Revista de investigación e innovación en ciencias de la salud
ISSN: 2665-2056
Fundación Universitaria María Cano

Muitana, Gérson; Amato, Cibelle

Topics, Concerns, and Feelings Commented on Facebook after the First Death by COVID-19 in Mozambique

Revista de investigación e innovación en ciencias de la salud, vol. 5, no. 1, 2023, January-June, pp. 144-159
Fundación Universitaria María Cano

DOI: https://doi.org/10.46634/riics.165

Available in: https://www.redalyc.org/articulo.oa?id=673275488010

RESEARCH ARTICLE
OPEN ACCESS

REVISTA RIICS Investigación e innovación en ciencias de la salud

Topics, Concerns, and Feelings Commented on Facebook after the First Death by COVID-19 in Mozambique

Temas, preocupaciones y sentimientos comentados en Facebook tras la primera muerte por COVID-19 en Mozambique

Gérson Muitana[1], **Cibelle Amato**[2]

[1] *Department of Psychology; Faculty of Education; Eduardo Mondlane University; Maputo; Mozambique.*

[2] *Center for Biological and Health Sciences; Mackenzie Presbyterian University; Sao Paulo-SP; Brazil.*

Correspondence
Gérson Muitana.
Email: gmuitana@gmail.com

Cite like this:
Muitana, Gérson; Amato, Cibelle. (2023). Topics, Concerns, and Feelings Commented on Facebook after the First Death by COVID-19 in Mozambique. *Revista de Investigación e Innovación en Ciencias de la Salud. 5*(1), 144-159. https://doi.org/10.46634/riics.165

Received: 09/29/2022
Revised: 11/17/2022
Accepted: 01/25/2023

Editor:
Fraidy-Alonso Alzate-Pamplona, MSc.,

Declaration of interests
The authors have declared that there is no conflict of interest.

Data availability
All relevant data is found in the article. For more information, contact the corresponding author.

Abstract

In Mozambique, as in other parts of the world, COVID-19 has had consequences in many areas, especially in the health sector. This study aims to analyze the comments made and discussed on Facebook after the first death from the disease, verifying the main topics, concerns, and feelings that users most expressed on that social network. Using the content analysis method, IRaMuTeQ® generated a dendrogram focused on death, diagnostic circumstances, disease prevention, and restrictive government measures. Users also raised concerns about health care professionals, family and community, and feelings of sadness. Although the feelings presented reflect the language used in comments on a social network, and it is impossible to diagnose from them, this study creates paths for further research in the area. Therefore, for the first time, it demonstrates results from a mental health study with data analyzed from a social network in Mozambique. These results can guide and alert local health entities about health communications, strategies, and attention that should be given to the mental health of individuals during this pandemic and in the long term.

Keywords

Mental health; COVID-19; social media; Mozambique; expression of concern; feelings; social impact; Africa; death, pandemic; facebook government publication.

Resumem

En Mozambique, como en otras partes del mundo, el COVID-19 trajo consecuencias en muchas áreas, principalmente en el sector de la salud. Este estudio tiene como objetivo analizar los comentarios realizados y discutidos en Facebook después de la primera muerte por la enfermedad, con el fin de verificar los principales temas, preocupaciones y sentimientos que los usuarios más expresaron en esa red social. Utilizando el método de análisis de contenido, IRaMuTeQ® generó un dendrograma con temas enfocados en las circunstancias de la muerte, las circunstancias del diagnóstico, la prevención de enfermedades, y las medidas restrictivas del gobierno. También hubo preocupaciones con los profesionales de la salud, la familia y la comunidad, además de sentimientos de tristeza. Aunque los sentimientos presentados reflejan el lenguaje

Financing
Academic Excellence Program - PROEX (1133/2019)

Disclaimer
The content of this article is the sole responsibility of the authors and does not represent an official opinion of their institutions or of the *Revista de Investigación e Innovación en Ciencias de la Salud*.

Authors contribution
Gérson Muitana: conceptualization, data curation, formal analysis, investigation, methodology, project administration, software, visualization, writing – original draft.
Cibelle Amato: Formal Analysis, Funding acquisition, Resources, Supervision, Validation, Writing – review & editing.

utilizado en los comentarios en una red social, y no es posible dar un diagnóstico basado en ellos, este estudio abre caminos para futuras investigaciones en el área. Por lo tanto, por primera vez, se demuestra un estudio de salud mental con datos analizados en una red social en Mozambique, y puede servir como ayuda y alerta a las entidades locales de salud sobre comunicaciones de salud, estrategias y atención que se debe dar a la salud mental de las personas durante esta pandemia y a largo plazo.

Palabras clave
Salud mental; COVID-19; redes sociales; Mozambique; expresión de preocupación; sentimientos; impacto social; África; muerte, pandemia; Facebook; publicación del gobierno.

Introduction
The COVID-19 pandemic is undoubtedly one of the biggest health challenges of the 21st century since its emergence in China. On March 16th, 2023, the world recorded 760,360,956 confirmed disease cases and 6,873,477 deaths [1]. This situation has significantly impacted the world population, both individually and collectively, especially in health, politics, education, and economy.

While many other countries were not prepared to face it [2], the African continent has been considered little affected by the disease [3]. Consequently, governments have been exceptionally quick to adopt social distancing measures, in some cases before their hospitals have registered a single death [2]. Expressly in Mozambique, through Presidential Decree No. 12/2020, a state of emergency was declared on March 30th, 2020, and urgent exceptional measures were enacted to prevent and mitigate the spread of COVID-19, with emphasis on the prohibition of public and private events, observance of social distancing, and the mandatory use of masks [4]. After the measures, the country confirmed the first death occurred on May 25th, 2020, by the local Ministry of Health (MISAU) [5].

Not only have the deaths drawn attention in this pandemic, but the meaning systems of people's lives have been compromised [6]. Research reveals that the confinement and quarantine measures adopted by governments to prevent the spread of the virus, besides the access to the news, led to changes in daily life and a drastic reduction in interpersonal and interactions relationships [7,8], which ended up generating concerns, feelings, and emotions of varying levels in the populations.

