

# Emotions in Health Tweets: Analysis of American Government Official Accounts

García López

**Abstract**—The Government Departments of Health have the task of informing and educating citizens about public health issues. For this, they use channels like Twitter, key in the search for health information and the propagation of content. The tweets, important in the virality of the content, may contain emotions that influence the contagion and exchange of knowledge. The goal of this study is to perform an analysis of the emotional projection of health information shared on Twitter by official American accounts: the disease control account *CDCgov*, National Institutes of Health, *NIH*, the government agency *HHSgov*, and the professional organization *PublicHealth*. For this, we used Tone Analyzer, an International Business Machines Corporation (IBM) tool specialized in emotion detection in text, corresponding to the categorical model of emotion representation. For 15 days, all tweets from these accounts were analyzed with the emotional analysis tool in text. The results showed that their tweets contain an important emotional load, a determining factor in the success of their communications. This exposes that official accounts also use subjective language and contain emotions. The predominance of emotion joy over sadness and the strong presence of emotions in their tweets stimulate the virality of content, a key in the work of informing that government health departments have.

**Keywords**—Emotions in tweets emotion detection in text, health information on Twitter, American health official accounts, emotions on Twitter, emotions and content.

## I. INTRODUCTION

ONE of the services provided by government health departments is to inform and to educate the population about public health issues and health risks [1]. For this, they must meet minimum standards, especially if the information is released through mass media channels such as social networks. Twitter, Facebook and YouTube, are online platforms with great prominence in the search for health information [2], and news or data shown in these networks, can reach millions of users in a matter of minutes. An example was the use of Twitter by the World Health Organization during the influenza A (H1N1) pandemic [3]. As in other communication platforms, tweets can use objective or subjective language, implicitly involving the possible emotionality of the content.

Emotions are contagious and a key factor for the exchange of knowledge [4]. On Twitter, therefore, as with other types of accounts, when official health agencies launch a tweet, they not only share information but also emotions. In previous studies, the importance of emotions to trigger the exchange

and viral content has been exposed, especially if positive emotions such as happiness are transmitted [5].

The objective of this study is to analyze the possible emotionality in the tweets of four official health accounts in USA during the period from April 15 to April 30, 2018. Thanks to this analysis we will be able to discover the emotional burden and the treatment of health tweets launched by the disease control account *@CDCgov*, National Institutes of Health *@NIH*, the government agency *@HHSgov* and the professional organization *@PublicHealth*. To do this, we use emotion detection in text, a technique that requires natural language processing and automatic learning techniques [6] through the IBM Tone Analyzer tool.

## II. OBJECT AND METHOD

The object of analysis of this study, carried out from April 15 to 30, 2018, are the tweets of the official accounts *@NIH* (47 tweets), *@HHSgov* (84 tweets), *@PublicHealth* (76 tweets) and *@CDCgov* (98 tweets). Their tweets have been analyzed, not including retweets. In addition to the overview, we analyzed in depth, the tweets that during that period of time contained the words "health", "vaccine", "cancer", "disease/s", "drug/s" and the topics "*E.coli* lettuce romaine" and "eggs recalled". These conversation topics generated controversy during the period of time analyzed.

For the study, we used the Tone Analyzer of IBM Watson tool. This tool is an example of analysis corresponding to the categorical model of emotion representation. The categorical model defends that there are basic categories or emotions such as anger, disgust, fear, joy, sadness and surprise [7], and those emotions are represented by words or categories. Tone Analyzer analyzes the affective load of tweets, the words that each phrase contains, providing score from 0 to 1, being None <.5, likely present .5 - .75 and Strong> .75, and classifies them into one of the five basic emotions: anger, disgust, fear, joy and sadness.

## III. EVALUATION AND RESULTS

The accounts analyzed are: 1) *@CDCgov* with 1.07 M followers. Centers for Disease Control & Prevention. 2) *@NIH* with 862 thousand followers. Official Twitter account of the National Institutes of Health. 3) *@PublicHealth* with 489 thousand followers. Official account of the American Public Health Association. 4) *@HHSgov* with 737 thousand followers. News and information from the U.S. Department of Health & Human Services (HHS).

