Chinese equivalent of Facebook (Carvajal-Miranda et al., 2020). Along with the rise in popularity of WeChat in China, WeChat official accounts provide unprecedented opportunities for individuals, businesses, and organizations they can create an official account to send multimedia posts or notifications to their followers (Guo et al., 2017). Thus far, several studies have reported that Chinese people living overseas were more frequently using WeChat than Facebook, which obviously influences their psychological well-being (Pang, 2018; Xie et al., 2017). Given its dissemination capacity, the significant amount of COVID-19 pandemic information delivered through WeChat has affected how Chinese people perceive and cope with this public health crisis (Chen et al., 2020; Fan et al., 2021). So far, however, there is a general paucity of studies focusing specifically on information dissemination, information needs, and personal preferences during the routine use of WeChat official accounts among Chinese immigrants in Portugal under the context of COVID-19. For the above reasons, this empirical research seeks to remedy the research questions about the role of WeChat official accounts in conveying pandemic information to Chinese immigrants in Portugal during the COVID-19 outbreak, focusing on information provision and followers' needs, preferences, and engagement. In summary, there are four primary aims of this study as follows:

- a) Identify the COVID-19-relevant posts more frequently delivered to Chinese immigrants in Portugal during the period under investigation.
- b) Examine the association of thematic category with view frequency and total engagement.
- c) Quantitatively describe the differences in COVID-19 posts across the developmental phases of the COVID-19 pandemic in Portugal.
- d) Determine the correlation between COVID-19 official case counts and the number of posts, view frequency, and total engagement.

## **Methods**

### *Sample selection*

A pilot study was conducted to determine which official accounts targeting Portuguese news are more frequently used among the Chinese community in Portugal. Among 129 participants, 88.4% obtained COVID-19-related information about Portugal through WeChat official accounts, including PUHUA NEWS (88.4%), RUA DA PALMA (62.8%), EMBASSY-PT (58.1%), JOURNAL PUXIN (51.2%) and PORTUGAL NEWS (11.6%). These results are consistent with their New Rank Index (NRI) ranking, calculated as the average of several metrics for evaluating the quality and activity of WeChat official accounts (Han et al., 2016). Although there is no NRI of EMBASSY-PT yet, as it was only registered in April 2021, we still took it into account because it is the only WeChat official account targeting Portuguese news created by the Chinese government. Hence, four official accounts targeting Portuguese news were selected in this study (Table 1).

Table 1: Background information of four official accounts

Creator	Official accounts	Active followers	New Index	Creation date
Individual	JOURNAL PUXIN	21,405	613.4	2016-06-01
	RUA DA PALMA	24,928	675.0	2019-07-09
Print media Chinese Embassy in Portugal	PUHUA NEWS	47,117	688.4	2015-03-05
	EMBASSY-PT	-	-	2021-04-05

Source: Author created

#### *Data collection and data cleaning*

The retrieval of data from the four official accounts was achieved using Python programming scripts during the study timeframe, encompassing the period of December 31, 2020, until January 31, 2022. A total of 6,808 posts were yielded from JOURNAL PUXIN ( $n=1085$ , 15.9%), RUA DA PALMA ( $n=2363$ , 34.7%), PUHUA NEWS ( $n=1640$ , 46.6%) and EMBASSY-PT ( $n=194$ , 2.8%). After filtering the data, 3,292 COVID-19-related posts remained, accounting for 48.4% of the total posts. During the period under study, there was an average of 8.31 COVID-19-related posts delivered by the four official accounts per day. As mentioned above, engagement on an individual level can be measured by several metrics, such as view frequency, comment frequency, the number of likes and shares, click-through rates, and time spent (Broersma, 2019). Therefore, three index numbers shown at the end of each post were recorded, indicating view frequency, comment frequency, and likes frequency (Ma et al., 2020). To facilitate the analysis, we summed up the number of comments and likes per post to get a single metric, called "total engagement," that can reflect all involvement with each post (Edeny et al., 2018). Ethical approval was not required because both case counts and posts disseminated via WeChat official accounts were publicly available.

For this research, we divided the period under investigation into four stages in accordance with the evolution of COVID-19 infections in Portugal as follows: a) Stage 1: January 1, 2021, to May 29, 2021: the State of Emergency; b) Stage 2: May 30, 2021, to September 30, 2021: the State of Calamity; c) Stage 3: October 1, 2021, to November 30, 2021: the State of Alert and d) Stage 4: December 1, 2021, to January 30, 2022: the State of Emergency.