Regarding mental health, studies have reported an increase in worry about the pandemic, mainly because of its impacts on contamination and death from the disease [9]. As the virus is potentially fatal and fast-spreading, it generates feelings that significantly impact the psychological well-being of many people [10]. A population-based study on mental health implications in the face of COVID-19 revealed moderate to severe symptoms of anxiety, depression, stress, and fear that family members would acquire the disease [11]. In the same vein, a systematic review with meta-analysis concluded that since the outbreak of COVID-19, levels of depression, anxiety, distress, and insomnia have increased, which may be due to reduced opportunities for socialization [12].

One of the aspects that grew most during this period was social media as a means of accessing information and communication, used primarily to express opinions, concerns, and feelings through pandemic-related comments, posts and publications. Because of this, media in pandemic times has been used for crisis communication, with health promotion messages and as a source to help quickly identify thoughts, feelings, concerns, attitudes, and issues occupying the individuals' minds [7,13]. In the ecosystem of digital social networks, Facebook is the leading platform [14] and is considered a highly relevant tool for searches and sharing of health-related content, mainly due to its interactive nature [15]. It gains even greater relevance in this period of social isolation, in which many users use it for communication, activism, opinions, and sharing of feelings [16,17], thus generating significant interest from researchers.

Specifically, the Facebook pages of governments and major public bodies dealing with the pandemic crisis attract users because they share and disseminate public health messages [18]. Several countries have analyzed them to verify aspects of the population's engagement, outreach efforts, and mental health [18–20]. In these studies, users on Facebook have discussed various topics, which vary over time due to the different stages of COVID-19 [18,21]. Using diverse content analysis methodologies, some results show that the populations present concerns related to prevention measures, finances, economy, family, employment, food, and an increase in cases and deaths [16,22]. Others have verified the occurrence of positive feelings, which include words of encouragement, unity of the population, solidarity, hope, gratitude, optimism and strength [23], alongside negative emotions such as anger, sadness and expressions of venting about the consequences imposed by the restrictions [18,24].

Although some studies have evaluated the same topic and Facebook is one of the popular social media used by governments, few studies have investigated this platform [20]. Moreover, as far as we know, no Mozambican studies have used a methodology based on information from this social network. On the other hand, while previous research was interested in evaluating Facebook comments over a given period, sometimes very long, involving different stages of the pandemic [19,25,26], and making comparisons on the subject in other countries [18,26,27], this paper will focus on evaluating a particular post and in a given context, which will help understanding the existence of specificities in the comments and, consequently, in the mental health of the investigated population. Therefore, as this is a global pandemic situation that Mozambicans have never experienced, it was hypothesized that the comments would be related to topics such as i) pandemic prevention, ii) concern about self-contamination and the spread of the disease, and iii) feelings of sadness. Thus, this study aimed to analyze the comments made in a MISAU publication on Facebook that announced the first death by COVID-19 in the country, verifying topics, concerns and feelings that users expressed most facing the announcement and the pandemic in general. We hope that the results will help the government and health facilities to understand public demand, make better decisions and respond quickly, considering that aspects related to mental health can be long-lasting if not addressed early.

Method

The qualitative content analysis method was used [28] about comments made on Facebook to verify topics, concerns, and feelings expressed by Mozambicans based on the lexical resource technique [29]. The MISAU post published on May 25th, 2020, which announced the first death from COVID-19 in the country, was analyzed through a convenience sample. In this post, until the data collection date for this study (01/25/2022), the publication had 129 shares and 452 comments. Currently (03/21/2022), the page has a total of 477,407 followers and has published, among other subjects, the pandemic situation in the country in recent years.

Eligibility Criteria

The eligibility criteria were divided into two stages. The first was for selecting posts on MISAU's leading social networks. The adopted criteria were: i) being a post or advertisement published on one of MISAU's official social network accounts (Instagram, Facebook, Twitter or Youtube); ii) being published in the pandemic period, specifically announcing the first COVID-19 death in the country; iii) having open access comments available to the public.

Next, based on the described criteria, searches were carried out with descriptors "MISAU" OR "Ministério de Saúde de Moçambique" (Mozambique Ministry of Health) in the main social networks (Instagram, Facebook, Twitter, and Youtube). Likewise, on the official website of the Ministry, https://www.misau.gov.mz/, links to the entity's social networks were visited. Three social networks (Facebook - www.facebook.com/MISAUMOCAMBIQUE/; Twitter - twitter.com/SaudeMisau; and Youtube - youtube.com/@misaumocambique504/featured) were found, while on Instagram, no accounts were found. From social networks, Instagram was excluded for non-existence, while Twitter and Youtube for not publishing or not announcing the first death from COVID-19. Thus, Facebook was the social network identified, and the post announcing the first death from COVID-19 in the country was published on May 25th, 2020.

After the selection of the post, in the second moment, the selection of the comments was conducted. Here it was analyzed a post that initially had 452 comments, of which, in the first reading, 19 were excluded: 16 presenting only *emojis* (faces) and three undecipherable expressions. After the second reading, seven more comments in languages other than Portuguese were also excluded, totaling 26 comments not included in the analyses. It is understood that comments with *emojis* and images cannot be accurately defined pragmatically, although they can convey emotion. On the other hand, the indecipherable expressions were mostly misspellings and/or abbreviations that did not allow us to determine their true meaning. Although the comments in another language were helpful for analysis, their size (in words) was quite insufficient to modify the findings. The processing software allows analysis of the *textual corpus* with the previously pre-defined language. Therefore, 426 comments were considered eligible and analyzed in this study due to these aspects. Figure 1 shows the flowchart of Facebook social network post and comment selection.

Pre-processing and data analysis

In the initial phase of processing, all comments on the publication were extracted from Facebook into a word document to perform the de-identification, verify all eligibility criteria, and do the grammar review. Everything identifying the users (for example, names or email) was excluded in this step, and only their comments were left. On the other hand, all comments (with words) preceded or followed by a graphic symbol (*emojis*, sticker or image) were kept, and the characters were removed. Next, the text was submitted for a grammatical revision for errors, abbreviations, and accents to standardize the entire text for Portuguese. In the final phase, the text with 426 comments was copied to a notepad, transformed into a text corpus following the software's guidelines for analysis, and later saved in text document format (*.txt) UTF-8 (*Unicode Transformation Format 8-bit code units*) coding.