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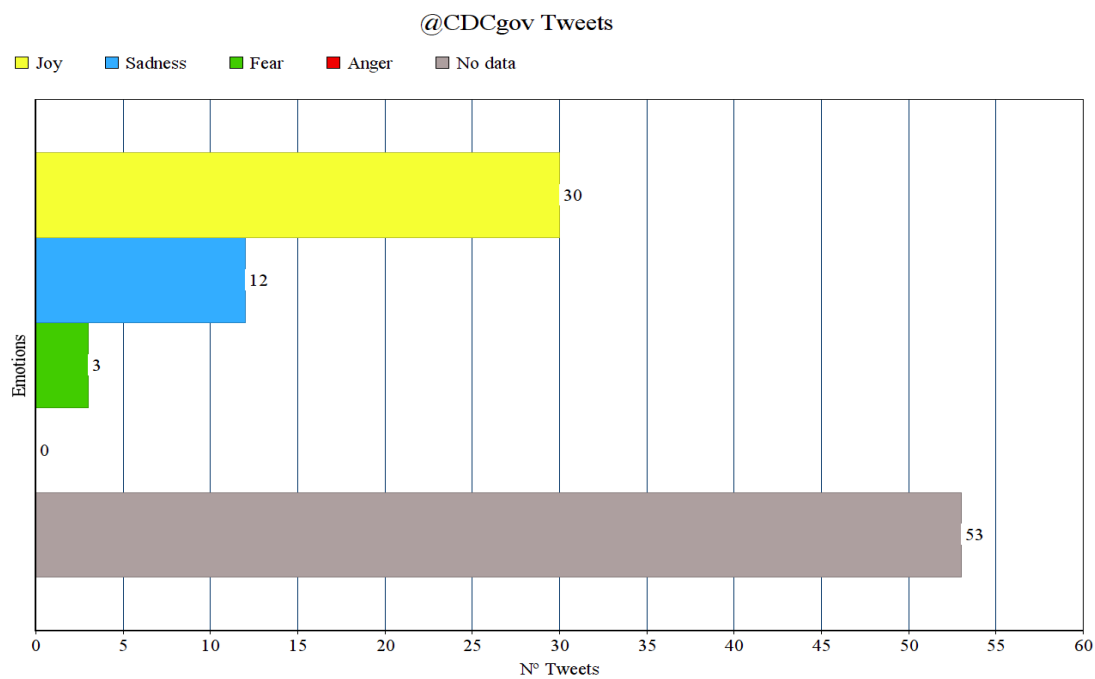


Fig. 1 @CDCgov tweets analyzed (April 15-30)

