# Social Media and Public Health Emergency of International Concern: The COVID-19 Outbreak

Josue Kuika Watat, Magaly Moukoko Mbonjo

# Social Media and Public Health Emergency of International Concern: The COVID-19 Outbreak

Josue Kuika Watat[1] [0000-0003-4673-3800] and Magaly Moukoko Mbonjo[2]

[1] AMBERO Consulting GmbH, 61476 Kronberg im Taunus, Germany
josuewatat@gmail.com
[2] Queen Mary University of London, London E1 4NS, United Kingdom
m.j.e.moukokombonjo@smd19.qmul.ac.uk

**Abstract.** The coronavirus (COVID-19) epidemic is the cause of several disasters on human health and livelihoods in many countries around the globe. Even though everyone is at risk of infections regardless of ethnicity, income, age, class and even political affiliation, the consequences of the epidemic will weigh enormously in Sub-Saharan Africa, at the level of the very fragile sanitary architecture, the economic, social and cultural fabric. This study examines the key determinants of social media adoption and the consequences of their use in managing a public health crisis of International Concern like the Coronavirus. We propose a theoretical framework resulting from a combination of several approaches, such as the health belief model, the Technology Acceptance Model and the theory of social influence. Moreover, we will use a mixed research method to carry out various investigations in our study. The findings and recommendations of this research will serve as a research base for government agencies, health organizations and associations in the reflections and strategic actions being implemented to effectively fight against COVID-19 and equip marginalized communities with efficient information through the use of social media.

**Keywords:** COVID-19, Sub-Saharan Africa, Public Health Crisis, Social Media, TAM, Health Belief Model, Social Influence.

## 1 Introduction

The coronavirus belongs to a group of viruses responsible for lower respiratory tract infections. Some of its manifestations include symptoms such as cough, shortness of breath and acute respiratory distress [1]. Seven type of coronaviruses are responsible of human infections. In 2003, prior to the SARS-cov-2 (Covid-19) outbreak, SARS-cov emerged in China and affected 8096 people with a 10% mortality rate. In 2012, MERS-cov was detected in the Middle East and affected 2494 people with a 37% mortality rate [2]. The clinical manifestations of these three viruses may overlap. However phylogenetically, the SARS-cov-2 has a greater similarity with SARS-like coronaviruses derived from bats. Bats are therefore suspected to be the primary host of the novel coronavirus [3].

The first novel Coronavirus case was discovered in Wuhan (the 7th most populous city in China). The virus is said to have originated from a 'wet market' where wild

animals were equally sold since the first four cases discovered in December 2019 were all in contact with that market [1]. Even though the secondary host has not been confirmed, wild animals sold at the market like pangolins have been incriminated. Animal to human transmission was followed by rapid human to human transmission in China and later on all over the world [4]. Epidemiologically, the novel coronavirus has a basic reproduction number R-naught (R0) estimated to range from 2.2-3.6. This implies that, for 1 case in a population, 2-3 other cases could susceptibly be infected in that given population [3,2].

On January 13th, 2020, Thailand was the first country that reported a case of the novel coronavirus after China [5]. Following the rapid spread of the virus, the WHO declared the coronavirus outbreak as a 'public health emergency of international concern on the 30th January 2020 [6,1]. The disease was named Covid-19 on the 11th of February 2020 and declared a pandemic on the 11th of March 2020. At that time, more than a hundred thousand cases and thousands of deaths had been confirmed in 118 countries [7,5]. As of today 10th May 2020, almost 4 million people have been infected in 215 countries , with 272,859 deaths , therefore putting great stress on health systems worldwide [8].

According to WHO, the first case in Africa was confirmed on the 14th February 2020 in Egypt. This raised concerns about the continent's ability to effectively manage the outbreak given the frailty of its health systems [9]. Sub-Saharan Africa in particular has a high burden of disease with half of deaths being attributed to infectious diseases such as HIV/AIDS, Malaria and Tuberculosis [10]. According to WHO regional director for Africa, "the covid-19 pandemic could be devastating socio-economically and cause thousands of deaths". WHO stressed the importance of a contextualized approach including decentralization of resources and expertise, and empowerment of communities as essential in the response towards the fight against Covid-19 in the region [9]. As of today 10th May 2020, 60657 cases have been confirmed with approximately 2115 deaths (<4% mortality rate) [11].