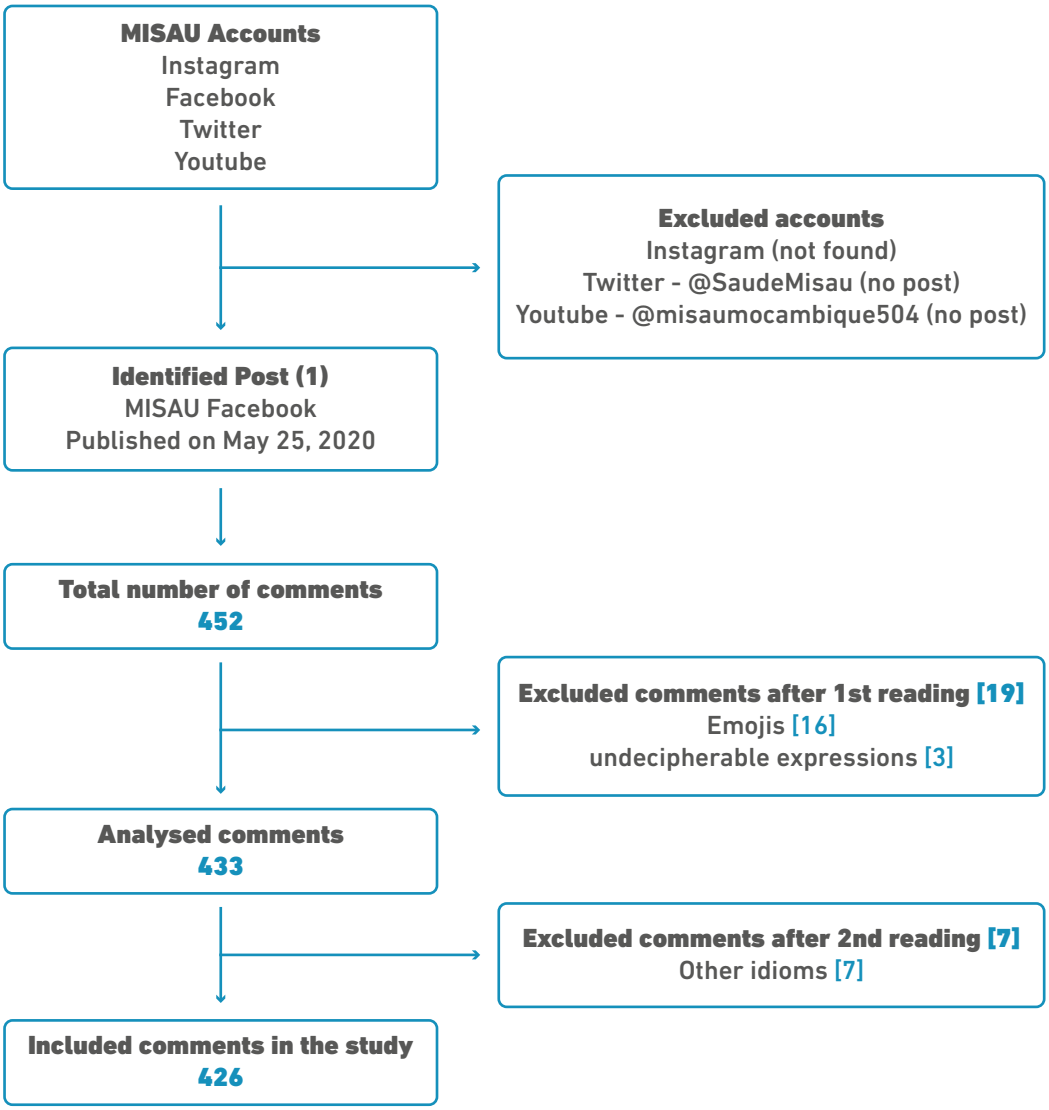

Figure 1. Facebook social network post and comment selection flowchart.

In the analysis phase, the IRaMuTeQ® for data processing was used. It is a software that allows you to perform different forms of statistical analysis of texts, from the simplest to multivariate analysis [30], produced from interviews, and documents, among others [31,32]. It is used worthwhile to perform statistical calculations on qualitative data, thus increasing the rigor and reliability of the analyses [33]. In this study, a basic lexicographical analysis was conducted, which consisted of calculating the frequency of words and the Descending Hierarchical Classification (DHC). The DHC aimed to obtain classes composed of a vocabulary/lexicon, simultaneously, analogous to each other and distinct from the vocabulary of the other classes, in addition to verifying the distance and proximity from Chi-Square Tests (chi²) [32]. In the associative strength through the Chi-Square Test of each word that composes a specific class, the results are more significant than 3.84 and $p<0.0001$ represent strong correlations among the terms [34].

Results

According to the dendrogram (see Figure 2), classes 5 and 4 (with 19.4% and 18.8%, respectively) were the ones that had the highest percentage in the entire textual corpus analyzed, while Class 1 (12.5%) had the smallest. In general, Figure 2 shows the division of the *textual corpus* analyzed into two categories, one of which was subdivided into four parts. In the divisions, verifying how some categories are related or opposed to each other and which words are part of each set is possible. In summary, there is a proximity between classes 3 and 4, which indicates a strong relationship between the content of the comments that address aspects related to the prevention of COVID-19. Furthermore, it is essential to verify that although they talk about the same subject, class 3 addresses each healthy or infected individual's duty concerning the disease, such as "quarantine" and "distancing". In contrast, class 4 is focused on the duty and responsibility of others, such as "family", "ministry", "nurses", and other "professionals".

