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Bevaola Kusumasari
Universitas Gadjah Mada

Fadhli Zul Fauzi
Institut Pemerintahan Dalam Negeri

Anang Dwi Santoso
Universitas Sriwijaya

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Amplifying Local Leadership: A Twitter Analysis of Indonesian Responses to the COVID-19 Pandemic

Bevaola Kusumasari¹, Fadhli Zul Fauzi², Anang Dwi Santoso³

Universitas Gadjah mada, Indonesia¹

Institut Pemerintahan Dalam Negeri, Indonesia²

Universitas Sriwijaya, Indonesia³

bevaola@ugm.ac.id¹, fadhli@ipdn.ac.id², anangdwi@fisip.unsri.ac.id³

Abstract. Social media has altered emergency communication between local governments and citizens. Studies on social media and natural disasters are expanding. Few studies have explored the crisis of social media use among local government officials. This study investigated how Indonesian leaders use social media. It used data scraping techniques with the Twitter API and the <http://tweepy.readthedocs.io/en/v3.5.0/api.html#tweepy-api-twitter-api-wrapper> library to collect tweets from each governor's account in Bahasa, Indonesia, between January 1, 2020, and December 31, 2020. The collected data were stored in a MySQL database to facilitate manual analysis and converted to text format. The data were manually labeled using a three-step coding procedure and assigned to categories to identify social media trends among local government leaders during the COVID-19 pandemic. This study examines the government response effectiveness concept, which depends on the timeliness and breadth of official engagement and how communities receive, perceive, and respond to information provided by governments and other agencies. Four leaders demonstrated compassion, care, and self-assurance throughout the pandemic. Leaders must have two-way communication. A recent study investigated the Twitter links between local leaders and pandemic victims. This study supports the notion that social media use by government officials during epidemics influences community perceptions of risk and trust, thereby influencing policy decisions. These findings have policy ramifications, notably for establishing social media restrictions for local government leaders during future health emergencies.

Keywords: leadership, COVID-19, Indonesia, local government

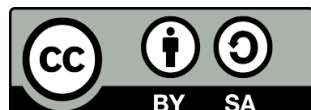
INTRODUCTION

This article examines how local government leaders in Indonesia, specifically those in DKI Jakarta, West Java, Central Java, and East Java, utilize social media, specifically Twitter, to respond to the COVID-19 pandemic. It identifies the strategies utilized by local government leaders in response to the pandemic and the effectiveness of social media-based strategies in dealing with pandemics. The article also seeks to determine whether local government leaders can effectively communicate and connect with the public via social media, and whether such communication and connection benefit the public. The article argues that studying leadership behavior in times of crisis can shed light on the role of social media in crisis decision-making and investigates potential moderators of this effect. Overall, this article aims to increase the understanding of the efficacy of government responses to the COVID-19 pandemic in Indonesia.

By 2020, Covid-19 had infected nearly every country and killed approximately 50 million people

worldwide (Allain-Dupré et al., 2020a; Kuguyo, Kengne, and Dandara, 2020a; W. Wang et al., 2021). The intensity of virus propagation and death rate varies by region (Mondal, 2021a). The disparity between these figures is due to various factors, including population growth rate, implementation of Covid-19 prevention rules, economic income level, and government control over the area (Choi, 2020a; George et al., 2021; Mondal, 2021b; Shadmi et al., 2020a). The income level of an area affects the spread of Covid-19. The findings of various studies indicate that regions with a middle-to low-income level typically struggle with a lack of information about Covid-19 prevention and health service capacity (Behzadifar et al., 2020a; Hopman, Allegranzi, and Mehtar, 2020). Consequently, the degree of economic income is also regarded as a significant factor in determining the dissemination of information about COVID-19 in a given location.

In reality, healthy economic income must be accompanied by policymakers' willingness to enact rules to avoid the spread of the virus; good and



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Correspondence to:
Bevaola Kusumasari
bevaola@ugm.ac.id

binding policies can aid in suppressing the spread of Covid-19 in an area (Mondal, 2021b). Earlier research also supports the assertion that appropriate strategies can aid in the containment of Covid-19 in an area (Kuguyo et al., 2020b; Li et al., 2020a; Shadmi et al., 2020b; Song et al., 2020a). The situation in Wuhan (China) demonstrates how government initiatives can affect the spread of the virus. Wuhan, the area with the world's first Covid-19 case, began enforcing a stringent lockdown policy on January 23, 2020, and enhanced its health services by constructing health facilities at many locations (Li et al., 2020b). The government's policies have demonstrated the country's ability to contain the growing rate of Covid-19 cases in Wuhan, despite the government's control function being extremely tight in its implementation. Additionally, the influence of government policies is evident in numerous locations in South Korea. When Covid-19 expanded rapidly in February in Daegu and Gyeongsangbuk-do, officials announced a series of laws to contain the spread, ranging from cluster control via mass inspections using the drive-thru approach to strengthening health facilities (Choi, 2020b).

In Indonesia, the rate of spread of Covid-19 differs by location. Certain places have a high rate of case spread (red/black zone), while others have a low rate of case spread (green zone). According to previous research, the variation in cases across regions is due to policymakers' willingness to prevent the spread of Covid-19 through binding policies and strict controls (Allain-Dupré et al., 2020b; Behzadifar et al., 2020b; Gudbjartsson et al., 2020; Kuguyo et al., 2020b; Song et al., 2020b; Mondal, 2021b). In Indonesia, the governor is responsible for regional (provincial) policymaking. The governor has the authority to enact provincial regulations that bind all regions' citizens.

Additionally, each governor in Indonesia has many laws to combat the spread of Covid-19. Numerous concepts, ranging from social distancing to physical distancing to large-scale social restrictions, have emerged as policy products of the Indonesian government in response to Covid-19 (Uwu, 2020). Indeed, each region's application of the Covid-19 handling guideline varies significantly, mainly when the number of cases in each province is considered. As such, this study examines governors' performance as policymakers in dealing with Covid-19 cases in their respective provinces. This study investigates the establishment of Covid-19 preventive strategies by the governors of DKI Jakarta, West Java, Central Java, and East Java to determine the efficiency of their policies in reducing the number of Covid-19 cases in their regions.