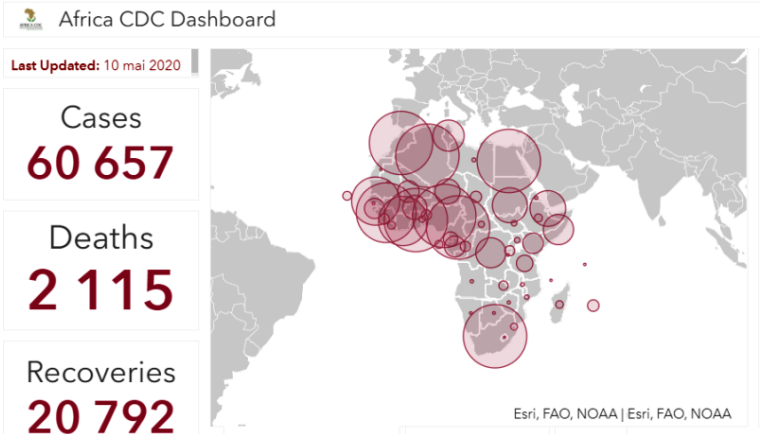


**Fig. 1.** Distribution of Covid-19 cases in Africa, from CDC Africa [11]

Although the African continent has experienced enormous changes in public health crises, it remains an area that is highly vulnerable compared to other continents and

faced with the epidemic of coronavirus (Covid-19). According to the vulnerability indicator for so-called infectious diseases, Africa alone counts 22 out of the 25 countries which are particularly vulnerable to several contagious diseases [12]. The high rate of diseases such as tuberculosis, or HIV, as well as several pathogens, contribute to delay the uncertainty of the diagnoses and to worry in the event of a widespread of the Covid-19 pandemic. Several speculations have emerged regarding Africans' fragility in the face of the virus. [13] discover that regarding the African population, mostly young, we could witness a drop-in demand for intensive care and hospitalization. It is estimated that deaths in Sub-Saharan Africa can vary from 298,000 when the response strategy has been well conducted with the respect of all measures of social distancing from the first alerts to 2.5 million in an environment where no strategy of response is not implemented [13]. Nevertheless, the estimation did not consider the level of health infrastructure, which is particularly low in Sub-Saharan Africa, but also the co-morbidity variation rate between communities of people.

## 2 Literature Review and Development of Hypotheses

### 2.1 Multi-country program on Sexual and Reproductive Health (SRH) for youth through Social Media

In sub-Saharan Africa, most of the population is young, making their sexual health vulnerable because they are not informed and equipped with adequate skills and services. The UNICEF global report [14] shows that in sub-Saharan Africa, the birth rate among adolescents is 120, which raises it to the highest rate in the world, against 85 on average in countries in developing. The report says that less than 5% of women between 15 to 19 years old use condoms [15]. In addition, less than 10% of women report using a modern contraceptive method, which draws attention to the need to communicate about health and sexual reproduction for young people [16]. For example, Kenya has set up a dynamic platform (Mobile for Reproductive Health (m4RH) to educate, engage and empower young people on sexual reproductive health and HIV [17]. The organization in charge of planning in Kenya has also created a digital platform to increase the information and knowledge already acquired on sexual health and sexual reproduction [18]. The success of these platforms in raising awareness and information on sexual health has enabled other East African country like Tanzania to use this communication model in order to maximize their communication on HIV AIDS and sexual health [19].

### 2.2 The Ebola Outbreak in Nigeria

Nigeria was one the most affected country by the Ebola epidemic in 2014. When the disease appeared in the country, fears turned to community contamination towards countries in the West Africa sub-region and across the continent[20]. According to the experience of countries which have managed to contain the crisis, Nigeria has adopted an approach centered on training the general public and health personnel on the various preventive measures [21]. Several results have reported that the strategy adopted by

Nigeria to contain the crisis and thus limit the number of deaths due to the Ebola epidemic has had a great impact thanks to the use of social media [22]. In view of the more than 67 million subscribers that Nigeria had at that time, as well as more than 130 million users of smartphones, coupled with a massive use of social media such as Twitter, Facebook, Instagram, the use of digital technology has therefore had a significant impact in the fight against Ebola [23]. International organizations such as UNICEF have started campaigns where real-time information was disseminated in local languages to people in remote areas, where access to digital tools is often difficult [24]. The Center for Diseases control (CDC) and the World Health Organization (WHO) provided information locally, nationally and internationally to make all information related to viruses widely available[25]. Several celebrities have also joined the various actions around the epidemic by using their notoriety and their multiple platforms for their fans and the communities of which they are standard bearers [26].