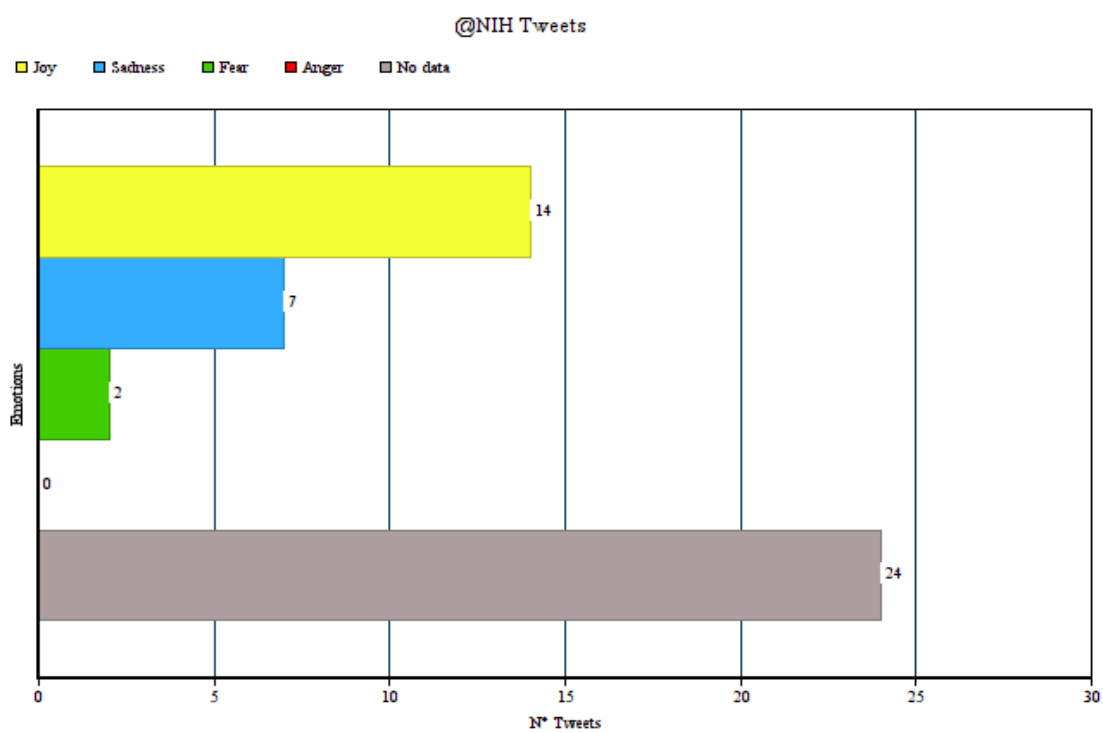


Fig. 2 @NIH tweets analyzed (April 15-30)

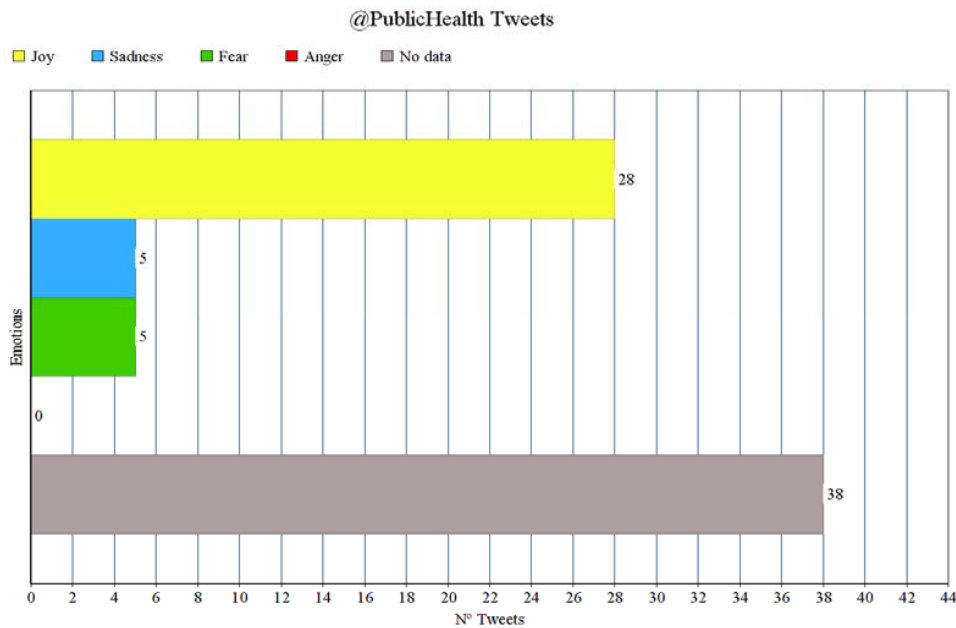


Fig. 3 @PublicHealth tweets analyzed (April 15-30)

