Government communication and online engagement during "the summer of Zika": Examining content and social media metrics of posts addressing the Aedes aegypti mosquito

by Edna Miola and Francisco Paulo Jamil Marques

Abstract

Over the last few years, health communication has become central in an environment characterized by disinformation and a pandemic. This paper investigates how official institutions have used social media to communicate about health issues and the effects of government-sponsored content on online engagement. Considering the need for a perspective that takes us beyond case studies from the United States and Europe, we examine the Brazilian Ministry of Health Facebook page during the Zika outbreak in 2016. Our research questions are: How does the Brazilian Ministry of Health use Facebook to communicate about Aedes aegypti? To what extent have the communication campaigns been used to promote the image of political actors and institutions? How do the Ministry’s communication strategies on Facebook affect users’ engagement with the content about Aedes aegypti? Using quantitative and qualitative methods, we combine content analysis and social media metrics to study posts addressing the Aedes aegypti mosquito. We discovered that publications recurrently adopted a preventive approach. However, posts focused on addressing diseases were those leading to higher user engagement. The data also indicated that emphasizing attributes favorable to government officials negatively affected user engagement, reducing the effectiveness and reach of the Ministry’s messages. This research allowed us to grasp the diversity of emerging practices in online government communication. It will potentially help policy-makers, communication managers, and scholars utilize the most effective communication strategies during health crises.

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Introduction

The literature on public health points out that factors such as population growth, global mobility, and climate change are among the primary reasons for a heightened risk of infectious diseases (Joffe, 2011;
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Dalrymple, et al., 2016; Linka, et al., 2021, mainly those disseminated by insects in the planet’s warmer regions (Evensen and Clarke, 2011). Accordingly, preventing and fighting tropical maladies has been a constant concern for the Global South over the past few decades (Jackson and Stephenson, 2014; Aya Pastrana, et al., 2020). In the Brazilian case, combating the Aedes aegypti mosquito (Ae. aegypti) started in the nineteenth century, when the first cases of dengue and yellow fever were recorded in the country (Schliessman and Calheiros, 1974; Marzochi, 1994; Gubler, 2011; Teixeira, et al., 2009).

Even though they may have different priorities over time (depending on the epidemiological context), health communication campaigns usually encourage the public to report suspected cases and take preventive steps (Chiaravalloti Neto, 1997; Chiaravalloti, et al., 2002; Rocha, 2003; Noar, et al., 2009; Kalch and Bilandzic, 2017). Nonetheless, despite increased government-sponsored campaigns to provide information about health risks, the media and public remain cyclical to these issues (França, et al., 2004).

One of these cycles started in October 2015, when authorities from the state of Pernambuco, Brazil, warned about a sudden upsurge in cases of neonates born with microcephaly, forcing the federal government to declare a public health emergency (Lowe, et al., 2018). At the time, the media put forward the possibility that this problem could be related to the Zika virus (Aguiar and Araújo, 2016; Teixeira, et al., 2016). The authorities responded to the crisis by sending medical aid to the most affected regions. Communication campaigns were also enhanced to inform the public about how to combat Ae. aegypti, the primary vector of dengue, Zika virus, and Chikungunya virus.

Preventive actions against mosquitoes has been one of the most recurrent communication initiatives carried out by the Ministry of Health in Brazil (Chiaravalloti Neto, 1997; Chiaravalloti, et al., 2002; França, et al., 2004). However, few follow the recommended practices (Chiaravalloti, et al., 2002). What can explain this phenomenon, which was also observed in other countries (Hairi, et al., 2003)?

Faulty communication in public health has been associated with inefficient use of media channels, as well as the government’s low credibility as an information source (Logan, 2014). In fact, government communication in Brazil and other Latin American countries has been marked by the political use of public media (Jambeiro, 2001; Gil and Matos, 2013; Bucci, 2015; Bastian, 2019), leading the literature to contend that the low level of public confidence in government communication has influenced the success of health care campaigns (Dalrymple, et al., 2016; Graham, et al., 2015; Jang and Baek, 2019).

However, when considering the challenges historically faced by different public communication initiatives, several studies have argued that digital media could transform how the government informs and advises citizens (Bertot, et al., 2010; Mergel, 2013a; Darwish, 2017). Even though some scholars are not so optimistic regarding the Internet’s contribution to enhancing communication with society (Morozov, 2011; Marques, et al., 2019), an increasing number of citizens use social media to gather information and discuss public matters, especially in health crises (Graham, 2014; Yuan and Gascó, 2018). From the government’s point of view, this provides an opportunity to measure the repercussions of its initiatives on social media (Macnamara, 2017). Put differently, social media dissemination offers policy-makers the opportunity to collect relevant data for planning communication strategies in public health (DePaula and Dincelli, 2018; Milakovich, 2012; Klievink, et al., 2017; Martinez-Martin, et al., 2018).