### 2.3 Failures identified in the Existing Literature and Theoretical Transformation

For decades, research has explored several theoretical approaches to explain, improve and even provide answers regarding the acceptance of information systems by users. They have contributed significantly to the literature by producing important information on the affective, cognitive, emotional and behavioural reactions of individuals in contact with technology. These studies have also been shown to be important in explaining the various external factors that gravitate around psychological responses and contribute to their formation. Therefore, this study has made use of several models and theories widely used in the existing literature to explore different options for accepting and using technology.

The present research is based on two specific motivations to explore the adequacy with the arrangement of any model. First, the study is based in sub-Saharan African countries that are at high risk of being seriously affected by the covid-19 outbreak. Indeed, communities in rural Africa have difficulties in having access to reliable and viable information, and communication is often difficult between several stakeholders in view of the particularly difficult economic climate, and the absence of reliable telecommunications infrastructures. Statistics show a low level of digital literacy in rural areas [27]. Doubtlessly, there is a considerable gap between the big cities where the heart of the economic and social activity is concentrated and the rural areas where poor and marginalized communities are not always informed of national and world news. They are therefore ignorant given the barrier measures adopted by governments and the World Health Organization to deal with the pandemic, as well as the daily steps being taken to fight against the disease. Besides, the very conservative aspect, refractory to changes, and beliefs in rites and traditions in several villages and rural areas constitute a colossal obstacle first of all to raising awareness of a possible crisis in view as prevention, but also the penetration of digital tools intended to inform but also raise awareness. This is how the researchers undertook to investigate the possibilities of developing constructs which help to assess and reinforce the use and impact of social media for communication in times of public health crises, such as the coronavirus disease.

Also, the literature reports that there have been few studies on the use of web 2.0 technologies in a public health crisis. This literary vacuum leads to the use of the Health Belief Model (HBM) and the theory of social influence regarding the large volume of information exchanged on social networks in times of health crisis.

### 2.4 Health Belief Model (HBM)

The Health Belief Model (HBM) was developed to provide answers to the prophylactic approaches of individuals when it comes to their health as well as detecting the elements that justify the failure of the vaccination program [28]. Indeed, the individual should be aware of a certain number of important factors to adopt a prevention approach against the disease: (a) he must realize that his immune system may be vulnerable to a health threat (sensitivity perceived); (b) he should be aware of the severe consequences that the disease could cause in his life; (c) in the event of contamination, the endorsement of individual attitudes could have a severe effect on his life (d) these attitudes would not be obstructed by pain, cost and embarrassment [29]. The IS literature indicates the importance of the HBM in several fields of action related to health. Among these areas, we can list fertility control [30,31], breast cancer screening [32,33], HIV-related sex [34,35].

Perceived Severity of Chronic Disease is one of the key constructs contributing to the formation of the HBM. We adapted it according to [36] and it is defined in this study as the measurement of the incidence leading to repercussions of certain diseases such as covid19 which one can think that an individual suffers from. As for Perceived Susceptibility to chronic diseases, it refers to a subjective feeling of being infected with covid19 or seeing symptoms related to covid19 (fever, dry cough and tiredness, aches and pains, nasal congestion, sore throat or diarrhea) [37,38]. Perceived Health Risk is therefore the composition of Perceived Severity and Perceived susceptibility. Actions taken to prevent disease or improve health are estimated to be the essential of the health attitude in several theoretical models in the literature [39,40]. Health Consciousness is therefore a varied but significant concept since it refers to the healthy actions taken by an individual to preserve good health (physical, mental) [41]. Individuals who are concerned about their health tend to adopt behaviours which keep them away from diseases [42] and which reminds them of the consequences of attitudes such as unhealthy environment, poor diet [43]. The use of social media in health has two dimensions: social media for the search for health information, the use of social media to communicate on health problems. According to the adaptations made from the research of [44-46], the use of social media for the search for health information refers in this study to existing information on health which exists on the commonly used social media (Twitter, Facebook, WhatsApp, Snapchat…). They can relate to the evolution of an epidemic in an area, the barrier measures adopted in the face of the disease, information on the treatment of the disease and even the existence of a vaccine to prevent the disease. As for the use of social media to communicate on health problems, it involves communicating to your knowledge network (family friends, professional relationships) on social media, the difficulties / symptoms observed regarding the disease. According to the emerging literature, we propose the following hypotheses:

H1: Perceived Severity of chronic Diseases is positively related to Perceived Health Risks
H2: Perceived Susceptibility to Chronic Diseases is positively related to Perceived Health Risk
H3: Perceived Health Risk is positively related to Perceived Usefulness of Social Media
H4: Perceived Health Risk is positively related to Health-related Social Media Use
H5: Health consciousness is positively related to Perceived Usefulness of Social Media
H6: Health consciousness is positively related to Attitude towards Social Media Use
H7: Health consciousness is positively related to Health-related Social Media Use
H8: Social Media Use for Information Seeking is positively related to Health-related Social Media Use
H9: Social Media Use for Health Communication is positively related to Health-related Social Media Use

### 2.5 Social Influence Theory

Social influence theory refers to the different external forces that act on an individual so that he can adopt a certain behaviour or perform certain actions. It contains a tripartite differentiation between normative prejudices in order to (1) maintain an honourable bond between the stakeholders with regard to the awards or censorship related thereto, (2) guaranteeing connectedness and a favourable appreciation of self (3) understanding external social domination [47]. The theory of Social Influence registers three dimensions which refer to social influence. The first dimension refers to compliance. These are subjective norms, which refer to "the perceived social pressure to perform or not to perform a behaviour" [48]. It refers to the domination of external expectations over an attitude [49]. Second, social identity(identification) refers to "one's conception of self in terms of the defining features of a self-inclusive social category that renders the self stereotypically interchangeable with other group members, and stereotypically distinct from outsiders" [50]. Third, Group Norm that refers to goals and values adopted by the members of a community and which are conveyed to all members of the community [50]. We Suggest:
H10: Subjective Norms are positively related to Intention to Use Social Media
H11: Social Identity is positively related to Intention to Use Social Media
H12: Group Norm is positively related to Intention to Use Social Media

### 2.6 Technology Acceptance Model

The Technology Acceptance Model was used in this study to premeditate the use of social media for health communication in a technological aspect [51]. So far, the separate use of the Technology Acceptance Model (TAM) and the Health Beliefs Model (HBM) has not produced concrete results on health-seeking behaviour on social media. TAM was used to explain the different postures adopted by an individual for the use of technology. However, when we want to interpret the behaviour of an individual for the use of technology for health, TAM alone is not enough given its heavy dependence on two of its key constructs, in this case, Perceived Ease of Use (PEOU) and Perceived

Usefulness (PU) [52]. Notwithstanding the wide use of the Technology Acceptance model to clarify various attitudes towards the use of a technology [53,54,51], its action on the use of social media for health-related purposes can only be complete when it is associates with the dimensions of the model Health Beliefs Model as they exhibit an individual's assent when it comes to health. It is therefore wise to evaluate the use of social media for health purposes in a unifying posture that combines behaviour, attitude, cognition, as well as the artificial examination of an individual's mental conditions regarding the viewpoint of his health status. Regarding the literature on the technology acceptance model, as well as the definition of its constructs, we therefore suggest the following hypotheses:

H13: Perceived Ease of social Media Use is positively related to Perceived Usefulness of Social Media

H14: Perceived Ease of social Media Use is positively related to Attitude towards the Use of Social Media

H15: Perceived Usefulness of social Media is positively related to Attitude towards the Use of Social Media

H16: Attitude towards Social Media Use is positively related to Intention to Use Social Media