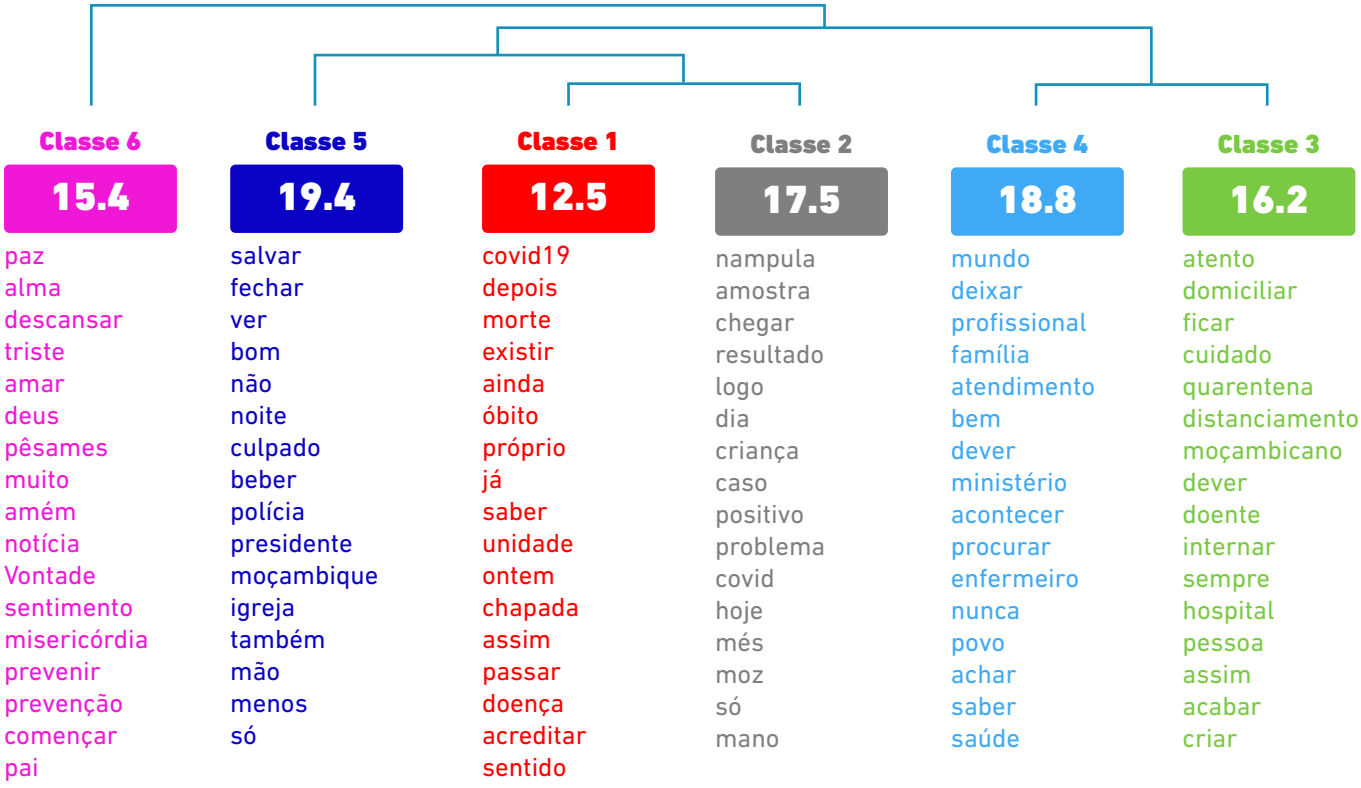

Figure 2. Dendrogram showing the division of the textual corpus into 6 classes.

In classes 2 and 1, perceiving some relationship is possible. For example, in class 2, the comments are related to the diagnosis, in which it is possible to observe expressions such as "sample", "result", and "positive". In contrast, in class 1, the terms focus on "death" and "decease". Thus, it can be seen that the comments address the stages of the disease identification process until the patient's death, starting with sample collection and diagnosis until the death

phase. On the other hand, class 5 is far from classes 2 and 1. This distance is explained insofar as one class has nothing to do with the other. In this case, according to the Mozambicans, if there were strict measures with the support of the "police" to "close" the places with the most significant crowding, then there would be a possibility of "saving" a lot of people (class 5). Consequently, there would be no positive COVID-19 results and deaths (categories 2 and 1).

Still, regarding the antagonistic categories, it is possible to verify that class 1 is the most distant insofar as it addresses comments lamenting the death and consoling the family. It is important to note that although the pandemic and death brought about various debates such as "prevention", "diagnosis", and individual and collective "duty", a part of Mozambicans chose not to discuss these issues, limiting themselves only to lamenting the occurred and to seek strength to their encouragement and that of the deceased's family.

Analyzing the classes more precisely and in detail based on the comments, the authors inferred that Class 1 was named "circumstances of death (disbeliefs about the disease and death)" and presented only two words with higher correlation indices: "COVID-19" (25.58; $p<0.0001$) and "after" (depois) (23.24; $p<0.0001$). In this class, the comments questioned the circumstances of the death and demonstrated disbelief about it, as well as about COVID-19, as presented in the following statements:

> "…they never identified positive exams results in Nampula. How is it that now there is already a death in Nampula by covid 19? - it doesn't make sense" (comment 1).
>
> "Even I don't believe this about someone dying from covid 19…" (comment 2).
>
> "… for me, coronavirus has not arrived in Mozambique yet…" (comment 3).

Semantic Class 2 was called "circumstances of diagnosis and place of death". The words that had the highest correlation rates were: "Nampula" (33.96; $p<0.0001$), "sample" (amostra) (29.39; $p<0.0001$), "to arrive" (chegar) (23.59; $p<0.0001$), "result" (resultado) (19.34; $p<0.0001$), "soon" (logo) (19.34; $p<0.0001$), "day" (dia) (18.49; $p<0.0001$), "child" (criança) (17.41; $p<0.0001$), "case" (caso) (16.7; $p<0.0001$); and "positive" (positivo) (15.97; $p<0.0001$). In this class, the comments focused on how the diagnosis was made in the city where the first death occurred, mainly because there was never a confirmed case of the disease. The following posts demonstrate this situation:

> "After all, how many days does the sample take to reach the laboratories" (comment 1).
>
> "How does Nampula register the first death by covid-19 if it did not have any confirmed positive case until the 24th?" (comment 2).
>
> "They took a sample on the 20th. They were only able to undergo the exam on the 24th to have results on the 25th" (comment 3).