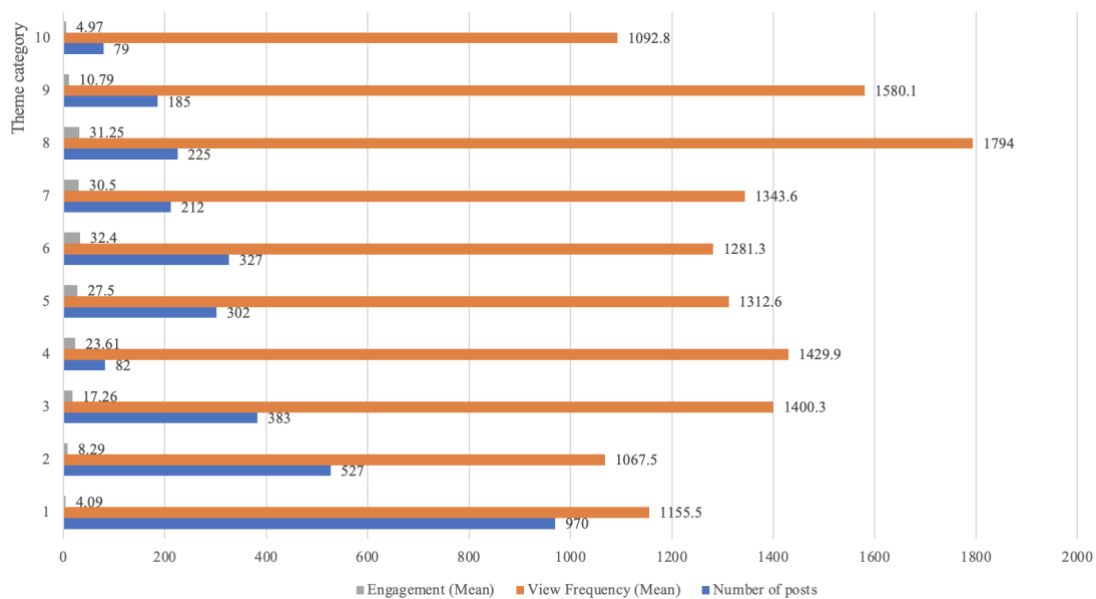
#### *Data analysis*

Firstly, using inductive coding approaches, content analysis was chosen to identify similar posts that fit within common themes. Descriptive analysis was adopted to show the frequency and percentage of each thematic category, the average view frequency, and the mean engagement per theme. Then, Chi-square tests were employed to determine significant differences in the percentage of themes over the four developmental stages of the COVID-19 pandemic in Portugal. In addition, negative binomial regression was used to determine whether the theme category is associated with view frequency and engagement of posts and whether the developmental stage is the predictor of view frequency and total engagement. Finally, linear regression analysis was performed to explore whether the number of COVID-19-related posts, view frequency, and engagement index changed in correlation to the actual number of reported cases from Portugal.



Similarly, the theme category was also related to the volume of total engagement, Wald  $\chi^2(df = 9) = 651.343, P < .001$ . Further statistical analysis revealed that posts relevant to the other eight themes result in a significantly higher volume of total engagement compared to the Theme 1 ( $\beta_{\text{Theme2}} = 3.502, P < .001$ ;  $\beta_{\text{Theme3}} = 9.428, P < .001$ ;  $\beta_{\text{Theme4}} = 14.987, P < .001$ ;  $\beta_{\text{Theme5}} = 17.881, P < .001$ ;  $\beta_{\text{Theme6}} = 20.956, P < .001$ ;  $\beta_{\text{Theme7}} = 19.423, P < .001$ ;  $\beta_{\text{Theme8}} = 20.122, P < .001$ ;  $\beta_{\text{Theme9}} = 5.462, P < .001$ ) (see details in Figure 1).

Figure 1: Post frequency and mean values of view frequency and total engagement of each theme



Source: Author created

#### Differences between the four stages

The Chi-square tests revealed that the proportion of relevant posts published during the first stage of the period under study was higher than that of the other three stages,  $\chi^2(3, N = 6808) = 92.859, p < 0.001, Cramer's V = .117, p < 0.001$  (See details, Table 2). Additionally, the percentage of each theme differed significantly across the four stages,  $\chi^2(27, N = 3292) = 202.938, p < 0.001, Cramer's V = .121, p < 0.001$ . As shown in Table 3, Theme 8 ("About China") was more prevalent in the first stage while relatively less in the third stage. Similarly, in the first stage, the eighth most prominent topic refers to "COVID-19-related specific knowledge" while it was more prevalent in the third and fourth stages. In addition, 17.4% of posts during the second stage were in relation to COVID-19 vaccination, while it accounted for only 6.7% in the fourth stage. Furthermore, the posts dedicated to economic news were more prevalent in the third stage.