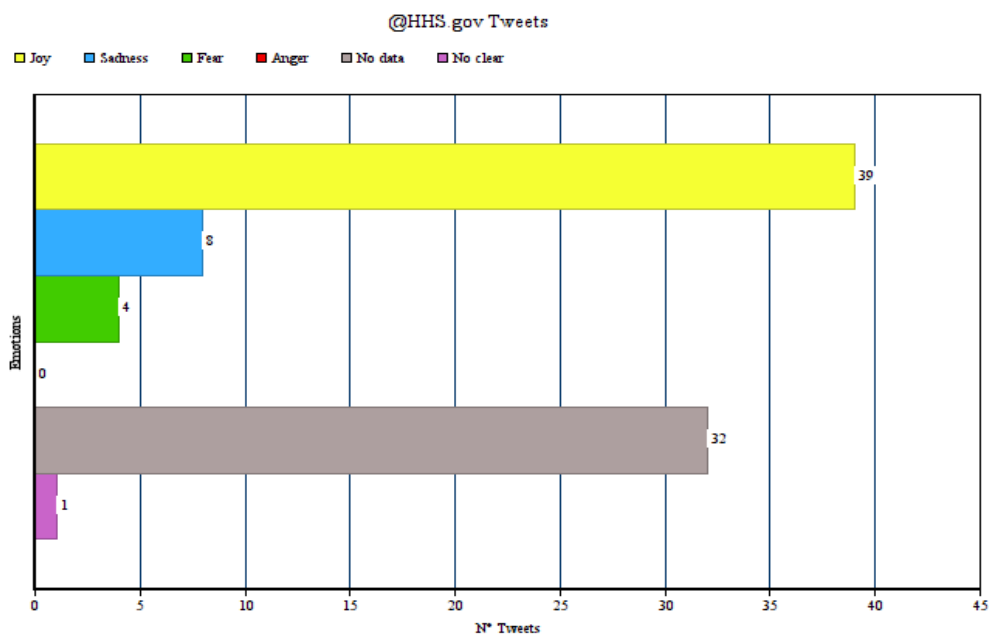


Fig. 4 @HHS.gov tweets analyzed (April 15-30)

In the analyzed tweets of @CDCgov, 54.08% showed no emotion and 45.92% was classified in some of the basic emotions. For @NIH, 51.06% were non-emotional and 48.94% emotional. In the tweets of @PublicHealth, 50% were non-emotional and 50% presented emotions. And for the account @HHSGov, 61.90% were emotional tweets and 38.10% did not present any emotions. In the analysis of the four official accounts, the presence of emotion Joy is higher than of Sadness. Anger is not shown in any of the cases and Fear, does not exceed 7% of the tweets.

The disease control account @CDCgov, with more than 1.07M followers, is the one with the highest percentage of non-emotional tweets. The account of the government agency @HHSGov, (News and information from the U.S. Department of Health & Human Services), with more than 737 thousand followers, is the one with the largest number of tweets classified as joy.

At a general level, the data showed that emotionality is marked in the tweets of the official health accounts analyzed, reaching in the case of @HHSGov 60% of emotionality

during the period analyzed. While the data do not indicate a large majority of emotionality in all accounts, we can speak about an important representation that undoubtedly affects the virality of the content and the treatment of the information.

When analyzing the tweets of these accounts with respect to concrete terms and topics, we found some significant data such as (Fig. 2):

- The term "health" is the most representative in tweets, with a majority in the presence of joy emotion.
- The term "vaccine" is treated in tweets with a greater presence of joy than of sadness. Therefore, it receives a treatment between neutral and positive.
- The tweets with the term "cancer" were classified mostly as sadness.
- The topics "*E.coli* lettuce romaine" and "eggs recalled" did not show relevant data.

#### IV. DISCUSSION

The emotionality in Twitter has been studied in different researches [8], as well as its implication in the propagation of contents. Given that social networks are a rapid and massive dissemination platform, they have become mechanisms to promote health education and research and have changed the approach and the way of communicating health issues. In particular, Twitter has been a tool in recent years booming in this field, used for retransmission from natural disasters to real situations in hospitals [9].

Tweets are natural contextual responses that target the general public beyond culture [10]. Therefore, it is important the work that official departments do with this tool, the information they disseminate, how they disseminate it and with what emotionality.

Through their accounts, they launch content that comes from an official source, is credited in advance with a degree of considerable truthfulness. Their followers will be in direct contact with the information whether positive or not, and with the emotional load that the tweet contains implicit in their words. The choice of some words preparing a message is essential to connect the user and also to show different types of emotions. The choice of an adjective with a greater or lesser degree of valence, excitation or dominance [11] can turn the emotional balance.

Health tweets, as it happens with other contents, can be positive or negative, transmit bad or good news and information in general. As the results showed with the word "cancer", bad news is associated with negative emotions such as sadness, understanding bad news as information that negatively affects the user. Normally, the bad news related to health was established in the doctor-patient relationship [12], however, now they are also part of the digital sphere.