In class 3, which was called "disease prevention", the words "attentive" (atento) (37.73; $p<0.0001$), "home" (domiciliar) (32.13; $p<0.0001$), "to stay" (ficar) (29.18; $p<0.0001$), "care" (cuidado) (25.95; $p<0.0001$), "quarantine" (quarentena) (25.95; $p<0.0001$), "distancing" (distanciamento) (21.14; $p<0.0001$), "Mozambican" (19.49; $p<0.0001$), "duty" (dever) (19.13; $p<0.0001$), and "sick" (doente) (15.41; $p<0.0001$) were displayed. Here, users made comments calling for the adoption and compliance of COVID-19 prevention measures, as presented below:

> "mandatory distance…, everyone in the house always wears a mask, everyone, always cleans all surfaces… they have to take all the hygiene care… Stay tuned Mozambican" (comment 1).

> "I fully agree, these people are all asymptomatic, and they have to have home quarantine, since being a carrier of the virus they are already a danger to everyone" (comment 2).

In class 4, the second with the highest percentage was called "health professionals, family and community". The words that had the highest correlations were: "world" (18.39; $p<0.0001$), "to leave" (18 .39; $p<0.0001$) and "professional" (17.07; $p<0.0001$). Here, the posts showed a particular concern and care that health professionals should have in order not to transmit the virus to their families and the community, as the comments show:

> "Professionals who attend these people should be forbidden to go home to avoid proliferation to their families and community!"

Class 5, which had the highest percentage in the entire corpus, was called "restrictive government measures". The words with the highest correlations were: "to save" (30.46; $p<0.0001$), "to close" (25.02; $p<0.0001$), "to see" (21.17; $p<0.0001$), "good" (20.62; $p<0.0001$), "no" (17.07; $p<0.0001$), "night" (17.07; $p<0.0001$), "guilty" (17.07; $p<0.0001$), "to drink" (17.07; $p<0.0001$). Here, the comments pleaded for the Republic President to decree the closure of more places to enforce quarantine compliance, besides suggesting that the police should be used continuously to strengthen compliance measures.

> "The Mozambican breweries must be closed too, not only the churches and schools because many people who don't stay at home go out to drink, and our police only act at night. Why can't they do that during the day too?"

Finally, Class 6 was called "sadness, comfort and solidarity with the victim's family". The words that had the highest correlations were: "peace" (89.47; $p<0.0001$), "soul" (75.81 ; $p<0.0001$), "to rest" (39.53; $p<0.0001$), "sad" (36.95; $p<0.0001$), "to love" (33.53; p<0, 0001), "God" (29.26; $p<0.0001$), "condolences" (27.87; $p<0.0001$), "very much" (25.2; $p<0.0001$), "amen" (17.29; $p<0.0001$). Here are the comments:

> "...This death is to be regretted, and I address my heartfelt condolences to the bereaved family..." (comment 1).

> "Unfortunate news, my condolences about the young lady... Only God can protect us by his mercy" (comment 2).

> "What sad news, my goodness.... May God rest her soul.... Peace to her soul...!" (comment 3).

Discussion

This study aimed to analyze the comments made and discussed in a publication by MISAU on the Facebook social network that announced the first death by COVID-19 in Mozambique to verify topics, concerns, and feelings that users most expressed in the face of the announcement and the pandemic. Using the content analysis method, the textual corpus generated six themes that represented the main subjects, namely: i) "circumstances of death" (with two subtopics: "disbeliefs about death" and "disbeliefs about the disease"), ii) "circumstances of diagnosis" (with a subtopic about "place of death"), iii) "disease preven-

tion", and iv) "restrictive government measures". They also showed concern for v) "health professionals, family and community" and vi) feelings of "sadness" (with a subtopic: "comfort for the victim's family").

In recent years, the use of social networks has increased exponentially, especially during the pandemic. Since the announcement of the first case of COVID-19 in the world, users have become more active than ever before. As a result, collecting and analyzing data from these media has attracted significant attention from researchers, becoming a rich field, particularly in mental health [35,36], verified by several studies and publications focused on the individual's health [16,18,25,37].

One of the advantages that makes these platforms used as a means of analysis has been mainly due to their methodological process and their utility for assessing real-time changes in mental health and social well-being before, during, and after rapid socioeconomic changes [27]. Social media data provide an increasingly detailed large-scale record of the behavior of a sizable fraction (about one-seventh) of the world's population [38]. A survey from social media allows for a more direct measurement of patients' perspectives on illness [38]. It can provide timely estimation and forecasts at a lower cost, which is sorely needed during the COVID-19 pandemic for immediate public health practices [36]. Another important fact is the voluntary contribution of participants, high availability, broad geographic coverage [36,39], and participation of a very representative sample at a time when social contact was restricted.

Specifically, Facebook has the most active users, with 2.45 billion monthly users and 2.8 billion across all of the company's major products [14]. This fact can be critically crucial for analyzing content, concerns, and sentiments, especially amid rapidly evolving news cycles that change the discourse related to the pandemic [27]. Accompanied by the absence of research data, this social network represents a potentially valuable data source for studying emerging social issues during an unprecedented public health event [40].