This study responds to Hyland-Wood et al. (2021), who emphasize that the effectiveness of government responses to people depends on the timeliness and scope of official engagement and how communities receive, perceive, and respond to information provided by governments and other agencies. This research addresses three key issues: information

patterns and types local leaders frequently share, the role of Twitter in managing the COVID-19 pandemic, and how social media platforms assist local leaders in making decisions during disasters. Addressing the issues will demonstrate how effectively Indonesian governors can communicate with their citizens via social networking sites. This study also demonstrated that communication via social media is a two-way channel that necessitates the delivery of clear messages through appropriate channels, customization for various audiences, and sharing by reputable individuals. Long-term success requires the acquisition and maintenance of public trust.

Leadership in Disaster

Comprehensive knowledge of emergency management leadership requires evaluation of the function and behaviors of leaders in the context of past leadership and disaster management studies. (Trainor & Velotti, 2013). Trainor and Velotti also mention that leadership in the context of disaster can be observed from the extent that a leader comprehensively understands every emergency management phase (mitigation, preparedness, response, recovery). The command-and-control leadership style in disaster management has a long history anchored in the military paradigm of emergency preparedness (Bahauddin & Iftakhar, 2018). Command and control are keywords in cases of leadership in disaster to avoid chaos or disorder instigated by various factors. The command-and-control concept also has variations, such as Incident Management Systems (Perry, 2003) and Unified Command Incident Systems (Buck et al., 2006). In other words, command and control by a leader are essential points of concern as they are highly influential in handling disasters (Perry, 2003).

Leadership is highly required in the disaster management process so that proper coordination is fostered among relevant parties/stakeholders and clarity in sharing thoughts, information, and experiences (Bahauddin & Iftakhar, 2018). Bahauddin and Iftakhar suggest three components that should be carried out in disaster leadership, known as the three components of community leadership. Dialog, connected leadership, and collective empowerment are the three components. Dialogue and collective thinking create an atmosphere of collaboration, fluidity, communal and inclusive learning, and sustainability (Kirk & Shutte, 2004). A good dialog process is also believed to minimize stakeholder misunderstandings and provide a common perspective among all parties involved.

As for connective leadership, every leader needs to know at least three advantages of connective leadership. First, connective leadership helps each integrate his/her desire with the objective of a community or organization. Second, connective leadership can help explore opportunities and potentials to achieve a common goal. Third, connective leadership helps develop and nurture a creative environment where collaborative leadership can flourish (Kirk & Shutte, 2004). Subsequently, the last component of

community leadership is collective empowerment. Collective empowerment occurs when a leader has assisted individuals in finding their role in a disaster management system/process (Bahauddin & Iftakhar, 2018). In other words, the individuals can influence others (in this case, the public/stakeholders) to participate in disaster management (Bahauddin & Iftakhar, 2018; Kirk & Shutte, 2004).

RESEARCH METHOD

Indonesia has experienced a significant increase in COVID-19 cases in several provinces and districts. On 12 June, the National COVID-19 Task Force (Satuan Tugas (Satgas)) reported that the provinces with the highest number of new confirmed cases were DKI Jakarta, Central Java, West Java, DI Yogyakarta, and Riau. On June 10, Satgas reported that the bed occupancy rate (BOR) in several provinces in Java had reached more than 50%, including Banten, DKI Jakarta, West Java, DI Yogyakarta, and Central Java. The most significant increase in cases and BOR was observed in Kudus, Central Java, and Bangkalan, East Java. The Ministry of Health (MoH) continues to strengthen the COVID-19 response in these two districts in collaboration with multiple stakeholders, including the National Army (TNI) and the Police (Polri). The MoH has also distributed around 50,000 doses of COVID-19 vaccines to accelerate vaccination rolls out in Kudus. Governors with a verified account include the governors of West Java (@ridwankamil), Jakarta (@aniesbaswedan), Central Java (@ganjarpranowo), and East Java (@KhofifahIP). The profile of each governor's Twitter account is presented in Table 1.

According to Baskaran and Ramanujam (Baskaran & Ramanujam, 2018), data scraping includes (1) mining of opinion, (2) feelings analysis, (3) modeling topology, and (4) trend analysis. This research is in the fourth area, namely trend analysis. The primary objective of this research was to identify trends for local government leaders on social media during the COVID-19 pandemic. The processes of data scraping follow the big-data architecture by Zhang et al.

The scraping method in this study was carried out using the <http://tweepy.readthedocs.io/en/v3.5.0/api.html#tweepy-api-twitter-api-wrapper> Twitter library and Twitter API. The data provided in the parameters were stored in the MySQL database. Next, the data

were converted to .txt format for more straightforward manual analysis. Only tweets in Bahasa Indonesia were collected. The scraping results were manually labeled (by code) to assign tweets to categories established by Bellström et al. (2016). Further details on the sample tweet categories can be found in Table 5.

We collected tweets from each governor's account between January 1 and December 31, 2020, to analyze the provincial government's activities to combat the COVID-19 epidemic throughout one year. Because each governor has a specific level of awareness regarding the COVID-19 pandemic, this date represents the start of the first data collection period, as shown in Table 2. We used a three-stage coding procedure to ensure the coding results' reliability and validity. The first and second authors who coded independently completed the first round. The third author examined the work of the two authors in the second round. The final round involved three researchers discussing discrepancies in the coding results.

RESULT AND DISCUSSION

This section provides the categories of information collected during the COVID-19 pandemic. This is to ascertain information patterns and the types of information they frequently communicate with between January 1 and December 31, 2021. We identified 11 broad areas: educating citizens, marketing provincial events, marketing provincial services, seeking assistance from citizens, obtaining information from citizens, service information, and service maintenance information.

The most common type of information is requests by citizens. This implies that the governor is using the media to monitor people's circumstances and health and to study and identify the hurdles they experience during the COVID-19 outbreak. Another frequently discussed category is provincial marketing. The governors in this study attempt to assist the community in marketing their businesses to attract more consumers. Technically, business owners are urged to share posters, videos, and product profiles that governors retweet.

The next category was public education. The proliferation of hoax news, misinformation, disinformation, fake news, and other false news prompted governors to combat them by providing genuine information. This category mostly contained health information,

Table 1. Profiles of each governor's Twitter account

Province	Governor's Name	Twitter Account	Followers	Number of Tweets
Jakarta	Anies Baswedan	@aniesbaswedan	4.2M	13.5K
West Java	Ridwan Kamil	@ridwankamil	4.4M	42.8K
Central Java	Ganjar Pranowo	@ganjarpranowo	2M	143.2K
East Java	Khofifah Indar Parawansa	@KhofifahIP	549.4K	2.8K

Table 2. Categories of content shared by the governors

Category	Number of tweets/each category	%
Educating citizens	262	6.0%
Marketing events in the provincial government	1373	31.5%
Marketing events outside of the provincial government	82	1.9%
Marketing the provincial government	59	1.4%
Marketing service	226	5.2%
Requesting assistance from citizens	228	5.2%
Requesting information from citizens	1584	36.3%
Service Information	231	5.3%
Service maintenance information	26	0.6%
Other	292	6.7%
Number of Tweets	4363	100%

most notably how to deal with the COVID-19 epidemic. In this category, the governor attempts to influence community behavior by requiring residents to engage in or abstain from particular activities under health authority guidelines.