Regarding the view frequency and total engagement over four stages, a significant correlation was found between different stages and the volume of total engagement, Wald  $\chi^2(df = 3) = 11.356, P < .01$ , while no evidence was observed for associations with the volume of readings. Additionally, the COVID-19-related posts published in the second, third, and fourth stages generated less engagement than in the first stage ( $\beta_{\text{Stage 2}} = 0.811, P < .05$ ;  $\beta_{\text{Stage 3}} = 0.698, P < .01$ ;  $\beta_{\text{Stage 4}} = 0.804, P < .05$ ).

Table 2: Chi-square tests on the themes (Relevant vs. Irrelevant) over four stages

	Relevant	Irrelevant	df	Chi-square	p
S1	54.7%	45.3%	3	92.859	.000
S2	46.15	53.9%			
S3	37.8%	62.2%			
S4	37.8%	62.2%			

Source: Author created

Table 3: Chi-square tests on the ten themes over four stages

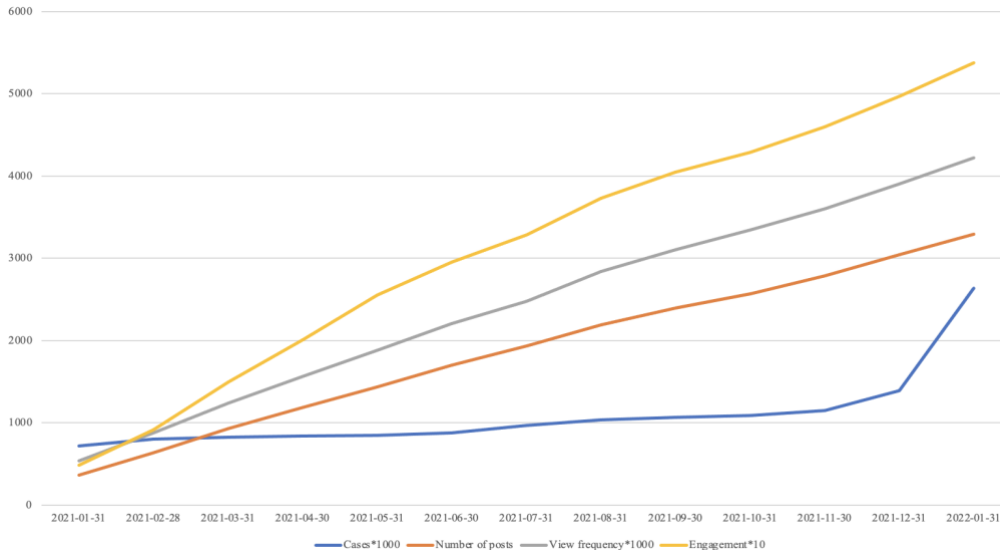
	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	df	Chi-square	p
S1	30%	18%	10.1%	2.7%	9.2%	10.1%	6.2%	8.3%	4.2%	1.1%	27	202.938	.000
S2	26.8%	17.3%	17.4%	2.7%	7.0%	10.0%	6.8%	5.7%	3.5%	2.8%			
S3	30.1%	10.1%	9.1%	2.3%	15.4%	9.6%	4.8%	1.5%	10.6%	6.3%			
S4	32.4%	12.5%	6.7%	1.6%	8.3%	9.5%	7.7%	9.1%	9.9%	2.4%			

Source: Author created

*Relationship of post frequency, view frequency, engagement, and the number of cases*

Notably, the results of the Pearson correlation analysis found a strong positive correlation between the total number of posts and official COVID-19 case counts in Portugal during the thirteen months of the study period,  $\gamma(13) = 0.726, P < .001$ . Hence, an increase in the total number of COVID-19-related posts on WeChat official accounts was concomitant with the increase in infection cases in Portugal (Posts=0.001\*cases+384.278;  $P < .01$ ;  $R^2=0.527$ ). Similarly, view frequency was also correlated to the COVID-19 official case counts in Portugal,  $\gamma(13) = 0.724, P < 0.001$ . As seen in Figure 2, the results from the regression analysis indicated that the number of COVID-19 infected cases in Portugal was predictive of view frequency (View frequency=1.718\*cases+562216.05;  $P < .01$ ;  $R^2=0.524$ ). Similarly, the relationship between infection cases and total engagement was also observed,  $\gamma(13) = 0.702, P < .001$ . In other words, the total engagement became higher as infection cases rose (Total engagement=0.022\*cases+7104.668;  $P < .01$ ;  $R^2=0.493$ ).