This research corroborates previous studies on the topic and the hypothesis initially explicitly raised to the comments associated with disease prevention, concerns about contamination and the spread of the disease, and feelings of sadness. Regarding disease prevention, a survey that analyzed the accuracy of articles on this topic on social media concluded that of the top 30 articles shared 4,904,160 times, 96.8% were through Facebook [41]. On this platform, there is a demand for shares and comments related to preventing COVID-19 more than on other social networks. This fact is not surprising, considering that Facebook is widely accessed, and prevention remains the primary means of limiting the spread of the coronavirus until a more substantial portion of the population is vaccinated. On the other hand, appeals for compliance with prevention measures have already been found in many topics of studies carried out on Facebook [18,21]. In them, users comment on social distancing, mandatory use of masks, surface hygiene, and home quarantine, which represent some measures released by the World Health Organization and authorities in many countries, including Mozambique [4,18]. Although there is an action gap between COVID-19 prevention knowledge and implementation into practices to combat the spread [42], these findings are encouraging as they may indicate that most users are aware of the measures, which is extremely important for combating the pandemic, as it encourages others to comply with them, differently from what was found in the research by Keller et al. [37], held in 2021, in which 63% of the comments were against preventive measures, mainly about compliance with the use of the mask.

The care was an aspect that was also evident in the comments. However, this is not directly related to self-contamination, and the disease's spreading as initially predicted. It is noted that users are more concerned about the possibility of health professionals transmitting COVID-19 to their families and the community because they are considered a high-risk group. Indeed, what has been found is that, compared to people in general, health professionals who work on the frontline are at greater risk of becoming infected and infecting their peers, whether family members or co-workers [43,44], which somewhat reinforces this reported worry.

The professionals themselves also share the worries of Mozambicans with this class. Studies show that professionals have feared becoming infected and transmitting the virus to their family members [45], mainly because asymptomatic individuals can infect several family members [46]. Still on this issue, in contrast with other research, while in this study, users showed concern about the possibility of professionals transmitting the disease. Further Facebook research found that there was much solidarity and gratitude towards these health workers in the comments because of the recurring numbers of those infected, recovered, and killed by the disease in the population [16,18].

Regarding the feelings presented by users, it is essential to note that interpretation should be cautious as an individual's use of words may not accurately reflect underlying psychological states, even though they did demonstrate sadness over the death and manifest expressions of comfort to the victim's family. As in other social media studies, language indicative of sadness was used in tweets about losing loved ones due to COVID-19 infection [47]. Even for individuals who have not experienced some loss in the family, sadness remains a very evident and characteristic feeling across the population during this pandemic, not only because of the deaths but also because of the high number of positive tests [22]. Therefore, corroborating the findings of this research, it is frequent to verify that users post several messages giving emotional support to those who are sad and facing the process of loss and/or mourning [24].

The emotional support verified in the subtopic "comfort for the victim's family" was manifested through comments that expressed empathy, condolences, and welcome for the victim's relatives. This support involved messages of individuals' beliefs, emotions, practices, and relationships to a higher power or a divine being, the sacred [48]. The fact is that in this odd moment of the pandemic by COVID-19, with many losses and mourning that can generate insecurity, affliction, and fear, Mello and Silva [16] refer that with certainty: people connect around spirituality as an encouragement to their longings through Facebook groups.

However, although not initially foreseen in the hypotheses, other topics related to the pandemic were also commented on, which can demonstrate the population's engagement in this social network and how much the pandemic has impacted the lives of Mozambicans. The subtopics "disbeliefs about the disease and death" were identified in this research, and these may have been influenced by conspiracy theories linked to the pandemic [25], and/or many questioning caused by the concerns that generally occur during this period [9]. Conspiracy theories and questioning can lead to many risky behaviors, explicitly disregarding the pandemic's severity and the information transmitted by official channels [19]. Still related to this, it is recurrent to check Facebook studies that have observed the occurrence of topics related to myths and conspiracy theories linked to the pandemic [25]. For example, rumors that the consumption of garlic, keeping the throat moist, the need to avoid spicy foods for the disease prevention, as well as conspiracy theories relating COVID-19 as a biological weapon designed by international agencies [25].

Another perspective postulates that during times of turbulence, conspiracy beliefs act as a buffer against stress or uncertainty, causing individuals to minimize the significance of the existing threat [49], reducing panic and fear. However, given that the current perception of risk leads to the adoption of prevention behaviors [50], disbelief coupled with misinformation and circulation of fake news, which have often been disseminated in this period, can lead to less accurate knowledge about COVID-19 and increase the likelihood of contracting the disease. Thus, in a pandemic such as this, in which behavior is vital to avoid even worse catastrophes, it is fundamental to reflect on the collective impacts that individual posture can take, although disbelief is a strategy to minimize the significance of the existing threat.

For the subtopic "place of death", it is common to see in social networks the occurrence of words or expressions that refer to the names of places around the world, especially when they have been reported in the news as the epicenter of the pandemic. A longitudinal study found that in late January 2020, China was a dominant topic on Twitter, indicating that the public may have commented on where the virus originated. But later, topics and tweets were centered on the "United States" because Americans became more concerned about pandemic control measures [27]. Thus, there is a tendency for social media content to follow the flow of information that is released by the media. That is why expressions such as "Nampula" were expected to appear very often in this subtopic, as it is the place where the first death from COVID-19 was recorded.

To conclude, governments have constantly been monitoring the pandemic. This study showed that users appealed to authorities to enact more "restrictive measures" to prevent virus transmission. Topics related to government plans and measures to combat the pandemic have already been investigated using Facebook in previous studies [18]. Specifically in Mozambique, the government decreed, among other measures, the restriction of circulation on public roads [51]. But the comments seem to show that non-compliance by the population, so they requested stricter interventions, such as using the police to reinforce compliance. This topic may have drawn users' attention because of examples on social networks about what was happening in some contexts, in which the police authorities were used to act in situations of non-compliance and others that were somehow justified [21].

Limitations

In this research, the presented feelings reflected the language used in the social network comment; therefore, they were not necessarily the underlying emotions of the population. It is also impossible to accurately diagnose someone with a mental health condition only through social media comments. However, research has shown that social media content contains important indicators regarding mental health and biomedical signs.

The results were obtained through Mozambican Facebook users, which is a different approach from national survey statistics. However, public opinions collected on this social network may represent opinions from younger populations. Another limitation is that although the data had numerous variables (date, time, profile information, locations, etc.), they were not analyzed, and no inferences were made about them. Moreover, these limitations do not diminish the importance or validity of the study; instead, they create paths for future research to expand on these findings.