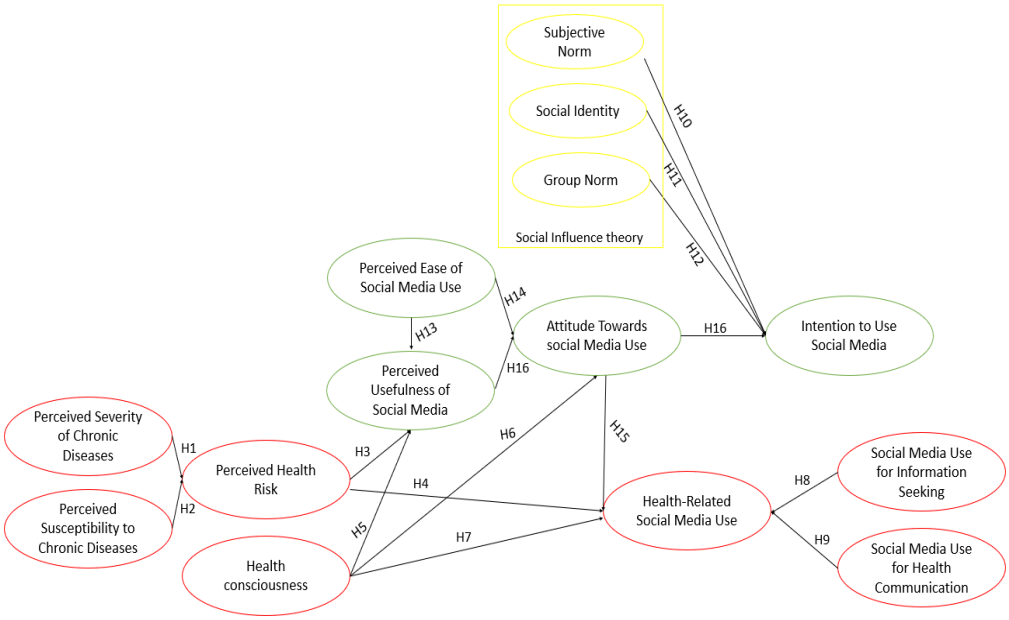


**Fig. 2.** Research Model adapted from [55]

## 3 Methodology

This research draws its foundations from an inclusive model that reconciles the elements of the Technology Acceptance model, the theory of social influence, as well as

research on health beliefs. Works on technology adoption and e-health have historically been managed using surveys [56-59]. The instrument development process is prioritized according to [60]. Items of constructs are collected according to the emerging literature from valid and accessible scales in the literature in order to arrive at an adequate description of each construct resulting from the research model. the terminologies of each construct item are modified and contextualized in research on social media and health. Constructs are evaluated separately in order to reflect the feelings of each individual. For our study, seven-point Likert scales graduated from 1 (“strongly disagree”) to 7 (“strongly disagree”) was used on each item of the constructs of the research model. As for the data analysis, it will be carried out according to the Partial Least Square to Structural Equation Modeling (PLS-SEM) approach. This approach is contextualized to our study environment because it assesses the existing causal links between the constructs of our research model [61,62]. For this research, we will use SmartPLS v. 3.2.8.

## 4 Future Research Directions

In view of the increasingly growing digital evolutions in the world, the use of ICT applications like social media is increasing every day, and their use is becoming more and more diverse and varied, in several areas of life (health, finance, agriculture ...). Social media are therefore important applications to large-scale objectives, with the potential to be informed in real-time about what is happening in the world (health crisis, economic and financial crisis, social crisis). In addition, the presence of social media applications in sub-Saharan Africa provides a feeling of satisfaction for many Africans not only because of the fun carcass it contains but the various features it offers in a context marked by an absence of advanced technology and a gloomy socio-economic situation. The success of social media applications in rural Africa is highly dependent on the adoption of this technology by disadvantaged communities living in rural areas. Thus, the objective of this research was to establish a research framework based on the concentration of the Technology Acceptance Model (TAM) with the theory of Social Influence and the Health Belief Model (HBM) which will thus help to detect the key factors impacting the resolution to adopt social media for health communication in rural Africa. The other goal sought in this research was to develop a theoretical model that could increase the use of social media in the field of health in rural Africa. Social media is important in Africa, but so far there has not been a theoretical framework in the existing literature for understanding the factors that can justify the adoption and continuous usage of social media for health communication. Hence, this study, therefore, bridges the existing gap in the literature by merging the TAM, the theory of social influence, as well as the HBM.

The above model can be used for empirical exploration, whether by practitioners or researchers. The empirical acceptance of the proposed research model will allow us to understand the consequences of the independent variables on the dependent variables. It is recommended to conduct an in-depth quantitative study of the proposed model for

the purposes of generalization and validation. The continuing quantitative study by using the proposed research model will provide homogeneous responses to universalize the results from a strategic point of view.

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