Figure 2: Trends of COVID-19 posts on WeChat, total view frequency, total engagement, and infection cases



Source: Author created

## Discussion

The most obvious finding from this study is that the number of COVID-19-related posts provided by these four official accounts targeting Portuguese news increased following the growth of the number of infection cases reported from Portugal. It also aligns with recent observations of other studies, which showed that the volume of COVID-19-related posts significantly correlates to pandemic dynamics (Li et al., 2020; Pobiruchin et al., 2020). In other words, due to the ongoing COVID-19 pandemic, the volume of outbreak-related posts has boomed, and various social media platforms have become powerful communicative tools for broad and rapid information dissemination (Goel & Gupta, 2020; Tsao et al., 2021). These results also reflect those of Zhang et al. (2020) and Goldsmith et al. (2022), who found that social media platforms provided numerous sources for migrants to obtain pandemic information and real-time news in the times of COVID-19. On the one hand, this initial finding explains why migrants rely more on digital media during an unprecedented health emergency. On the other hand, a continuous stream of COVID-19-related information delivered through various channels could be a major factor, if not the only one, influencing the attitudes and perceptions of migrants. Collectively, this result has important implications for designing more persuasive and practical COVID-19-related posts on social media specifically targeting immigrant groups in the future.

A key objective of the current research was to identify the main thematic categories of COVID-19-related posts disseminated by WeChat official accounts targeting Portuguese news during the coronavirus pandemic. Overall, the results indicate that the posts regarding local disease conditions, Covid-19 vaccinations, and economic news were the most prevalent on the WeChat platform during the study period. These results differ from earlier studies published in 2020, which reported that the posts about specific knowledge and protective measures had dominated outbreak-related digital content (Liu et al., 2020; Xu et al., 2020). However, they are broadly consistent with relevant studies published in 2021, which pointed out that more digital content regarding economic recovery and vaccine safety has emerged (Baines et al., 2021; Chipidza et al., 2021). Such studies could also explain why the proportion of themes varied among different stages over the period studied. In this regard, for instance, the decline in the number of posts relevant to COVID-19 vaccination may be the result of the growing vaccination rate in China and Portugal, and the increase in the number of posts pertinent to economic news may partly be explained by the continuous attention on economic recovery by the government and individuals. This combination of findings may indicate that the COVID-19 pandemic should be considered a severe social issue rather than a health crisis.

As mentioned above, the view frequency of each post can reflect the users' information interest and demands in the coronavirus pandemic (Ma et al., 2020). Consistent with the literature, this study confirmed that the public's attention was reactive to the number of infection cases (Cui et al., 2021; Zhao et al., 2020). No significant association between stages and view frequency indicates a sustained demand for information regarding the COVID-19 pandemic. From this perspective, the current study found that the content regarding "about China," "specific knowledge about COVID-19," and "flight information" are more in demand than ever before, for which, there are several possible explanations. Firstly, this finding might be explained by the fact that the public still has some concerns about virus transmission and treatment, how to protect themselves and how to distinguish the symptoms relevant to COVID-19, as public knowledge enhancement is associated with positive emotions and can promote community participation in the fight against the COVID-19 pandemic (Arslanca et al., 2021; Min et al., 2020). Secondly, these results may reflect that a



sense of national superiority and positive emotional appeal were essential and more needed in the face of an unprecedented health crisis (Mundel & Yang, 2021; Wang & Tao, 2021). Thirdly, the observed growing demand for flight information could be attributed to changed travel regulations applied by different countries, such as cancellation, temporary restrictions, and entry requirements (Obembe et al., 2021; Yu et al., 2021). These findings might further suggest that communicators and health practitioners must capture the diverse and changing demands of the target audience, not only to inform the public but also to make individuals more responsible for health issues.