Against this background, our main goal was to understand how and to what extent government institutions can take advantage of social media to deal with health crises. At the same time, we assessed the possible impacts that the political use of government communication can have on public engagement. We examined publications on Facebook of the Brazilian Ministry of Health, addressing the mosquito Ae. aegypti and diseases that it transmits. Our research considered posts published between January and April 2016, a season of heat and rain in Brazil, favorable for disseminating the vector (Chiaravalloti Neto, 1997). In fact, this period became known as “the summer of Zika” (Day, 2018).

The Ministry under analysis is the head of a complex structure encompassing the Brazilian Health System (Paim, et al., 2011; Gragnolati, et al., 2013), and has one of the most significant budgets among
government agencies [1]. The Ministry also has one of the most active government pages on Facebook, with almost two million followers/likes at the time we collected the data for this research. Moreover, users’ engagement with publications of the Ministry of Health is also significant compared to other Executive Branch institutions (Miola and Marques, 2020).

To the best of our knowledge, there has been no study aimed to evaluate, at the same time, (a) public institutions’ communication practices on social media, (b) the political use of social media by government actors and institutions, and (c) engagement metrics of Facebook posts. Our analytical framework combines these dimensions to shed light on uncharted territories, such as the extent to which promoting the public image of institutions or political authorities may reduce the effectiveness of health messaging.

In addition, since Brazil is the largest country in Latin America in terms of territory, economy, and population, our paper helps to understand government communication in a region historically featured by health crises, political instability, and patronage (Doyle, 2011; Mackey, et al., 2016). If we consider that much of the Brazilian population depends on public healthcare, investigating the features of communication campaigns is essential to improve policies and save lives. Our research assists policy-makers, researchers, and communication managers in identifying effective messaging in public health communication.

The literature review discusses health communication policies and their relationship with political institutions in Brazil. Next, this paper details its methodological design. After presenting results of the study, we provide new insights into online institutional communications, based on the main research findings.

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**Literature review**

Public communication about health involves promoting awareness, encouraging proper attitudes, refuting misconceptions, and contributing to decision-making processes (Logan, 2014). According to McGuire [2], “if a communication is to have the desired impact on health attitudes and behavior, an individual must be exposed to it, pay some attention to it, become sufficiently engrossed in it to persist, comprehend what it says, agree with it, and ultimately must act as the message urges.”

Accordingly, understanding how to increase the effectiveness of health campaigns has been a common concern in scholarship (Kalch and Bilandzic, 2017). For instance, many researchers note that the public already knows about the risks associated with tropical diseases and how to prevent them, even though few follow recommended practices (Chiaravalloti, et al., 2002; Hairi, et al., 2003). What obstacles prevent effective public health communication? What are the possible solutions to this problem?

In his “communication/persuasion matrix” concerning health campaigns, McGuire (2001) suggested paying attention to some potential problems. For example, McGuire suggested that the source’s credibility (in terms of expertise and trustworthiness) influenced the effectiveness of health communication initiatives. In this paper, we adopt the concept of effectiveness as referring to metrics provided by Facebook — namely, the level of interactions measured by reactions, shares, and comments to each post (DePaula and Dincelli, 2018; Lwin, et al., 2018; Mergel, 2013b).

McGuire’s argument is pertinent to understanding some parallels between health communication practices in Brazil and other countries. Regarding content, for example, communication campaigns in different societies have historically been influenced by actions aimed at primarily informing and convincing the public to know more about public health priorities (Bandura, 2004; Gubler, 2011; Logan, 2014). Scholars have recently included enhancing patient care and facilitating access to services as functions of health communication campaigns (Logan, 2014). However, a key element in Brazil is the role that political power has played in designing government communication practices.
Authoritarian periods in Brazil’s history are reflected in health policies, which shifted from a quasi-coercive approach (e.g., compulsory vaccination at the beginning of the twentieth century) to a more educational one in the 1940s (Rocha, 2003; Paim, et al., 2011). Brazilian re-democratization in the 1980s and the development of participatory institutions helped to promote more dialogical decision-making processes (Coelho, 2006; Avritzer, 2009). Nevertheless, the new scenario did not change the “informationist” character of communication campaigns nor erased the tensions arising from partisan interests of government officials who tried to benefit from (or instrumentalize) public communication (Pitta and Magajewski, 2000).

At this point, it is worth noting that our use of the concept of “political instrumentalization” is slightly different from that proposed by Hallin and Mancini [3], who define it as the “control of the media by outside actors — parties, politicians, social groups or movements, or economic actors seeking political influence — who use them to intervene in the world of politics.” In the context of this research, we understand political instrumentalization as the use of public communication resources (such as public broadcast channels or government social media profiles) by political agents aimed at favoring private interests (electoral ones, for example) (Graber, 2004). In addition, political instrumentalization can be traced to the efforts of politicians to project favorable images about themselves (Bernstein, 1984; McNair, 2015), which frequently occur through the promotion of pseudo-events, pseudo-actions, or pseudo-structures (Alvesson, 1990; Boorstin, 2012).