One of the more intriguing categories discovered during this investigation was the desire for aid from citizens. This category provides information about community invitations to collaborate, assist, and share. Support comes in various forms, including information on oxygen needs, hospitals with vacant rooms, and other humanitarian assistance. This is significant because teamwork is critical during a disaster, so community engagement is critical.

Another area is information about services. This category contains a variety of different types of information regarding public services. The COVID-19 pandemic has compelled the government to forgo the traditional method of providing public services in favor of digital-based services. These changes affect the requirements of public services and the numerous processes involved in obtaining them. As a result, the governor attempts to democratize these governmental services through social media platforms. This area includes introducing new services, information on government websites and social media channels, and various requirements for public services.

However, the categories were not too many. They include marketing events held outside the provincial government, marketing the provincial government, and information about service maintenance. Each category contained no more than 2% of the total. Little information is available in this area because the government has eliminated many tourism and other events in favor of public health initiatives. Meanwhile, although service maintenance is critical, little information is available in this category.

We observed each governor's account, as indicated in Table 3, and then compared them. In addition, we examined the commonalities between them.

According to the research findings, Ganjar Pranowo, the governor of Central Java, is the most active in two-way communication with the public compared to other governors. He also claimed in multiple tweets that he frequently visited the community to appeal to and encourage the population to follow health regulations. On the other hand, Anies Baswedan, the governor of DKI Jakarta, maintains minor two-way communication with the population. The governor of West Java, Ridwan Kamil, frequently provides updated information about Covid-19 cases in West Java. Finally, Khofifah has the most significant tweets regarding official public victims.

What is fascinating is that each governor delivers

Table 3. Content categories shared by each governor

Category	Anies Baswedan	%	Ridwan Kamil	%	Ganjar Pranowo	%	Khofifah	%
Educating citizens	29	9.8%	106	14.1%	99	3.6%	28	4.7%
Marketing events in the provincial government	105	35.4%	302	40.3%	700	25.7%	266	45.1%
Marketing events outside of the provincial government	1	0.3%	12	1.6%	58	2.1%	11	1.9%
Marketing the provincial government	16	5.4%	21	2.8%	11	0.4%	11	1.9%
Marketing service	33	11.1%	48	6.4%	92	3.4%	53	9.0%
Requesting assistance from citizens	34	11.4%	63	8.4%	81	3.0%	50	8.5%
Requesting information from citizens	8	2.7%	19	2.5%	1544	56.6%	13	2.2%
Service Information	13	4.4%	118	15.7%	45	1.7%	55	9.3%
Service maintenance information	2	0.7%	5	0.7%	13	0.5%	6	1.0%
Other	56	18.9%	56	7.5%	83	3.0%	97	16.4%
Number of Tweets	297	100%	750	100%	2726	100%	590	100.0%

a wealth of information regarding the role of MSMEs during the pandemic and the importance of assisting MSMEs. This is critical because MSMEs are the bedrock of the community economy and hence require aid and intervention from all levels of government. For instance, according to Ridwan Kamil's Twitter account, 20 million masks created by MSMEs were delivered in stages to West Java citizens who received social assistance from the West Java Provincial Government. Another similarity is that all governors spend the least time discussing tweets on service maintenance information (public service disruptions).

COVID-19 Pandemic Response

The Indonesian government's swift response to the COVID-19 pandemic is unprecedented. Leaders at all levels of government and institutions have communicated with citizens actively to ensure understanding and cooperation (Giacomini & Simonetto, 2020; Sobaci & Karkin, 2013; Wukich, 2020). Social media has enabled the spread of information at a rapid pace from traditional platforms that rely on TV and radio broadcasting or even newspaper journalism (Lindsay, 2011; Hemachandra, Haigh, and Amaratunga, 2021). With the recent COVID-19 pandemic, many countries have been left scrambling to move ahead of the developing situation. However, Indonesia has taken this one step further and started using Twitter as a two-way communication channel with its citizens to report what is happening in their area.

Although Twitter is still a relatively new medium in Indonesia, it has developed rapidly and has become one of the key social media channels for Indonesian citizens to exchange messages (Rakhmawati et al., 2020; Santoso et al., 2020; Rasyid et al., 2021). This study examines how local government officials have used Twitter to communicate and coordinate responses during the COVID-19 pandemic. The results of our study show a significant influence of the type of media use on decision-making regarding pandemic control measures. The findings are based on tweets gathered during the first year of the pandemic in Indonesia through the Twitter accounts of four governors in Java Island, Indonesia. Twitter followers of elected local government leaders aim to support policy and management decisions on pandemic prevention and control. The findings also suggest that using Twitter can positively influence public behaviors and attitudes, but it can also have negative impacts if not used properly. Therefore, it is crucial for local government leaders to consider the public's preferences and competency before using it. Table 1 shows that in Central Java, governor Ganjar Pranowo is the most active in establishing two-way communication with the public. Only Ganjar Pranowo urges the enforcement of health protocols by going to the field. On the other hand, Governor Anies Baswedan, Jakarta Special Region, has less two-way communication than other governors, while in West Java, Governor Ridwan Kamil has the advantage of regularly updating Covid-19 cases. Khofifah, the governor of East

Java, became the governor who tweeted the most about victims from public officials.

The response to COVID-19 information has been extensive and rapid. For example, in May 2020, Governor Ridwan Kamil spread information on the increase in Covid-19 cases. Through his account (@ridwankamil), he said that Covid-19 cases had heavily increased in only two days because of the undisciplined behavior of some people. He also encouraged citizens to maintain their health protocols wherever they were and diminish their mobility. The tweet was retweeted more than 3.500 times and has been liked almost 5.000 times. In April 2020, Governor Ganjar Pranowo responded to a dispute between medical personnel and citizens regarding how the government handled Covid-19 in Indonesia. Through his account (@ganjarpranowo), he said that we must respect each other; during this time (during the pandemic), we must help one another solve the problems. Although it is difficult to determine the effectiveness of this social media strategy in curbing the spread of the dengue virus before and after COVID-19, these messages still serve as an example of a successful approach to Twitter use by government agencies.