In view of all that has been mentioned so far, these studies support the notion that the engagement level of social media users can directly reflect their preferences and appreciation of digital content (Isip-Tan et al., 2020). In this respect, this study produced a result in accordance with the findings of a great deal of the previous work, namely that user engagement is significantly associated with pandemic dynamics (Cinelli et al., 2020). Additionally, the posts relevant to "real-time local news," "About China," and "notifications released by the Chinese embassy in Portugal" have generated more engagement than the other themes. It seems possible that these results are due to the impact of strong patriotic feelings and migrants' concerns for security (Cheng & Espanha, 2021). These findings may be taken to indicate that social media has been harnessed not only to increase public knowledge by combining various information sources but also to foster users' sense of community belonging by providing interactive spaces.

Furthermore, it was notable that the posts published during the last three stages generated less engagement, this finding is likely related to emotional fatigue and tiredness from fighting COVID-19 (Whelehan et al., 2021). Therefore, communicators and health practitioners have to place greater emphasis on the originality and entertainment of COVID-19-related information by taking advantage of the diverse functionalities of social media platforms. One unexpected finding was the extent to which WeChat official accounts gratify the information needs of subscribers and attract their engagement. Contrary to expectations, this study found that the main themes provided by four official accounts are not consistent with followers' information demands. Meanwhile, the content more in demand among followers did not generate more likes and comments. Therefore, these findings have important implications for carefully scoping which topics are the most wanted and which content type can promote engagement behaviors. In this regard, for instance, communicators should deliver more posts regarding COVID-19-specific knowledge, especially scientific facts in a narrative style to satisfy information needs and generate more engagement (Ngai et al., 2020). In addition, storytelling is fundamental and essential for providing emotional support and coping with stress (Gesser-Edelsburg et al., 2021). Furthermore, when designing digital content targeting migrants, communicators should pay attention not only to the ever-changing requirements and preferences of subscribers but also to local social issues and the political environment. Besides these considerations, in this aspect, prior studies clearly show that multimedia use, timely and accurate information dissemination, interaction with subscribers, and layout optimization may serve as essential factors in driving users' engagement (Jiang et al., 2021; Zhang et al., 2019). Taken together, there is a definite need for tracing the information needs of the Chinese community in Portugal that are different from users living in China and giving sufficient consideration to their sense of community, patriotic feelings, and emotional tiredness. Besides providing all kinds of practical information according to their demands, increasing social media engagement should be a priority for designing digital messages tailored to suit this particular group.

## Conclusion

This study appears to be one of the first attempts to thoroughly analyze the COVID-19-related posts delivered by WeChat official accounts targeting Portuguese news during the whole year of 2021 and quantitatively describe the differences in themes between the four developmental stages in Portugal. Overall, this study strengthens the idea that communicators must leverage the characteristics of social media platforms and emotional appeals to serve the information needs of migrants as well as promote their engagement behaviors. In addition, the analysis has confirmed that the pandemic dynamics are closely associated with the post frequency, view frequency, and total engagement. It has also provided a deeper insight into the impact of thematic categories on view frequency and engagement. These findings contribute several ways to our understanding of what digital content has been disseminated to the Chinese community in Portugal through WeChat official accounts and which themes are most wanted and preferred while also providing a basis for further research. This study is limited by the lack of information on the volume of reposts and the official statistics about the use of WeChat official accounts among the Chinese community in Portugal. This investigation was not specifically designed to evaluate the differences between the four WeChat official accounts. More broadly, it has not been able to confirm which content characteristics can generate more engagement, hence, this research has thrown up many questions in need of further investigation.

## Funding information

The proofreading of this article was supported by Fundação para a Ciência e a Tecnologia (FCT) in the scope of the Strategic Funding UIDB/03126/2020

## Bibliographical references

- Arslanca, T., Fidan, C., Daggez, M., & Dursun, P. (2021). Knowledge, preventive behaviors and risk perception of the COVID-19 pandemic: A cross-sectional study in Turkish health care workers. *PloS one*, 16(4), e0250017. <https://doi.org/10.1371/journal.pone.0250017>
- Broersma, M. (2019). Audience Engagement. *The International Encyclopedia of Journalism. Studies*, 1-6. <https://doi.org/10.1002/9781118841570.iejs0060>
- Baines, A., Ittefaq, M., & Abwao, M. (2021). # Scamdemic, # plandemic, or# scaredemic: What parler social media platform tells us about COVID-19 vaccine. *Vaccines*, 9(5), 421. <https://doi.org/10.3390/vaccines9050421>
- Chipidza, W., Akbaripourdibazar, E., Gwanzura, T., & Gatto, N. M. (2021). Topic Analysis of Traditional and Social Media News Coverage of the Early COVID-19 Pandemic and Implications for Public Health