Conclusion

Many studies on social media have reported the increase or worsening of psychic changes with significant impacts on the mental health of populations. In this paper, we could note that users have addressed issues related to the death circumstances and diagnosis, disease prevention, and government restrictive measures. Also, there were worries with health professionals, family, and the community and additionally feelings of sadness, besides posting messages of empathy and comfort for the victim's family. This distribution of themes may reflect the moment the country went through, which may be different if they were evaluated at other times, suggesting further research at other times.

Governments were committed to responding very quickly to the effects of the pandemic to avoid tragic long-term consequences. However, due to traditional research methods that are time-consuming and expensive, such as high costs in recruiting participants, screening using existing scales and instrument validation, drawing real-time conclusions is arduous. In this way, the use of social networks provides great benefit to respond with recent research that characterizes different moments of the pandemic, consequently helping in the rapid development and evolution of mental health policy guidelines for populations.

These findings support the appeals of public health and medical studies that warn of urgent concern for aspects of mental health during the pandemic due to adverse effects on the population. Furthermore, increasing rates of social media use suggest that they may be a coping mechanism to combat worries and feelings of isolation related to long-term social distancing beyond their feasibility to study biopsychosocial aspects.

From the conclusions reached, it is essential to emphasize that the presence of authorities on social networks, such as Facebook, per se, is not enough. They need to have them with legitimacy (e.g., verified accounts), outreach, strategy, and expertise. Allied with that, we draw attention to the importance of investigating the dynamics of these tools in general and Facebook in particular, on the part of communication professionals from these bodies. This action may be necessary for the primary purpose of health communication and evaluate the effectiveness of their public health education efforts. Communicating and interacting with users through more understandable messages in the most critical comments can increasingly direct health communication, especially concerning COVID-19. Therefore, the psychological and psychiatric implications of COVID-19 continue to be evident in the Mozambican population, although these are probably underestimated and neglected by some health authorities. On the other hand, for the first time, it has been shown results of a study on mental health with data analyzed from a social network in Mozambique. These data can guide and alert local health entities about health communications, strategies, and attention that should be given to the mental health of individuals currently in this pandemic and the long term.

References

1. World Health Organization [WHO]. WHO Coronavirus (COVID-19) Dashboard. WHO; 2022. Available from: https://covid19.who.int/info (accessed March 21, 2023).
2. Dyer O. Covid-19: Africa records over 10 000 cases as lockdowns take hold. BMJ 2020;369:1–1. doi: https://doi.org/10.1136/bmj.m1439
3. Obi-Ani NA, Anikwenze C, Isiani MC. Social media and the Covid-19 pandemic: Observations from Nigeria. Cogent Arts Humanit. 2020;7. doi: https://doi.org/10.1080/23311983.2020.1799483

4. MOÇAMBIQUE. Conselho de Ministros. Boletim da República. Maputo: Imprensa Nacional de Moçambique; 2020.

5. MOÇAMBIQUE. Ministério da Saúde. Comunicado diário de actualização de casos de coronavirus. Maputo: MISAU. Maputo; 2020.

6. Cox CR, Swets JA, Gully B, Xiao J, Yraguen M. Death Concerns, Benefit-Finding, and Well-Being During the COVID-19 Pandemic. Front Psychol. 2021;12:1–11. doi: https://doi.org/10.3389/fpsyg.2021.648609

7. Nicola M, Alsafi Z, Sohrabi C, Kerwan A, Al-Jabir A, Iosifidis C, et al. The socio-economic implications of the coronavirus pandemic (COVID-19): A review. Int J Surg. 2020;78:185–93. doi: https://doi.org/10.1016/j.ijsu.2020.04.018

8. Masciantonio A, Bourguignon D, Bouchat P, Balty M, Rimé B. Don't put all social network sites in one basket: Facebook, Instagram, Twitter, TikTok, and their relations with well-being during the COVID-19 pandemic. PLoS One. 2021;16:1–14. doi: https://doi.org/10.1371/journal.pone.0248384

9. Sarkadi A, Sahlin Torp L, Pérez-Aronsson A, Warner G. Children's Expressions of Worry during the COVID-19 Pandemic in Sweden. J Pediatr Psychol. 2021;46:939–49. doi: https://doi.org/10.1093/jpepsy/jsab060

10. Carvalho PM de M, Moreira MM, Oliveira MNA de, Landim JMM, Neto MLR. The psychiatric impact of the novel coronavirus outbreak. Psychiatry Res. 2020;286:1–2. doi: https://doi.org/10.1016/j.psychres.2020.112902

11. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho C, et al. Immediate Psychological Responses and Associated Factors during the Initial Stage of the 2019 Coronavirus Disease (COVID-19) Epidemic among the General Population in China. Int J Environ Res Public Health. 2020;17:1–25. doi: https://doi.org/10.3390/ijerph17051729

12. Wu T, Jia X, Shi H, Niu J, Yin X, Xie J, et al. Prevalence of mental health problems during the COVID-19 pandemic: A systematic review and meta-analysis. J Affect Disord. 2021;281:91–8. doi: https://doi.org/10.1016/j.jad.2020.11.117

13. Sinnenberg L, Buttenheim AM, Padrez K, Mancheno C, Ungar L, Merchant RM. Twitter as a tool for health research: A systematic review. Am J Public Health. 2017;107(1):e1–8. doi: https://doi.org/10.2105/AJPH.2016.303512

14. Clement J. Facebook - statistics & facts. Statista 2022. https://www.statista.com/topics/751/facebook (accessed January 1, 2023).