The Role of Twitter in the Management of the COVID-19 Pandemic

This study suggests that Twitter is a robust information and communication tool that can profoundly transform how we deal with COVID-19. It has been shown that Twitter can provide accurate, timely, and credible information to populations at risk and in need of emergency relief. Twitter has a great potential to connect people in remote and inaccessible areas with medical experts while diverting attention from less urgent questions. The use of Twitter is not only about obtaining information. Indonesian local government leaders use Twitter to manage disaster response by empowering citizens with knowledge of prevention and minimizing their vulnerability to this deadly virus. We analyzed how local government leaders at all levels of administration interacted actively with citizens during the COVID-19 pandemic in Indonesia. These results suggest that they interacted quite actively through text messaging on Twitter.

Table 2 shows that all governors in Java told a lot about the role of MSMEs in the pandemic and the priority of assisting MSMEs. Ridwan Kamil tweeted that 20 million Masks produced by MSME have been distributed in stages to West Java residents affected by COVID who receive social assistance from the West Java Provincial Government. Tweets on service maintenance information (public service disruptions) are the least discussed by all governors.

The findings of this study demonstrate the critical role in managing COVID-19. It is an effective means of exchanging information and providing it in a short time. Social media also create virtual sites for interactions between citizens and local government leaders (Szmigielska-Rawska et al., 2018; Szmigielska-Rawska and Tavares, 2019; Wukich, 2020). Moreover, Twitter

offers many opportunities to improve public engagement with the government, to engage communities in making decisions that affect them, to assist people to help themselves, and to improve the way we make policy decisions (Majumdar, 2017; Nurmandi et al., 2018; Saip, Kamala, and Tassabehji, 2018). For these reasons, Twitter has become increasingly important for disaster response.

Policy Implemented

The Indonesian government launched a national strategy for pandemic influenza preparedness (National Action Plan) 5 months before the COVID-19 pandemic virus. The President of Indonesia described the response to the outbreak as it managed to control the spread of the disease in the country. This success is partly due to the use of social media.

Since 2008, Indonesian local government leaders have used Twitter for disaster response. After introducing Twitter in Indonesia, local government leaders have used social media for disaster management. Specifically, they now use it for communication and gathering monitoring information, such as public opinion and concerns (Anang Dwi Santoso, 2020; Carley et al., 2016; Chatfield & Brajawidagda, 2013). The government has also recognized the importance of Twitter and other social media in managing COVID-19. In its Pandemic Mitigation Plan, Twitter is important in disseminating information regarding prevention, transmission, and treatment (Pulido et al., 2020; Zeemering, 2021).

The role of local government leaders on social media is vital (Gesuele, 2016). Thus far, the role of social media has been described as passive because it provides information and advice. Local government leaders now use Twitter to engage citizens and manage disasters actively. They have recognized that this is how they can get informed about their citizens' needs to minimize their vulnerability to infectious diseases (Garavaglia, Sancino, & Trivellato, 2021).

This study highlights that most local government leaders use Twitter to gather information on the distribution of the COVID virus, address public concerns, and provide guidance on how people can help themselves. These activities made local government leaders proactive instead of responding to an infectious disease outbreak. The use of Twitter to manage the COVID-19 pandemic has been described as successful by local government leaders. It has also helped the government to control the COVID-19 pandemic.

The role of social media in managing COVID-19 is not limited to the leadership of local governments. In Indonesia, citizens can use Twitter to exchange ideas and provide feedback on minimizing their vulnerability to the deadly virus. Over eight million people use Twitter in Indonesia (Social and Hootsuite, 2019). Citizens use it for various activities, from daily communication with friends and family to searching for jobs and political discussions. Citizens have used Twitter as a platform to provide ideas regarding the management of COVID virus (Zeemering, 2021).

Local government leaders use social media not only as a communication and information platform but also as a platform for decision-making during disasters. They used Twitter to exchange ideas on handling the COVID-19 pandemic, which helped them minimize their vulnerability by taking action based on what they learned from others' experiences (Garavaglia et al., 2021). Once people know how others have handled an infectious disease outbreak, they can improve their responses and minimize their vulnerability.

The findings of this study suggest that Twitter helps local government leaders to engage citizens in managing the COVID-19 pandemic. Local government leaders use Twitter to gather information from the public and ask them for their opinions on handling the COVID-19 pandemic and what kind of information they need to minimize their vulnerability. For instance, Ganjar Pranowo, a governor of Central Java, uses Twitter to interact with his citizens and collect information about the performance of the local government in handling Covid-19 based on public opinion. In another case, Ridwan Kamil, a governor of West Java, used Twitter to introduce his application called Pikobar (West Java's Covid-19 Information and Coordination App), which contains information about Covid-19 in West Java and kolom pengaduan that can be filled in by citizens.

The Indonesian government has been using social media to minimize its vulnerability to the COVID-19 pandemic (Djalante et al., 2020). Using a combination of Twitter, which is accessible to almost every Indonesian citizen, and local radio shows, they gathered the public's views on how to handle the COVID-19 pandemic. Local government leaders also use Twitter as a barrier to the spread of COVID virus. Twitter users have contacted them regarding the COVID pandemic many times. Thus, local government leaders began posting information about how people could help themselves to reduce their vulnerability.

The use of social media has given local government leaders more opportunities to become informed about their citizens' needs and concerns. This is especially important because the spread of COVID has affected all aspects of Indonesian life (Suryahadi et al., 2020). Therefore, the government used social media to obtain information about the changes caused by the COVID-19 pandemic and helped them respond to them. This could make local government leaders aware of people's difficulties and help them act immediately. This also enables local government leaders to learn about people's needs and concerns (Garavaglia et al. 2021). Twitter has enabled local government leaders to connect with their constituents. The governors of the Indonesian government have been using Twitter to inform the public and as a tool for exchanging ideas and sharing information. Twitter has helped local government leaders communicate directly with their constituents during crises. This method is more efficient because it can disseminate information faster

Table 4. The policy implemented by each provincial government during the 2020 pandemic (1/2)