- Communication. *Disaster Medicine and Public Health Preparedness*, 1-8. <https://doi.org/10.1017/dmp.2021.65>
- Cui, H., & Kertész, J. (2021). Attention dynamics on the Chinese social media Sina Weibo during the COVID-19 pandemic. *EPJ data science*, 10(1), 8. <https://doi.org/10.1140/epjds/s13688-021-00263-0>
- Carvajal-Miranda, C., Mañas-Viniegra, L., & Liang, L. (2020). Online Discourse in the Context of COVID-19, the First Health Crisis in China after the Advent of Mobile Social Media: A Content Analysis of China's Weibo and Baidu. *Social Sciences*, 9(10), 167. <https://doi.org/10.3390/socsci9100167>
- Cuello-Garcia, C., Pérez-Gaxiola, G., & van Amelsvoort, L. (2020). Social media can have an impact on how we manage and investigate the COVID-19 pandemic. *Journal of clinical epidemiology*, 127, 198-201. <https://doi.org/10.1016/j.jclinepi.2020.06.028>
- Cinelli, M., Quattrocioni, W., Galeazzi, A., Valensise, C. M., Brugnoli, E., Schmidt, A. L., ... & Scala, A. (2020). The COVID-19 social media infodemic. *Scientific reports*, 10(1), 1-10. <https://doi.org/10.1038/s41598-020-73510-5>
- Cheng, C., & Espanha, R. (2021, November). Descriptive Analysis of Posts Delivered by WeChat Official Accounts Targeting Portugal News During the COVID-19 Outbreak. In *International Conference on Design and Digital Communication* (pp. 339-352). Springer, Cham. [https://doi.org/10.1007/978-3-030-89735-2\\_28](https://doi.org/10.1007/978-3-030-89735-2_28)
- Chen, X., Zhou, X., Li, H., Li, J., & Jiang, H. (2020). The value of WeChat as a source of information on the COVID-19 in China. *Bull World Health Organ*. <https://doi.org/10.2471/blt.20.256255>
- Edney, S., Bogomolova, S., Ryan, J., Olds, T., Sanders, I., & Maher, C. (2018). Creating engaging health promotion campaigns on social media: observations and lessons from Fitbit and Garmin. *Journal of medical Internet research*, 20(12), e10911. <https://doi.org/10.2196/10911>
- Fan, Z., Yin, W., Zhang, H., Wang, D., Fan, C., Chen, Z., ... & Guo, H. (2021). COVID-19 Information Dissemination Using the WeChat Communication Index: Retrospective Analysis Study. *Journal of Medical Internet Research*, 23(7), e28563. <https://doi.org/10.2196/28563>
- Gesser-Edelsburg, A. (2021). Using narrative evidence to convey health information on social media: the case of COVID-19. *Journal of Medical Internet Research*, 23(3), e24948. <https://doi.org/10.2196/24948>
- Goel, A., & Gupta, L. (2020). Social media in the times of COVID-19. *Journal of Clinical Rheumatology*. <https://doi.org/10.1097/rhu.0000000000001508>
- Goldsmith, L. P., Rowland-Pomp, M., Hanson, K., Deal, A., Crawshaw, A. F., Hayward, S. E., ... & Hargreaves, S. (2022). The use of social media platforms by migrant and ethnic minority populations during the COVID-19 pandemic: a systematic review. *medRxiv*. <https://doi.org/10.1101/2022.02.07.22270579>
- Guo, L., Zhang, M., Kang, K., & Hu, M. (2017). Transforming followers into fans: a study of Chinese users of the WeChat Official Account. *Online Information Review*. <https://doi.org/10.1108/oir-01-2016-0013>
- Han, F., Ge, Z., & Zhou, R. (2016). Reconfiguration and empirical study on the evaluation system of WeChat communication effect of sci-tech periodicals. *Advances in Journalism and Communication*, 4(01), 8. <https://doi.org/10.4236/ajc.2016.41002>