The literature argues that government communication initiatives in Brazil have been received with suspicion by the general populace. This distrust stems from a concern that electoral objectives are at play (Jambeiro, 2001; Gil and Matos, 2013). That is, while occupying a prominent position in government makes authorities and managers more visible, instrumentalization of public communication on social media weakens their credibility and diminishes trust that people have in government institutions (Marques, et al., 2019). Nevertheless, as shown by Fairbanks, et al. (2007), this is not a problem exclusive to Brazil, appearing even in more mature democracies.

Even though some researchers argue that communication strategies aimed at boosting political actors’ reputation are a feature of many initiatives in political communication (Graber, 2004), there has been little empirical research to date on partisanship in public communication about health. The political use of government-sponsored health communication became a global phenomenon in the context of the COVID-19 pandemic (Makridis and Rothwell, 2020; Touchton, et al., 2021).

While most work focuses on health communication and social media (Avery, et al., 2010; Fu and Zhang, 2019; Jang and Baek, 2019; Moorhead, et al., 2013; Shi, et al., 2018; Thackeray, et al., 2012; Oh, et al., 2020; Bonsón, et al., 2015; DePaula, et al., 2018; Mergel, 2013a; Yuan and Gascó, 2018), other research emphasizes the partisanship of specific health policies (Singer, et al., 2020). This paper employs a methodological framework that combines content analysis and social media metrics — an effort that benefits from Liao, et al. (2020), an analysis of government communication during the early stages of the COVID-19 pandemic in China.

To summarize, if communication is essential to public institutions building trust, confidence, and credibility before the public (Falcione and Adrian, 1997), it may also be employed to cultivate a favorable image for the organization itself and its officials and staff. It is crucial then to reflect on how government actors and institutions can use circumstances, such as public health crises, to promote self-interests. Considering the chronic political instrumentalization of government communication in Brazil (Jambeiro, 2001; Bucci, 2015; Kitzberger, 2012; Bastian, 2019; Marques and Miola, 2021) and that health communication has been predominantly under the responsibility of the state (Paim, et al., 2011), we investigated the content of health messages and how users engaged with those messages on Facebook. Following the literature but considering the lack of evidence to pose formal hypotheses, we propose the following research questions:

**RQ1:** How does the Brazilian Ministry of Health use Facebook to communicate about health issues related to the *Ae. aegypti*
mosquito?

RQ2: To what extent have the Ministry of Health campaigns on *Ae. aegypti* been used to promote the images of political actors and institutions?

RQ3: How do the Ministry of Health communication strategies on Facebook affect users’ engagement with posts about *Ae. aegypti*?

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**Methods**

Concerning content analysis, our research followed protocols recommended by Altheide and Schneider (2013), as well as Neuendorf (2017) and Krippendorff (2004). Driven by our research questions, we first defined each post as the unity of analysis. Next, we filtered out the empirical corpus by considering posts published by the Ministry of Health and terms associated with *Ae. aegypti*. Then, taking the literature into account and employing an inductive approach, we built and applied a set of variables as described in Table 1.

We used Netvizz — a data collector aimed at providing outputs for different sections of Facebook (Rieder, 2013; Thorson, *et al.*, 2020) — to generate a tabular file containing elements such as each post’s URL, date of publication, content, and engagement metrics from the Ministry of Health Facebook page ([https://www.facebook.com/minsaude](https://www.facebook.com/minsaude)). Considering the period between January and April 2016, the Ministry published 626 posts. This period was chosen for two reasons: first, these months had the most favorable conditions for the proliferation of the *Ae. aegypti* suggesting an increase in the Ministry of Health’s efforts to address this issue. Second, it was a time of high public interest since the cases of microcephaly and other congenital malformations were more widely known to be associated with the Zika virus (Day, 2018; Teixeira, *et al.*, 2016; Lowe, *et al.*, 2018).

After extracting the Ministry of Health Facebook page data, we identified which posts mentioned a set of keywords directly associated with *Ae. aegypti*: “aedes,” “mosquito,” “dengue,” “zika,” and “chikungunya”. As a result, we found 190 of 626 publications that met this requirement (among the posts we disregarded were those addressing issues not directly linked to our objectives, such as publications about other diseases, issues like organ donation, and services related to vaccination). These 190 posts were then codified in categorical variables concerning (a) public interest communication and (b) political instrumentalization ([Table 1](#)) [4].

In the context of previous studies on health communication (Bandura, 2004; McGuire, 2001; França, *et al.*, 2004; Mo and Coulson, 2008; Logan, 2014), political communication (McNair, 2015; Holtz-Bacha, 2016), and public image (Bernstein, 1984; Alvesson, 1990; Boorstin, 2012), we used content analysis as a key methodological framework. We built a first set of dummy variables to identify the kind of content that the Ministry of Health published on Facebook. Next, we trained a team of students to test this version of variables.

The preliminary results presented a relatively high number (approximately eight percent) of posts that did not fit into categories proposed in the first round. We then added new variables to improve our methodological design. The final set of seven variables proved to be much more reliable and accurate according to intercoder reliability tests (percent agreement > 91.7 percent; Cohen’s Kappa > 0.821; Krippendorff’s Alpha > 0.833), providing a more precise and detailed view of content published by the Ministry of Health.
### Table 1: Variables.