Month	DKI Jakarta	West Java	Central Java	East Java
January	Thermal Scanner Usage		Repatriation of Indonesian Citizens from Wuhan	Installation of Body Thermal Scanner at the Airport
February				Repatriation of Indonesian Citizens from Wuhan
March	Preparation of Covid-19 patient pick-up facilities, determination of emergency response, closure of tourist attractions, <i>work-from-home</i> appeals, school closures, appeals not to go home, suspension of odd-even transportation policies, suspension of worship activities, additional facilities for health workers	Closing of public facilities, the establishment of <i>command centers</i> , activation of Covid-19 response applications, <i>door-to-door</i> rapid tests, assistance for the poor	Increase of 46 referral hospitals, prohibition of leaning on cruise ships, implementation of <i>school from home</i> , Assignment of Saprol PP to become Covid-19 Police, budgeting 1.4 billion Rupiah for handling Covid-19	<i>school from home</i> , spraying disinfectant on people's boats on GiliTappang Island, spraying vehicles from and to Madura Island on Suramadu Bridge
April	Restrictions on the use of transportation modes, Providing social assistance, Enforcement of PSBB, Determination of referral hospitals	Increasing the volume of screening, implementing PSBB in several cities, changing the function of luxury hotels for medical personnel, social assistance, blocking roads	Directions for providing isolation places for travelers, increasing the availability of PPE, using reporting applications for travelers, returning Indonesian migrant workers, implementing PSBB	Increasing the Covid-19 handling budget, providing self-isolation places for travelers, banning debt collectors from collecting affected customers, repatriating Indonesian citizens/TKIs, social assistance, implementing PSBB, increasing tracing,
May	Self-isolation booths in several places, Application of Exit Permit (SIKM)	Picking up Indonesian Workers abroad, Public-Private Partnership in handling Covid-19, implementing provincial PSBB, easing PSBB in green zones, strengthening sanctions for violators of PSBB regulations	Relaxing PSBB regulations in several green zones, conducting Virtual Open Houses to see the development of residents' conditions	Increasing social assistance and implementing PSBB in several areas
June	Implementation of the transitional PSBB, free bus delivery for accommodation, collaboration with the private sector and labs in tracing	Increasing government vehicles for Covid-19 handling/tracing accommodation, receiving assistance from the private sector for technology improvement in handling Covid-19, Prokes Policy in Islamic Boarding Schools		Loosening the implementation of PSBB in the city of Surabaya, forming a task force in the city of Surabaya

Table 4. The policy implemented by each provincial government during the 2020 pandemic (2/2)

Month	DKI Jakarta	West Java	Central Java	East Java
July	Increasing the implementation of accommodation management, educational scholarships for children from fallen health workers	Use of administrative sanctions for violators of health protocol rules, allowing face-to-face schools in some green zone areas	allow face-to-face schooling in green zone areas	Receive medical equipment assistance from the private sector and LIPJ
August	Reapply odd-even activities to reduce mobility.	Develop guidelines for public health risk assessment and adaptation to the new normal.		
September	Formation of the Economic and Social Recovery team, re-enactment of PSBB, formation of the RPD drafting team on Covid-19, adjustment of several regulations	Increased tracing, launched a Covid-19 reporting platform called Pikobar,	Strengthening sanctions for violators of health protocols, conducting health protocol operations at Traditional Markets	
October	Establishment of the DKI Jakarta Covid-19 Task Force, implementing transitional PSBB, regulations on visitor registration for business actors.	Coordination and evaluation with local governments (districts/provincialities), stopping the use of provincial applications and integrating with the central government, increasing tracing through QR Code scanning in public places, opening training for Covid-19 volunteers, increasing promotion of MSMEs through social media	Increased MSME promotion	
November	Recruiting Contact Tracer Covid-19 Detection, Providing essential social assistance, progressive fines for PSBB violators	Increased tracing at Tourist Destinations and West Java gates		
December		Adding isolation buildings and deploying TNI/Polri to be volunteers, prohibiting New Year celebrations, strengthening health facilities	Provide accommodation to improve tracing.	

than conventional methods (Takahashi et al., 2015).

As local government leaders in Indonesia, governors have used Twitter to connect with their constituents. Once they have contacted them, these leaders can get feedback directly from them to help them identify the problems their constituents are facing and to obtain suggestions on how best to respond to these issues. Twitter also provides local government leaders opportunities for more effective communication (Garavaglia et al., 2021). The integration of Twitter with local Indonesian government leaders has led to more effective communication. The Indonesian government has been using social media to exchange information and obtain feedback from the public about the COVID virus, leading to more efficient communication.

Policy Implementation by Local Government Leaders

Another crucial part of the government's COVID-19 pandemic policy was the nationwide "stay at home." The reason for this was that it was more important to contain and treat those who had contracted COVID-19 before they could spread it further than it was to keep citizens from visiting others who could be infected, delaying them from recovering and infecting others. Table 4 illustrates the policies implemented by each provincial government during the 2020 pandemic.

The crucial part of the government's policy on the COVID-19 pandemic was the closure of all borders, isolating any possible cases from spreading outside them. This strategy aimed to prevent the spread of COVID-19 outside tour shores, home to one of the best medical teams in the world. Coordination of the pandemic response is essential for providing adequate responses to the needs of affected areas. Responding to and managing a pandemic requires effective science-based strategies that best use the available resources. It also involves coordinating with other stakeholders such as government, academia, healthcare providers, and international organizations to develop a comprehensive response strategy to minimize pandemics' impacts on vulnerable populations and reduce health system impacts in the long term.

There is plenty of literature on social media use by local government leaders during the COVID-19 pandemic, and the findings of the previous studies can be compared. For example, studies conducted by (C. Wang et al., 2021; Hizbaron et al., 2021; Mohanty et al., 2021) found that "leaders who used social media during crisis showed higher levels of adaptive behavior than those who did not." This finding supports our findings. Similarly, articles written by (Deng et al., 2020; Fadmastuti, 2019; Xiong et al., 2020) state that "government leaders should encourage the public to reach out to government for support and guidance, which also supports our findings as it relates to public engagement.

This can also be compared to a study by Kusumasari and Prabowo (2020), which states that "the majority

of communities who used social media during crisis reported that they received support from government leaders." In addition to comparing studies published during the COVID-19 pandemic, comparisons were made by the author with previous literature. The author evaluated the literature from the perspective of local government leaders and noted the findings from previous research. For example, a study conducted prior to COVID-19 that used a mix of qualitative and quantitative methods found that social media is a "powerful tool for helping communities in times of crisis" (Cai, 2017; Eckert et al., 2018). The study found that "social media platforms such as Twitter are valuable sources of information during emergencies, which supports the findings of our study.