- Han, X., Wang, J., Zhang, M., & Wang, X. (2020). Using social media to mine and analyze public opinion related to COVID-19 in China. *International Journal of Environmental Research and Public Health*, 17(8), 2788. <https://doi.org/10.3390/ijerph17082788>
- Isip-Tan, I. T., Gutierrez, J., & Bernardo, D. C. (2020). Use of Facebook to serve information needs of persons with diabetes amid the COVID-19 pandemic. *Journal of the ASEAN Federation of Endocrine Societies*, 35(1), 32-37. <https://doi.org/10.15605/jafes.035.01.09>
- Jiang, T., Wang, Y., Lin, T., & Shangguan, L. (2021). Evaluating Chinese government WeChat official accounts in public service delivery: a user-centered approach. *Government Information Quarterly*, 38(1), 101548. <https://doi.org/10.1016/j.giq.2020.101548>
- Li, J., Xu, Q., Cuomo, R., Purushothaman, V., & Mackey, T. (2020). Data mining and content analysis of the Chinese social media platform Weibo during the early COVID-19 outbreak: retrospective observational in-foveillance study. *JMIR Public Health and Surveillance*, 6(2), e18700. <https://doi.org/10.2196/18700>
- Liem, A., Wang, C., Wariyanti, Y., Latkin, C. A., & Hall, B. J. (2020). The neglected health of international migrant workers in the COVID-19 epidemic. *The Lancet Psychiatry*, 7(4), e20. [https://doi.org/10.1016/s2215-0366\(20\)30076-6](https://doi.org/10.1016/s2215-0366(20)30076-6)
- Liem, A., Wang, C., Dong, C., Lam, A. I. F., Latkin, C. A., & Hall, B. J. (2021). Knowledge and awareness of COVID-19 among Indonesian migrant workers in the Greater China Region. *Public Health*, 197, 28-35. <https://doi.org/10.1016/j.puhe.2021.05.029>
- Liu, Q., Zheng, Z., Zheng, J., Chen, Q., Liu, G., Chen, S., ... & Ming, W. K. (2020). Health communication through news media during the early stage of the COVID-19 outbreak in China: digital topic modeling approach. *Journal of medical Internet research*, 22(4), e19118. <https://doi.org/10.2196/19118>
- Ma, R., Deng, Z., & Wu, M. (2020). Effects of health information dissemination on user follows and likes during COVID-19 outbreak in China: Data and content analysis. *International journal of environmental research and public health*, 17(14), 5081. <https://doi.org/10.3390/ijerph17145081>
- Min, C., Shen, F., Yu, W., & Chu, Y. (2020). The relationship between government trust and preventive behaviors during the COVID-19 pandemic in China: exploring the roles of knowledge and negative emotion. *Preventive medicine*, 141, 106288. <https://doi.org/10.1016/j.ypmed.2020.106288>
- Mundel, J., & Yang, J. (2021). Consumer Engagement with Brands' COVID-19 Messaging on Social Media: The Role of Perceived Brand-Social Issue Fit and Brand Opportunism. *Journal of Interactive Advertising*, 21(3), 173-190. <https://doi.org/10.1080/15252019.2021.1958274>
- Ngai, C. S. B., Singh, R. G., Lu, W., & Koon, A. C. (2020). Grappling with the COVID-19 health crisis: content analysis of communication strategies and their effects on public engagement on social media. *Journal of medical Internet research*, 22(8), e21360. <https://doi.org/10.2196/21360>
- Obembe, D., Kolade, O., Obembe, F., Owoseni, A., & Mafimisebi, O. (2021). Covid-19 and the tourism industry: An early stage sentiment analysis of the impact of social media and stakeholder communication. *International Journal of Information Management Data Insights*, 1(2), 100040. <https://doi.org/10.1016/j.ijime.2021.100040>