<table>
<thead>
<tr>
<th>Numeric variables</th>
<th>Description</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>Date of publication of the post</td>
<td>Date</td>
</tr>
<tr>
<td>Comments</td>
<td>Number of comments each post received until the data gathering</td>
<td>Discrete number</td>
</tr>
<tr>
<td>Reactions</td>
<td>Number of reactions each post received until the data gathering (including like, love, wow, haha, sad, and angry)</td>
<td>Discrete number</td>
</tr>
<tr>
<td>Shares</td>
<td>Number of shares each post received until the data gathering</td>
<td>Discrete number</td>
</tr>
<tr>
<td>Engagement</td>
<td>Sum of all kinds of actions users took when interacting with a post on Facebook until the data gathering. Besides other analyzed actions, it includes post saves, three-second video plays, photo views, and link clicks</td>
<td>Discrete number</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Categorical variables</th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posts on <em>Ae. aegypti</em></td>
<td>Is the post theme related to <em>Ae. aegypti</em>?</td>
<td>0 = No 1 = Yes</td>
</tr>
<tr>
<td>Public interest communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevention</td>
<td>Is there information and/or persuasion on how to prevent the spread of the <em>Ae. aegypti</em> mosquito, <em>i.e.</em>, health campaigns?</td>
<td>0 = No 1 = Yes</td>
</tr>
<tr>
<td>Diseases</td>
<td>Is there information on symptoms and/or how to treat diseases transmitted by the <em>Ae. aegypti</em> mosquito?</td>
<td>0 = No 1 = Yes</td>
</tr>
<tr>
<td>Services</td>
<td>Is there information on public services (for example, the location of public health clinics, sanitation actions, and house inspections)?</td>
<td>0 = No 1 = Yes</td>
</tr>
<tr>
<td></td>
<td>Is there data on health</td>
<td></td>
</tr>
</tbody>
</table>
The first group of categorical variables (assembled under public interest communication) focused on communication strategies of the Ministry of Health used to promote health issues, i.e., to ensure the success of policies linked to Ae. aegypti and its related diseases. From one perspective, the notion of public interest communication could be understood as the use of mass media to inform citizens and encourage behaviors that benefit all of society (Rice and Atkin, 2013; Logan, 2014; Sood, et al., 2014). On the other hand, the concept of public interest communication could refer to those communication efforts prescribed by democratic theories, such as promoting participation, transparency, accountability, and citizen rights (Bastian, 2019; Bertot, et al., 2010; Gaber, 2016; Graber, 2004; Habermas, 1996; Miola and Marques, 2020). While the variables on prevention, diseases, and services are associated with the idea of public health as a right (United Nations, n.d.), reports contributed to the latter conception, since it dealt with decision procedures and public policies (Marques, 2016).

The second group of categorical variables focused on what is called “image politics” as evidence of political instrumentalization. We acknowledge that there are controversies surrounding the concept of “image” (Grunig, 1993; Gioia, et al., 2000). Aiming to grasp the extent to which the Ministry of Health instrumentalized its communication, we defined image politics as discursive strategies adopted to fabricate and project attributes favorable to a particular agent or institution (Bernstein, 1984; Boorstin, 2012; McNair, 2015). Similarly, Alvesson [5] labeled communicated image as “something affected by the intentions of particular actors (a company), for whom the image is singled out as a particular concept and target for instrumental action.” We thus assessed the projection of the Ministry and its officials public
images in posts comprising the corpus, as well as tried to find traits of personalized political communication (namely, contents emphasizing political actors associated with pseudo-events or self-promotion) (Alvesson, 1990; Adam and Maier, 2010; Bennett, 2012; McNair, 2015; Holtz-Bacha, 2016; Figenschou, et al., 2017).

To understand features concerning the image politics dimension, we employed the variables *Ministry of Health’s institutional image, Government agents’ image*, and *Non-political actors’ image*.

It is important to mention that all variables listed in Table 1 may co-occur in one single post since publications on Facebook might associate public interest communication goals with a projection of favorable images of institutions and agents.

We also investigated a set of quantitative variables to identify the reach of different content types published on Facebook by the Ministry of Health. Other works have considered Facebook metrics as evidence of popularity, commitment, and virality (Bonsón and Ratkai, 2013; Oh, et al., 2020; Silva, et al., 2019). The platform’s metrics were used as a proxy for digital communication effectiveness (DePaula and Dincelli, 2018; Lwin, et al., 2018; Mergel, 2013b). Considering these works, we included likes, comments, reactions, and shares from the Ministry of Health posts as dependent variables.