CONCLUSION

In conclusion, the use of Twitter by local government leaders in Indonesia during the first year of the COVID-19 pandemic demonstrates the potential of social media as a crisis communication tool. As with any other communication medium, the effectiveness of government officials' use of Twitter can vary, with positive and negative results. Nonetheless, the experiences of Indonesian leaders provide valuable insights into how social media can be utilized for public service during a public health emergency. The findings of this study highlight the themes of social media activity from three governors representing provinces in Java, providing insight into how local leaders use Twitter to communicate with constituents during the pandemic. Using Twitter, these leaders can rapidly exchange information and receive public feedback regarding COVID-19. This enables quicker and more effective crisis response efforts. Moreover, social media platforms such as Twitter can play a significant role in community resilience during infectious disease outbreaks by providing a channel for governments to disseminate vital information to the public.

Despite the study's merits, it has several limitations. First, the study's time frame (the first year of the pandemic) may not capture long-term patterns in local officials' use of social media. In addition, the scope of the study is limited to three governors of Indonesian provinces in Java, and additional research is required to determine how the use of social media by leaders in other regions and countries may vary. Nonetheless, these results can serve as a foundation for developing policies governing local officials' use of social media during future infectious disease outbreaks. Public organizations can use the insights gained from this study to create more effective social media crisis communication strategies.

REFERENCES

- Allain-Dupré, D., Chatry, I., Michalun, V., & Moisisio, A. (2020a). The territorial impact of COVID-19 : managing the crisis across levels of government. *OECD Tackling Coronavirus, April*, 2–44.

- Allain-Dupré, D., Chatry, I., Michalun, V., & Moisiu, A. (2020b). The territorial impact of COVID-19 : managing the crisis across levels of government. *OECD Tackling Coronavirus*, April, 2–44.
- Bahauddin, K. Md., & Iftakhar, N. (2018). Exploring the Leadership Skill and Challenge in Responding Natural Disaster: Lesson Learning from Leaders Involved in Emergency Response of Bangladesh. *Management of Sustainable Development*, 9(2), 31–34. <https://doi.org/10.1515/msd-2017-0019>
- Baskaran, U., & Ramanujam, K. (2018). Automated scraping of structured data records from health discussion forums using semantic analysis. *Informatics in Medicine Unlocked*, 10(January), 149–158. <https://doi.org/10.1016/j.imu.2018.01.003>
- Behzadifar, M., Ghanbari, M. K., Bakhtiari, A., Behzadifar, M., & Bragazzi, N. L. (2020a). Ensuring adequate health financing to prevent and control the COVID-19 in Iran. *International Journal for Equity in Health*, 19(1), 61. <https://doi.org/10.1186/s12939-020-01181-9>
- Behzadifar, M., Ghanbari, M. K., Bakhtiari, A., Behzadifar, M., & Bragazzi, N. L. (2020b). Ensuring adequate health financing to prevent and control the COVID-19 in Iran. *International Journal for Equity in Health*, 19(1), 61. <https://doi.org/10.1186/s12939-020-01181-9>
- Bellström, P., Magnusson, M., Pettersson, & Sören, J. (2016). Facebook usage in a local government: A content analysis of page owner posts and user posts. *Transforming Government: People, Process and Policy*, 10(4), 548–567. <https://doi.org/doi:10.1108/TG-08-2013-0026>
- Buck, D. A., Trainor, J. E., & Aguirre, B. E. (2006). A critical evaluation of the incident command system and NIMS. *Journal of Homeland Security and Emergency Management*, 3(3). <https://doi.org/10.2202/1547-7355.1252>
- Cai, Y. (2017). Bonding, bridging, and linking: photovoice for resilience through social capital. *Natural Hazards*, 88(2), 1169–1195. <https://doi.org/10.1007/s11069-017-2913-4>
- Carley, K. M., Malik, M., Landwehr, P. M., Pfeffer, J., & Kowalchuck, M. (2016). Crowd sourcing disaster management: The complex nature of Twitter usage in Padang Indonesia. *Safety Science*, 90, 48–61. <https://doi.org/10.1016/j.ssci.2016.04.002>
- Chatfield, A. T., & Brajawidagda, U. (2013). Twitter early tsunami warning system: A case study in Indonesia's natural disaster management. *Proceedings of the Annual Hawaii International Conference on System Sciences*. <https://doi.org/10.1109/HICSS.2013.579>
- Choi, J. Y. (2020a). Covid-19 in South Korea. *Postgraduate Medical Journal*, 96(1137), 399–402. <https://doi.org/10.1136/postgradmedj-2020-137738>
- Choi, J. Y. (2020b). Covid-19 in South Korea. *Postgraduate Medical Journal*, 96(1137), 399–402. <https://doi.org/10.1136/postgradmedj-2020-137738>
- Deng, Q., Gao, Y., Wang, C., & Zhang, H. (2020). Detecting information requirements for crisis communication from social media data: An interactive topic modeling approach. *International Journal of Disaster Risk Reduction*, 50. <https://doi.org/10.1016/j.ijdr.2020.101692>
- Djalante, R., Lassa, J., Setiamarga, D., Sudjatma, A., Indrawan, M., Haryanto, B., Mahfud, C., Sinapoy, M. S., Djalante, S., Rafliana, I., Gunawan, L. A., Surtiari, G. A. K., & Warsilah, H. (2020). Review and analysis of current responses to COVID-19 in Indonesia: Period of January to March 2020. *Progress in Disaster Science*, 6, 100091. <https://doi.org/10.1016/j.pdisas.2020.100091>
- Eckert, S., Sopory, P., Day, A., Wilkins, L., Padgett, D., Novak, J., Noyes, J., Allen, T., Alexander, N., Vanderford, M., Vanderford, M., & Gamhewage, G. (2018). Health-Related Disaster Communication and Social Media: Mixed-Method Systematic Review. *Health Communication*, 33(12), 1389–1400. <https://doi.org/10.1080/10410236.2017.1351278>
- Fadmastuti, M. (2019). Selfies Save Lives (Digital Strategies for Flood Response in Indonesia). *IOP Conference Series: Earth and Environmental Science*, 338(1). <https://doi.org/10.1088/1755-1315/338/1/012040>
- Garavaglia, C., Sancino, A., & Trivellato, B. (2021). Italian mayors and the management of COVID-19: adaptive leadership for organizing local governance. *Eurasian Geography and Economics*, 62(1), 76–92. <https://doi.org/10.1080/15387216.2020.1845222>
- George, S., Ansari, M. S., Kalliath, A., Khan, M. J., Abdullah, M. S., Asli, R., Momin, R. N., Mani, B. I., Chong, P. L., & Chong, V. H. (2021). COVID-19 in children in Brunei Darussalam: Higher incidence but mild manifestations. *Journal of Medical Virology*, 93(1), 199–201. <https://doi.org/10.1002/jmv.26310>
- Gesuele, B. (2016). Municipalities and Facebook Use: Which Key Drivers? Empirical Evidence from Italian Municipalities. *International Journal of Public Administration*, 39(10), 771–777. <https://doi.org/10.1080/01900692.2015.1034323>
- Giacomini, D., & Simonetto, A. (2020). How Mayors Perceive the Influence of Social Media on the Policy Cycle. *Public Organization Review*, 20(4), 735–752. <https://doi.org/10.1007/s11115-020-00466-5>
- Gudbjartsson, D. F., Norddahl, G. L., Melsted, P., Gunnarsdottir, K., Holm, H., Eythorsson, E., Arnthorsson, A. O., Helgason, D., Bjarnadottir, K., Ingvarsson, R. F., Thorsteinsdottir, B., Kristjansdottir, S., Birgisdottir, K., Kristinsdottir, A. M., Sigurdsson, M. I., Arnadottir, G. A., Ivarsdottir, E. V., Andresdottir, M., Jonsson, F., ... Stefansson, K. (2020). Humoral Immune Response to SARS-CoV-2 in Iceland. *New England Journal of Medicine*, 383(18), 1724–1734. <https://doi.org/10.1056/nejmoa2026116>
- Hemachandra, K., Haigh, R., & Amaratunga, D.