Previous studies have shown that viral content increases if the news is positive and the content transmits positive emotions such as happiness, even affirming that emotional intensity affects the probability of sharing regardless of the positivity or negativity of the generated emotion [5]. Through this study, we have seen how the emotion Joy, predominates over Sadness in the twitter accounts analyzed. This fact would

help the virality of the contents. In addition, the presence of emotions in tweets is very important, a factor that helps these official health agencies to fulfill their role of reaching the user, informing and educating.

#### V. CONCLUSION

As with ads that use emotional content, which get more connection with their audience, emotional content also influences the assimilation of information and its dissemination in social networks. Health departments with official accounts on platforms such as Twitter also generate emotional information that serves their followers as a guide to issues of great importance, for example with public health.

Emotions are present in personal, professional tweets and also in those published by government agencies whose main mission is to inform and educate.

#### REFERENCES

- [1] Harris, J. K., Choucair, B., Maier, R. C., Jolani, N., & Bernhardt, J. M. (2014). Are public health organizations tweeting to the choir? Understanding local health department Twitter followership. *Journal of medical Internet research*, 16(2).
- [2] Fox S. The social life of health information, 2011. Washington, DC: Pew Internet & American Life Project, 2011. May 12, 2013-09-23. Link: [http://pewinternet.org/~media/Files/Reports/2011/PIP\\_Social\\_Life\\_of\\_Health\\_Info.pdf](http://pewinternet.org/~media/Files/Reports/2011/PIP_Social_Life_of_Health_Info.pdf).
- [3] Moorhead, S. A., Hazlett, D. E., Harrison, L., Carroll, J. K., Irwin, A., & Hoving, C. (2013). A New Dimension of Health Care: Systematic Review of the Uses, Benefits, and Limitations of Social Media for Health Communication. *Journal of Medical Internet Research*, 15(4), e85. <http://doi.org/10.2196/jmir.1933>.
- [4] Hyvärinen, H., & Beck, R. (2018, January). Emotions Trump Facts: The Role of Emotions in on Social Media: A Literature Review. In *Proceedings of the 51st Hawaii International Conference on System Sciences*.
- [5] Dafonte-Gómez, A. (2018). News Media and the Emotional Public Sphere| Audiences as Medium: Motivations and Emotions in News Sharing. *International Journal of Communication*, 12, 20.
- [6] Shivhare, S. N., & Khethawat, S. (2012). Emotion detection from text. *arXiv preprint arXiv:1205.4944*. Department of CSE and IT, Maulana Azad National Institute of Technology, Bhopal, Madhya Pradesh, India. Url: <https://arxiv.org/ftp/arxiv/papers/1205/1205.4944.pdf>
- [7] Ekman, P. (1992). An argument for basic emotions. *Cognition Emotion*, 6(3), 169-200. University of California. Url: <https://www.paulekman.com/wp-content/uploads/2013/07/An-Argument-For-Basic-Emotions.pdf>.
- [8] Go, Bhayani, Huang. (No date) Twitter Sentiment Classification using Distant Supervision. Stanford University. Url: <https://www-cs.stanford.edu/people/alecmgo/papers/TwitterDistantSupervision09.pdf>.
- [9] Stump, T., Zilch, S., & Coustasse, A. (2012). The emergence and potential impact of medicine 2.0 in the healthcare industry. *Hospital topics*, 90(2), 33-38.
- [10] Emma Hilton, C. (2017). Unveiling self-harm behaviour: What can social media site Twitter tell us about self-harm? A qualitative exploration. *Journal of Clinical Nursing*, 26, 1690-1704. doi:10.1111/jocn.13575 Google Scholar, Crossref, Medline, ISI.
- [11] Bradley, M.M., & Lang, P.J. (1999). Affective norms for English words (ANEW): Instruction manual and affective ratings. Technical Report C-1, The Center for Research in Psychophysiology, University of Florida. Link: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.306.3881&rep=rep1&type=pdf>.
- [12] Llopart López, E. (2018). ¿Qué estrategias habilidades sociales y comunicativas debe tener el profesional de la salud en relación a la comunicación de las malas noticias?.