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**Results**

The importance of *Ae. aegypti* on the Ministry of Health Facebook page is illustrated in Figure 1 by the size of the terms related to this matter in the word cloud. As expected, there were several words relevant to health as a broad issue (such as “tratamento,” “vacina,” “vacinação,” “doença,” “prevenção,” “vida,” “doença,” “risco,” “sintomas,” and “cuidar”). Among the words referring to specific diseases, those linked to *Ae. aegypti* (“aedes aegypti,” “aedes,” “zikazero,” “dengue,” “microcefalia,” “mosquito,” “zika,” “dengue,” and “chikungunya”) were most frequent. Besides mentioning terms associated with health communication, there were words related to different government agencies (“ministério,” “tvsaúde,” “país,” “SUS,” and “governo federal”). We highlighted the presence of the word “ministro” [Minister], reinforcing the notion that political actors were recurrently cited on the Ministry of Health Facebook posts.
Results of the metrics analysis showed that the Ministry of Health Facebook posts amassed 1,056,602 reactions (like, love, wow, haha, sad, and angry) between January and April 2016 — with most of the reactions were likes (1,027,880). The posts published by the Ministry had an average of 1,687.9 reactions, 102.9 comments, and 1,683.9 shares (Table 2).

Table 2: Metrics, Ministry of Health Facebook posts.

<table>
<thead>
<tr>
<th>Count</th>
<th>Sum</th>
<th>Mean</th>
<th>St. Deviation</th>
<th>Median</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comments</td>
<td>626</td>
<td>64,444</td>
<td>102.95</td>
<td>188.77</td>
<td>49.00</td>
<td>1</td>
</tr>
</tbody>
</table>
We applied content analysis to the 190 posts associated with *Ae. aegypti* to identify the occurrence of public interest communication (variables: *prevention, diseases, services, and reports*) and image politics (variables: *Ministry of Health institutional image, government agents’ image; non-political actors’ image*).

### Table 3: Content analysis.

<table>
<thead>
<tr>
<th>Posts on <em>Ae. aegypti</em></th>
<th>Count</th>
<th>% about <em>Ae. aegypti</em> (n=190)</th>
<th>% total posts (n=626)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>436</td>
<td>.70</td>
<td>.30</td>
</tr>
<tr>
<td>Yes</td>
<td>190</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public interest communication</td>
<td>No</td>
<td>21</td>
<td>.11</td>
</tr>
<tr>
<td>Yes</td>
<td>169</td>
<td>.89</td>
<td>.27</td>
</tr>
<tr>
<td>Prevention</td>
<td>No</td>
<td>108</td>
<td>.57</td>
</tr>
<tr>
<td>Yes</td>
<td>82</td>
<td>.43</td>
<td>.13</td>
</tr>
<tr>
<td>Diseases</td>
<td>No</td>
<td>174</td>
<td>.92</td>
</tr>
<tr>
<td>Yes</td>
<td>16</td>
<td>.08</td>
<td>.03</td>
</tr>
<tr>
<td>Services</td>
<td>No</td>
<td>116</td>
<td>.61</td>
</tr>
<tr>
<td>Yes</td>
<td>74</td>
<td>.39</td>
<td>.12</td>
</tr>
<tr>
<td>Reports</td>
<td>No</td>
<td>175</td>
<td>.92</td>
</tr>
<tr>
<td>Yes</td>
<td>15</td>
<td>.08</td>
<td>.02</td>
</tr>
<tr>
<td>Image politics</td>
<td>No</td>
<td>117</td>
<td>.62</td>
</tr>
<tr>
<td>Yes</td>
<td>73</td>
<td>.38</td>
<td>.12</td>
</tr>
<tr>
<td>Ministry of Health’s institutional image</td>
<td>No</td>
<td>140</td>
<td>.74</td>
</tr>
<tr>
<td>Yes</td>
<td>50</td>
<td>.26</td>
<td>.08</td>
</tr>
<tr>
<td>Government agents’ image</td>
<td>No</td>
<td>148</td>
<td>.78</td>
</tr>
<tr>
<td>Yes</td>
<td>42</td>
<td>.22</td>
<td>.07</td>
</tr>
<tr>
<td>Non-political actors’ image</td>
<td>No</td>
<td>173</td>
<td>.91</td>
</tr>
<tr>
<td>Yes</td>
<td>17</td>
<td>.09</td>
<td>.03</td>
</tr>
</tbody>
</table>

We found 169 posts on *Ae. aegypti* as public interest communication. As shown in Table 3, a relevant part of the messages supported prevention (82 posts). In these publications, the Ministry of Health encouraged...
citizens to participate in urban sanitation actions, as one example. There was also a significant number of posts on public services (74 posts), informing the public about access to health care. Sixteen other posts addressed diseases transmitted by Ae. aegypti. Even though the Ministry of Health downplayed posts about diseases, this issue attracted the most public engagement. Reports was the less frequent category in public interest communication, registering only 15 posts. Usually, this type of post provided epidemiological details as briefings.