- (2021). Enablers for Effective Multi-hazard Early Warning System: A Literature Review. *Lecture Notes in Civil Engineering*, 94, 399–416. https://doi.org/10.1007/978-981-15-7222-7_33
- Hizbaron, D. R., Ruslanjari, D., & Mardiatno, D. (2021). Amidst covid-19 pandemic: An adaptive disaster governance in Yogyakarta, Indonesia. *Social Sciences*, 10(3). <https://doi.org/10.3390/socsci10030092>
- Hopman, J., Allegranzi, B., & Mehtar, S. (2020). Managing COVID-19 in Low- and Middle-Income Countries. *JAMA - Journal of the American Medical Association*, 323(16), 1549–1550. American Medical Association. <https://doi.org/10.1001/jama.2020.4169>
- Hyland-Wood, B., Gardner, J., Leask, J., & Ecker, U. K. H. (2021). Toward effective government communication strategies in the era of COVID-19. *Humanities and Social Sciences Communications*, 8(1), 1–11. <https://doi.org/10.1057/s41599-020-00701-w>
- Kirk, P., & Shutte, A. M. (2004). Community leadership development. *Community Development Journal*, 39(3), 234–251. <https://doi.org/10.1093/cdj/bsh019>
- Kuguyo, O., Kengne, A. P., & Dandara, C. (2020a). Singapore COVID-19 Pandemic Response as a Successful Model Framework for Low-Resource Health Care Settings in Africa?. *OMICS A Journal of Integrative Biology*, 24(8), 470–478. <https://doi.org/10.1089/omi.2020.0077>
- Kuguyo, O., Kengne, A. P., & Dandara, C. (2020b). Singapore COVID-19 Pandemic Response as a Successful Model Framework for Low-Resource Health Care Settings in Africa?. *OMICS A Journal of Integrative Biology*, 24(8), 470–478. <https://doi.org/10.1089/omi.2020.0077>
- Kusumasari, B., & Prabowo, N. P. A. (2020). Scraping social media data for disaster communication: how the pattern of Twitter users affects disasters in Asia and the Pacific. *Natural Hazards* 103(3), 3415–3435. <https://doi.org/10.1007/S11069-020-04136-Z>
- Li, M., Yin, H., Jin, Z., Zhang, H., Leng, B., Luo, Y., & Zhao, Y. (2020a). Impact of Wuhan lockdown on the indications of cesarean delivery and newborn weights during the epidemic period of COVID-19. *PLoS ONE*, 15(8 August), 1–9. <https://doi.org/10.1371/journal.pone.0237420>
- Li, M., Yin, H., Jin, Z., Zhang, H., Leng, B., Luo, Y., & Zhao, Y. (2020b). Impact of Wuhan lockdown on the indications of cesarean delivery and newborn weights during the epidemic period of COVID-19. *PLoS ONE*, 15(8 August), 1–9. <https://doi.org/10.1371/journal.pone.0237420>
- Lindsay, B. R. (2011). *Social Media and Disasters: Current Uses, Future Options and Policy Considerations*. In Congressional Research Service Reports. <https://doi.org/R41987>
- Majumdar, S. R. (2017). The case of public involvement in transportation planning using social media. *Case Studies on Transport Policy*, 5(1), 121–133. <https://doi.org/10.1016/j.cstp.2016.11.002>
- Mohanty, S., Dabral, A., Chatterjee, R., & Shaw, R. (2021). Shelter management during pandemics: lessons from cascading risks of cyclones and COVID-19. *International Journal of Disaster Resilience in the Built Environment*, 13(1), 72–88. <https://doi.org/10.1108/IJDRBE-09-2020-0103>
- Mondal, A. (2021a). The importance of community engagement on COVID-19 vaccination strategy: Lessons from two California pilot programs. *EClinicalMedicine*, 32, 100754. <https://doi.org/10.1016/j.eclinm.2021.100754>
- Mondal, A. (2021b). The importance of community engagement on COVID-19 vaccination strategy: Lessons from two California pilot programs. *EClinicalMedicine*, 32, 100754. <https://doi.org/10.1016/j.eclinm.2021.100754>
- Nurmandi, A., Almarez, D., Roengtam, S., Salahudin, Jovita, H. D., Kusuma Dewi, D. S., & Efendi, D. (2018). To what extent is social media used in city government policy making? Case studies in three asean cities. *Public Policy and Administration*, 17(4), 600–618. <https://doi.org/10.13165/VPA-18-17-4-08>
- Perry, R. W. (2003). Incident management systems in disaster management. *Disaster Prevention and Management: An International Journal*, 12(5), 405–412. <https://doi.org/10.1108/09653560310507226>
- Pulido, C. M., Villarejo-Carballido, B., Redondo-Sama, G., & Gómez, A. (2020). COVID-19 infodemic: More retweets for science-based information on coronavirus than for false information. *International Sociology*, 35(4). <https://doi.org/10.1177/0268580920914755>
- Rakhmawati, N. A., Abadi, A. N., & Pramono, T. H. (2020). Social media ranking for local governments in Indonesia. *Electronic Government*, 16(4), 341–354. <https://doi.org/10.1504/EG.2020.110607>
- Rasyid, S. B. A., Nurmandi, A., Suswanta, Mutiarin, D., & Salahudin. (2021). Public Communication of Local Government Leaders: A Case Study of Three Major Governors in Indonesia. *Advances in Intelligent Systems and Computing*, 1352, 487–497. https://doi.org/10.1007/978-3-030-71782-7_43
- Saip, M. A., Kamala, M. A., & Tassabehji, R. (2018). Identifying social roles in a local government's digital community. *International Journal of Engineering and Technology(UAE)*, 7(4.19 Speci), 256–260.
- Santoso, A. D. (2020). Tweets flooded in bandung 2016 floods: Connecting individuals and organizations to disaster information. *Indonesian Journal of Geography*, 51(3), 242–250. <https://doi.org/10.22146/IJG.34767>
- Santoso, A. D., Rinjany, D. K., & Bafadhal, O. M. (2020). Social media and local government in indonesia: Adoption, use and stakeholder engagement. *Romanian Journal of Communication and Public Relations*, 22(3), 21–35. <https://doi.org/10.21018/RJCPR.2020.3.307>