- Pang, H. (2018). Understanding the effects of WeChat on perceived social capital and psychological well-being among Chinese international college students in Germany. *Aslib Journal of Information Management*.
- Padeiro, M., Bueno-Larraz, B., & Freitas, Â. (2021). Local governments' use of social media during the COVID-19 pandemic: The case of Portugal. *Government information quarterly*, 38(4), 101620. <https://doi.org/10.1016/j.giq.2021.101620>
- Park, H., Reber, B. H., & Chon, M. G. (2016). Tweeting as health communication: health organizations' use of Twitter for health promotion and public engagement. *Journal of health communication*, 21(2), 188-198. <https://doi.org/10.1080/10810730.2015.1058435>
- Pobiruchin, M., Zowalla, R., & Wiesner, M. (2020). Temporal and location variations, and link categories for the dissemination of COVID-19–related information on twitter during the SARS-CoV-2 outbreak in Europe: Infoveillance study. *Journal of medical Internet research*, 22(8), e19629. <https://doi.org/10.2196/19629>
- Rocha-Trindade, M. B. (2020). Chinese community in Portugal: history, migration, and business. *Gaudium Scienti*, (19), 15-42. <https://doi.org/10.34632/gaudiumscienti.2020.10065>
- Tsao, S. F., Chen, H., Tisseverasinghe, T., Yang, Y., Li, L., & Butt, Z. A. (2021). What social media told us in the time of COVID-19: a scoping review. *The Lancet Digital Health*. [https://doi.org/10.1016/s2589-7500\(20\)30315-0](https://doi.org/10.1016/s2589-7500(20)30315-0)
- World Health Organization (2022). WHO Coronavirus (COVID-19) Dashboard. <https://covid19.who.int>
- Whelehan, D. F., Algeo, N., & Brown, D. A. (2021). Leadership through crisis: fighting the fatigue pandemic in healthcare during COVID-19. *BMJ Leader*, 5(2). <https://doi.org/10.1136/leader-2020-000419>
- Wu, Y., Deng, M., Wen, X., Wang, M., & Xiong, X. (2020). Statistical Analysis of Dispelling Rumors on Sina Weibo. *Complexity*, 2020. <https://doi.org/10.1155/2020/3176593>
- Wong, A., Ho, S., Olusanya, O., Antonini, M. V., & Lyness, D. (2021). The use of social media and online communications in times of pandemic COVID-19. *Journal of the Intensive Care Society*, 22(3), 255-260. <https://doi.org/10.1177/1751143720966280>
- Wang, Z., & Tao, Y. (2021). Many Nationalisms, One Disaster: Categories, Attitudes and Evolution of Chinese Nationalism on Social Media during the COVID-19 Pandemic. *Journal of Chinese Political Science*, 26(3), 525-548. <https://doi.org/10.1007/s11366-021-09728-5>
- Xie, C., Putrevu, J. S. H., & Linder, C. (2017). Family, friends, and cultural connectedness: A comparison between WeChat and Facebook user motivation, experience and NPS among Chinese people living overseas. In *International conference on cross-cultural design* (pp. 369-382). Springer, Cham.
- Xu, Q., Shen, Z., Shah, N., Cuomo, R., Cai, M., Brown, M., ... & Mackey, T. (2020). Characterizing Weibo social media posts from Wuhan, China during the early stages of the COVID-19 pandemic: qualitative content analysis. *JMIR Public Health and Surveillance*, 6(4), e24125. <https://doi.org/10.2196/24125>
- Xi, W., Xu, W., Zhang, X., & Ayalon, L. (2021). A thematic analysis of Weibo topics (Chinese twitter. hashtags) regarding older adults during the COVID-19 outbreak. *The Journals of Gerontology: Series B*, 76(7), e306-e312. <https://doi.org/10.1093/geronb/gbaa148>

- Yu, M., Li, Z., Yu, Z., He, J., & Zhou, J. (2021). Communication related health crisis on social media: a case of COVID-19 outbreak. *Current issues in tourism*, 24(19), 2699-2705. <https://doi.org/10.1080/13683500.2020.1752632>
- Zhao, Y., & Zhang, J. (2017). Consumer health information seeking in social media: a literature review. *Health Information & Libraries Journal*, 34(4), 268-283. <https://doi.org/10.1111/hir.12192>
- Zhao, Y., Cheng, S., Yu, X., & Xu, H. (2020). Chinese public's attention to the COVID-19 epidemic on social media: observational descriptive study. *Journal of medical Internet research*, 22(5), e18825. <https://doi.org/10.2196/18825>
- Zhang, L. T., & Zhao, S. (2020). Diaspora micro-influencers and COVID-19 communication on social media: The case of Chinese-speaking YouTube vloggers. *Multilingua*, 39(5), 553-563. <https://doi.org/10.1515/multi-2020-0099>
- Zhang, Y., Xia, T., Huang, L., Yin, M., Sun, M., Huang, J., ... & Ni, J. (2019). Factors influencing user engagement of health information disseminated by Chinese provincial centers for disease control and prevention on WeChat: observational study. *JMIR mHealth and uHealth*, 7(6), e12245. <https://doi.org/10.2196/12245>