Of the 190 Ministry of Health posts, 73 addressed image politics. These underscored positive aspects of the Ministry of Health’s actions, illustrating achievements (e.g., international research agreements) or providing visibility to ministerial meetings and other activities liable to be characterized as pseudo-events (50 posts). These posts also regularly emphasized the association of the Ministry of Health’s actions with government authorities (42 posts praised the then Minister, Marcelo Castro, reinforcing the personalization of these messages). Moreover, we identified 17 posts mentioning other actors tied to health policies, such as professionals or celebrities acting as Ministry of Health’s spokespersons.

We argue that understanding engagement with Ministry of Health content on Facebook may reveal what type of information attracts user interest and to what extent users help spread health messages. At the same time, on the effects of communication campaigns on user engagement, we know that determining the extent to which investments in specific campaigns improve public health indicators has been a challenge to research (Sood, et al., 2014).

This research poses a framework to examine how online users engage with posts, a strategy to understand the effectiveness of online communication. To examine how communication strategies of public institutions have affected online engagement on social media, we assessed data considering (a) the issue when a publication addressed Ae. aegypti; (b) the variables tied to public interest communication; and, (c) the variables tied to image politics. Table 4 displays Spearman’s correlation of posts about Ae. aegypti and Facebook engagement metrics.

<table>
<thead>
<tr>
<th>Table 4: Spearman’s correlation of posts about Ae. aegypti and Facebook engagement metrics.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note: ** Correlation is significant at 0.01 level (two-tailed); List n=626.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>1 Posts about Ae. aegypti</td>
</tr>
<tr>
<td>2 Comments log</td>
</tr>
<tr>
<td>3 Reactions log</td>
</tr>
<tr>
<td>4 Shares log</td>
</tr>
<tr>
<td>5 Engagement log</td>
</tr>
</tbody>
</table>

The correlation test results of the logarithmic-transformed values [6] revealed that both reactions (like, love, wow, haha, sad, and angry) and shares have lower values for posts mentioning the Ae. aegypti (ρ=−.194 and ρ=−.191 respectively). Accordingly, the overall engagement level was negatively correlated to content addressing the mosquito (ρ=−.181). In other words, users had a low interest in posts about this matter, even
Government communication and online engagement during "the summer of Zika": Examining content and social media metrics of posts addressing the Aedes aegypt... though the country was experiencing a public health crisis. Furthermore, only the differences regarding the number of comments were not significant \((p>.05)\) which was compatible with the results of Lwin, et al. (2018) and Silva, et al. (2019), who found that comments were the least frequent type of engagement on governmental social media.

Comparative analysis between public interest communication and image politics demonstrated that projecting favorable images of institutions and authorities was negatively associated with user engagement on Facebook (Table 5). In fact, comments, reactions, shares, and engagement were significantly higher for posts tied to public interest communication \((\rho=.199, \rho=.329, \rho=.401, \text{ and } \rho=.384, \text{ respectively})\), while reactions, shares, and engagement were negatively related to image politics \((\rho=-.220, \rho=-.298, \text{ and } \rho=-.266, \text{ respectively})\). The number of comments was not affected by image politics.

Indeed, even when both public interest communication and image politics appeared in the same post, there was a negative impact on the same metrics (for reactions, \(\rho=-.204\); for shares \(\rho=-.228\); and for engagement, \(\rho=-.232\)). To summarize, user engagement with posts decreased whenever the projection of self-interested content appeared, even when these posts delivered information relevant to the health crisis.

### Table 5: Spearman’s correlation of Facebook engagement metrics and posts on public interest communication and image politics.

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<tbody>
<tr>
<td>Public interest communication only</td>
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</tr>
<tr>
<td>Both</td>
<td>-.777**</td>
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<td></td>
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<tr>
<td>Image politics only</td>
<td>-.446**</td>
<td>-.216**</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Comments log</td>
<td>.199**</td>
<td>-.141</td>
<td>-.109</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reactions log</td>
<td>.329**</td>
<td>-.204**</td>
<td>-.220**</td>
<td>.764**</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Shares log</td>
<td>.401**</td>
<td>-.228**</td>
<td>-.298**</td>
<td>.670**</td>
<td>.815**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engagement log</td>
<td>.384**</td>
<td>-.232**</td>
<td>-.266**</td>
<td>.767**</td>
<td>.971**</td>
<td>.918**</td>
<td></td>
</tr>
</tbody>
</table>

We also analyzed how the dummy variables of public interest communication and image politics were related to engagement metrics (Table 6). Concerning public interest communication, the results revealed that posts highlighting prevention had a significant negative impact on the number of comments \((\rho=-.145)\). At the same time, publications on services and reports did not significantly affect engagement. However, all engagement metrics significantly increased for posts related to diseases (for comments, \(\rho=.181\), for reactions, \(\rho=.148\); for shares \(\rho=.152\); and for engagement, \(\rho=.151\)).