- Shadmi, E., Chen, Y., Dourado, I., Faran-Perach, I., Furler, J., Hangoma, P., Hanvoravongchai, P., Obando, C., Petrosyan, V., Rao, K. D., Ruano, A. L., Shi, L., De Souza, L. E., Spitzer-Shohat, S., Sturgiss, E., Suphanchaimat, R., Uribe, M. V., & Willems, S. (2020a). Health equity and COVID-19: Global perspectives. *International Journal for Equity in Health*, 19(1), 104. <https://doi.org/10.1186/s12939-020-01218-z>
- Shadmi, E., Chen, Y., Dourado, I., Faran-Perach, I., Furler, J., Hangoma, P., Hanvoravongchai, P., Obando, C., Petrosyan, V., Rao, K. D., Ruano, A. L., Shi, L., De Souza, L. E., Spitzer-Shohat, S., Sturgiss, E., Suphanchaimat, R., Uribe, M. V., & Willems, S. (2020b). Health equity and COVID-19: Global perspectives. In *International Journal for Equity in Health*, 19(1), 104. <https://doi.org/10.1186/s12939-020-01218-z>
- Sobaci, M. Z., & Karkin, N. (2013). The use of twitter by mayors in Turkey: Tweets for better public services?. *Government Information Quarterly*, 30(4), 417–425. <https://doi.org/10.1016/j.giq.2013.05.014>
- Song, J.-Y., Yun, J.-G., Noh, J.-Y., Cheong, H.-J., & Kim, W.-J. (2020a). Covid-19 in South Korea — Challenges of Subclinical Manifestations. *New England Journal of Medicine*, 382(19), 1858–1859. <https://doi.org/10.1056/nejmc2001801>
- Song, J.-Y., Yun, J.-G., Noh, J.-Y., Cheong, H.-J., & Kim, W.-J. (2020b). Covid-19 in South Korea — Challenges of Subclinical Manifestations. *New England Journal of Medicine*, 382(19), 1858–1859. <https://doi.org/10.1056/nejmc2001801>
- Suryahadi, A., Al Izzati, R., & Suryadarma, D. (2020). Estimating the Impact of Covid-19 on Poverty in Indonesia. *Bulletin of Indonesian Economic Studies*, 56(2), 175–192. <https://doi.org/10.1080/00074918.2020.1779390>
- Szmigiel-Rawska, K., Lukomska, J., & Tavares, A. F. (2018). Social media activity and local civic engagement in Poland. *ACM International Conference Proceeding Series*, 279–287. <https://doi.org/10.1145/3209415.3209516>
- Szmigiel-Rawska, K., & Tavares, A. F. (2019). Sense or sensibility? Polish mayors in social media | Rozważni czy romantyczni? Polscy wójtowie..., burmistrzowie i prezydenci w mediach społecznościowych. *Studia Regionalne i Lokalne*, 77(3), 27–38. <https://doi.org/10.7366/1509499537702>
- Takahashi, B., Tandoc, E. C., & Carmichael, C. (2015). Communicating on Twitter during a disaster: An analysis of tweets during Typhoon Haiyan in the Philippines. *Computers in Human Behavior*, 50, 392–398. <https://doi.org/10.1016/j.chb.2015.04.020>
- Trainor, J. E., & Velotti, L. (2013). Leadership in Crises, Disasters, and Catastrophes. *Journal of Leadership Studies*, 7(3), 38–40.
- Wang, C., Dong, X., Zhang, Y., & Luo, Y. (2021). Community resilience governance on public health crisis in china. *International Journal of Environmental Research and Public Health*, 18(4), 1–20. <https://doi.org/10.3390/ijerph18042123>
- Wang, W., Wu, Q., Yang, J., Dong, K., Chen, X., Bai, X., Chen, X., Chen, Z., Viboud, C., Ajelli, M., & Yu, H. (2021). Global , regional , and national estimates of target population sizes for covid-19 vaccination : descriptive study. *BMJ Journal*, 2020, 371 <https://doi.org/10.1136/bmj.m4704>
- We are social, & Hootsuite. (2019). *Digital 2019: Essential Insights into How People Around The World Use The Internet, Mobile Devices, Social Media, and E-Commerce*. retrieved at <https://datareportal.com/reports/digital-2019-global-digital-overview>
- Wukich, C. (2020). Connecting Mayors: The Content and Formation of Twitter Information Networks. *Urban Affairs Review*, 58(1). <https://doi.org/10.1177/1078087420947182>
- Xiong, J., Hswen, Y., & Naslund, J. A. (2020). Digital surveillance for monitoring environmental health threats: A case study capturing public opinion from twitter about the 2019 Chennai water crisis. *International Journal of Environmental Research and Public Health*, 17(14), 1–15. <https://doi.org/10.3390/ijerph17145077>
- Zeemering, E. S. (2021). Functional fragmentation in city hall and Twitter communication during the COVID-19 Pandemic: Evidence from Atlanta, San Francisco, and Washington, DC. *Government Information Quarterly*, 38(1). <https://doi.org/10.1016/j.giq.2020.101539>