### Table 6: Spearman’s correlation of dummy variables and image politics and Facebook engagement metrics.

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<td>Public interest communication only</td>
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</tr>
<tr>
<td>Image politics only</td>
<td>.469**</td>
<td>.371**</td>
<td>.459**</td>
<td>.492**</td>
<td>.508**</td>
<td>.479**</td>
<td>.498**</td>
</tr>
<tr>
<td>Comments log</td>
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<td>Reactions log</td>
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<td>Shares log</td>
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<td>Engagement log</td>
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<tr>
<td>1</td>
<td>Prevention</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2</td>
<td>Diseases</td>
<td>-0.035</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td>Services</td>
<td>-0.522**</td>
<td>-0.164*</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4</td>
<td>Reports</td>
<td>-0.137</td>
<td>-0.018</td>
<td>-0.194**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Ministry of Health’s institutional image</td>
<td>-0.376**</td>
<td>-0.138</td>
<td>0.160*</td>
<td>0.135</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Government agents’ image</td>
<td>-0.285**</td>
<td>-0.116</td>
<td>0.121</td>
<td>0.126</td>
<td>0.229**</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Non-political actors’ image</td>
<td>-0.199**</td>
<td>-0.095</td>
<td>0.052</td>
<td>-0.023</td>
<td>0.315**</td>
<td>0.366**</td>
</tr>
<tr>
<td>8</td>
<td>Comments log</td>
<td>-0.145*</td>
<td>0.181*</td>
<td>0.072</td>
<td>0.006</td>
<td>-0.091</td>
<td>-0.291**</td>
</tr>
<tr>
<td>9</td>
<td>Reactions log</td>
<td>0.065</td>
<td>0.148*</td>
<td>-0.019</td>
<td>-0.103</td>
<td>-0.224**</td>
<td>-0.414**</td>
</tr>
<tr>
<td>10</td>
<td>Shares log</td>
<td>0.087</td>
<td>0.152*</td>
<td>0.015</td>
<td>-0.073</td>
<td>-0.249**</td>
<td>-0.398**</td>
</tr>
<tr>
<td>11</td>
<td>Engagement log</td>
<td>0.102</td>
<td>0.151*</td>
<td>-0.029</td>
<td>-0.101</td>
<td>-0.253**</td>
<td>-0.438**</td>
</tr>
</tbody>
</table>

Promoting the Ministry of Health image was related to decreased reactions, shares, and overall engagement levels ($\rho=-0.224$, $\rho=-0.249$, and $\rho=-0.253$, respectively). Any attempt to project the image of agents external to the Ministry of Health resulted in statistically lower levels of engagement (for comments, $\rho=-0.291$; for reactions, $\rho=-0.414$; for shares $\rho=-0.398$; and for engagement, $\rho=-0.438$). The most negative impact on engagement metrics was registered in posts promoting the image of public agents working for the Ministry of Health (for example, publications praising the then Minister, Marcelo Castro). In other words, focusing on projecting image (whether institutional or personal) was associated with statistically negative impacts on engagement.

#### Discussion and conclusions

The main goal of this paper was to understand how government institutions employ social media to deal with health crises. We investigated the communication strategies of the Brazilian Ministry of Health on Facebook during the “summer of Zika” (2016). This agency provided a key example of social media use to inform the public about healthcare, promote prevention, report about public policies, and — at the same time — a case study of the political use of communication by a governmental agency.

*RQ1* examined how the Brazilian Ministry of Health had used social media to communicate about health
Government communication and online engagement during "the summer of Zika": Examining content and social media metrics of posts addressing the Aedes aegypti issues. The results revealed that the Ministry of Health Facebook page emphasized persuading people to adopt preventive behaviors, as Logan (2014) prescribed. Also in line with Logan, the second most frequent content on the Ministry of Health’s Facebook page was services, offering health assistance information. The Ministry of Health promoted collective mobilization while publicizing services (Bandura, 2004; Thackeray, et al., 2012) to a lesser extent.

Aspects associated with democratic principles such as participation, transparency, and accountability are tied to the availability of information on public policies, including plans, actions, and results (Miola and Marques, 2020; Coelho, 2006; Avritzer, 2009; Graber, 2004; Bertot, et al., 2010; Bastian, 2019). That function was addressed when the Ministry of Health published reports on Facebook addressing budget planning and spending, as well as information on the number of cases of mosquito-borne diseases. However, this type of content appeared less frequently among public interest communication publications.

According to previous research, building images is a practice extensively used in contemporary mediated politics to foster institutional trust and confidence (Bernstein, 1984; Alveissos, 1990; Gioia, et al., 2000; Figenschou, et al., 2017). Nevertheless, in government-sponsored communication, the resources funding this type of strategy are public — and part of the literature questions whether it is legitimate to redirect public money for such purposes (Bucci, 2015). This issue led some countries to restrict advertising expenses (Fairbanks, et al., 2007), but there is little to no control over Brazilian government expenditures on communication (Hoepers, 2020; Kopp, 2017), despite the Constitution stating that public communication “shall not contain names, symbols or images that characterize personal propaganda of government authorities or employees” (Brazil, 2020).

RQ2 asked to what extent the Ministry of Health campaigns on Aedes aegypti had used to promote the image of political actors and institutions, as evidence of political instrumentalization. We found several Facebook posts promoting messages favorable to the Brazilian government, the Ministry itself, and, remarkably, Minister Marcelo Castro. That is, references to political actors or the Ministry’s self-promotion actions were often combined with public interest goals — for example, holding an open event to launch new health policies but focusing on the Minister’s speech, a typical case of pseudo-event (Alveissos, 1990; Boorstin, 2012). These occurrences of political use were consistent with the notion that reputation building coexists with public interest communication (Graber, 2004). In fact, the Ministry of Health combined image politics (of institutions and individuals) and public interest communication in a substantial portion of its publications. The harmful effects of this strategy can be demonstrated by analyzing the Facebook engagement metrics as a proxy variable, which proved to be a valuable alternative to analyze public institutions’ communication effectiveness on social media.

Considering that Facebook metrics can help us understand the effectiveness of social media communication, RQ3 investigated how the Ministry of Health communication strategies affected user engagement with posts about Aedes aegypti. We verified which type of content related to the health crisis attracted more engagement, and at the same time, we intended to assess the impact political use of government communication could have over reactions, shares, and comments metrics. We found that the content most recurrently used in the publications under study — preventive messages — did not always result in greater public engagement. Regardless of the importance of providing services and prevention as part of the Ministry of Health’s initiatives to fight Aedes aegypti, our data showed that these issues did not have a prominent effect on engagement. In our investigation, Facebook users were most interested in posts on diseases (symptoms and treatments) since they commented, reacted, and shared this content more frequently.

Overall, issues related to Aedes aegypti attracted less engagement than any other issue the Ministry of Health published on Facebook. Although we had not analyzed publications on different topics than mosquito-related posts, their content revealed that posts on diseases like cancer (or organ donation, for instance) usually attracted higher engagement. While counterintuititve, it is essential to highlight that the corpus analyzed in this research was published during the peak of the health crisis caused by the Zika virus. This phenomenon reinforced the importance of monitoring metrics for public agencies to test the effectiveness of
communication strategies and exploit the potential of digital media.

When we assessed the differences in engagement metrics of posts categorized as public interest communication and publications emphasizing image politics, the discrepancies became even more striking. First, as expected, posts categorized as public interest communication had higher engagement than those aiming to promote favorable images of institutions and individuals. The slightest attempt to fabricate and project attributes favorable to a specific agent or institution (Bernstein, 1984; McNair, 2015) resulted in lower engagement levels, even when associated with information on public services.

There is a discrepancy between the Ministry of Health’s communication strategies (the kind of content the institution at stake prioritizes) and user interest (at least according to engagement metrics). On the one hand, the Ministry underscores preventive measures and reinforces favorable attributes about the institution and political agents; on the other, users show little interest in interacting with such content.

Political instrumentalization of health communication may jeopardize effective public communication and threaten the credibility of public institutions as message sources — a concern that McGuire (2001, 1984) and Logan (2014) noted. Favoring agents’ and institutions’ political images compromises the consistency of information available, diminishing credibility.

Our findings are relevant not only for addressing key points regarding communication strategies on social media — a helpful contribution to scholars and communication managers — but also for combining in the same article a framework encompassing content analysis and engagement metrics. Nevertheless, of course, this study has some limitations. First, the available data permitted only discovery of what information that the public reacted to (maybe users did not find the information they really wanted and then decided not to interact). Second, an investigation based on interviewing the Ministry’s staff could help understand more details about the Ministry’s specific communication strategies at play during health crises.

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Notes

1. The budget for the Ministry of Health was planned to be about US$30.2 billion — well below the Minister of Social Security (US$139.4 billion) but higher than the Ministry of Education (US$26.6 billion) (Brazil, 2020).


4. Details on reliability tests, the complete codebook employed in this research, and original data are available in supplementary files at https://bit.ly/3yhyfY.


6. Since the standard deviation values for the Ministry of Health metrics were high, we applied a logarithmic transformation to ensure a normal distribution in statistical tests. Adding “Log” to the name of the variables tested indicated every time this procedure took place (for example, “Engagement Log” to the logarithmic scale of “Engagement”).

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Government communication and online engagement during "the summer of Zika": Examining content and social media metrics of posts addressing the Aedes aegypti...


P. Gil and H. Matos, 2013. “Quem é o cidadão na comunicação pública? Uma retrospectiva sobre a forma
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Government communication and online engagement during "the summer of Zika": Examining content and social media metrics of posts addressing the Aedes aegypti mosquito and Zika virus.


Government communication and online engagement during "the summer of Zika": Examining content and social media metrics of posts addressing the Aedes aegypti problem is critical for effective public health strategy. This approach involves the development of social and health communication campaigns that can inform and engage communities effectively. The use of social media, including social networking sites (SNSs), has become an essential tool in health communication campaigns, providing an opportunity to reach a wide audience quickly and efficiently.


Government communication and online engagement during "the summer of Zika": Examining content and social media metrics of posts addressing the Aedes aegypti mosquito by Edna Miola and Francisco Paulo Jamil Marques. *First Monday*, volume 27, number 7 (July 2022).

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