15. Oh HJ, Ozkaya E, Larose R. How does online social networking enhance life satisfaction? the relationships among online supportive interaction, affect, perceived social support, sense of community, and life satisfaction. Comput Human Behav. 2014;30:69–78. doi: https://doi.org/10.1016/j.chb.2013.07.053

16. Paula FR de, Mello MG da S. Análise de Redes Sociais: a formação de grupos do Facebook frente à epidemia da COVID-19 no Brasil. VITTALLE - Rev Ciências Da Saúde. 2020;32(1):32–42. doi: https://doi.org/10.14295/vittalle.v32i1.11406

17. Crisóstomo S, Matos AR, Borges M, Santos M. O Facebook faz bem à saúde? O caso "MAIS PARTICIPAÇÃO melhor saúde" em Portugal. Rev Bras Pesqui Em Saúde. 2019;21:123–33. doi: https://doi.org/10.21722/rbps.v21i2.29085

18. Raamkumar AS, Tan SG, Wee HL. Measuring the Outreach Efforts of Public Health Authorities and the Public Response on Facebook during the COVID-19 Pandemic in Early 2020: Cross-Country Comparison. J Med Internet Res. 2020;22(5):e19334. doi: https://doi.org/10.2196/19334

19. Revez J. Redes sociais e sociais e desinformação na saúde: o caso do facebook. Rev EDICIC. 2022;2(3):1–21.

20. Pang PCI, Cai Q, Jiang W, Chan KS. Engagement of government social media on facebook during the COVID-19 pandemic in Macao. Int J Environ Res Public Health. 2021;18(7):14–7. doi: https://doi.org/10.3390/ijerph18073508

21. Ribeiro PEO. COVID-19 and DGS on Facebook: analyzing Health in images and written text. J Semiot Cult. 2020;2021(10):7–20. doi: https://doi.org/10.25768/21.04.04.10.06

22. Li X, Zhou M, Wu J, Yuan A, Wu F, Li J. Analyzing COVID-19 on Online Social Media: Trends, Sentiments and Emotions. ArXiv. 2020;3:1–9. doi: https://doi.org/10.48550/arXiv.2005.14464

23. Chang A, Xian X, Liu MT, Zhao X. Health Communication through Positive and Solidarity Messages Amid the COVID-19 Pandemic: Automated Content Analysis of Facebook Uses. Int J Environ Res Public Health. 2022;19(10). doi: https://doi.org/10.3390/ijerph19106159

24. Hung M, Lauren E, Hon ES, Birmingham WC, Xu J, Su S, et al. Social network analysis of COVID-19 sentiments: Application of artificial intelligence. J Med Internet Res. 2020;22(8):1–19. doi: https://doi.org/10.2196/22590

25. Islam MS, Sarkar T, Khan SH, Kamal AHM, Murshid Hasan SM, Kabir A, et al. COVID-19-Related infodemic and its impact on public health: A global social media analysis. Am J Trop Med Hyg. 2020;103(4):1621–9. doi: https://doi.org/10.4269/ajtmh.20-0812

26. Tan SG, Sesagiri Raamkumar A, Wee HL. Users' Beliefs Toward Physical Distancing in Facebook Pages of Public Health Authorities During COVID-19 Pandemic in Early 2020. Heal Educ Behav. 2021;48(4):404–11. doi: https://doi.org/10.1177/10901981211014428

27. Valdez D, ten Thij M, Bathina K, Rutter LA, Bollen J. Social media insights into US mental health during the COVID-19 pandemic: Longitudinal analysis of twitter data. J Med Internet Res. 2020;22(12):1–18. doi: https://doi.org/10.2196/21418

28. Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. Qual Health Res. 2005;15(9):1277–88. doi: https://doi.org/10.1177/1049732305276687

29. Pandarachalil R, Sendhilkumar S, Mahalakshmi GS. Twitter Sentiment Analysis for Large-Scale Data: An Unsupervised Approach. Cognit Comput. 2015;7:254–62. doi: https://doi.org/10.1007/s12559-014-9310-z

30. Júnior JG, Sales JP, Silva FCT, Filho JDQ, Cavalcanti RCPB, Landim JMM, et al. Análise da saúde mental da população carcerária na pandemia de Sars-Cov-2: análise qualitativa. Psychiatry Res. 2021;296:113669. doi: https://doi.org/10.1016/j.psychres.2020.113669

31. Reinert M. Alceste une méthodologie d'analyse des données textuelles et une application: Aurelia De Gerard De Nerval. Bull Méthodologie Sociol. 1990;26(1):24–54. doi: https://doi.org/10.1177/075910639002600103

32. Camargo BV, Justo AM. Tutorial para uso do software IRaMuteQ. Florianópolis: Laboratório de Psicologia Social da Comunicação e Cognição - UFSC – Brasil; 2018.

33. Loubère L, Ratinaud P. Documentation IRaMuTeQ 0.6 alpha 3 version 0.1. Toulouse, France: Plone & Python; 2014.

34. Lahlou S. Text mining methods: an answer to Chartier and Meunier. Pap Soc Represent. 2012;20(2):1–7.

35. Ahmed MS, Aurpa TT, Anwar MM. Detecting sentiment dynamics and clusters of Twitter users for trending topics in COVID-19 pandemic. PLoS One. 2021;16(8):1–20. doi: https://doi.org/10.1371/journal.pone.0253300

36. Cai R, Zhang J, Li Z, Zeng C, Qiao S. Using Twitter Data to Estimate the Prevalence of Symptoms of Mental Disorders in the United States During the COVID-19 Pandemic: Ecological Cohort Study. JMIR Publications. 2022;6(12):1–11. doi: https://doi.org/10.2196/37582

37. Keller SN, Honea JC, Ollivant R. How social media comments inform the promotion of mask-wearing and other covid-19 prevention strategies. Int J Environ Res Public Health. 2021;18(11):Article5624. doi: https://doi.org/10.3390/ijerph18115624

38. Correia RB, Wood IB, Bollen J, Rocha LM. Mining Social Media Data for Biomedical Signals and Health-Related Behavior. Annual Review of Biomedical Data Science [Internet]. 2020 Jul 20;3(1):433–58. doi: http://dx.doi.org/10.1146/annurev-biodatasci-030320-040844

39. Kaila RP, Prasad AVK. Informational Flow on Twitter - Corona Virus Outbreak – Topic. Int J Adv Res Eng Technol. 2020;11:128–34.

40. Berry N, Emsley R, Lobban F, Bucci S. Social media and its relationship with mood, self-esteem and paranoia in psychosis. Acta Psychiatr Scand. 2018;138(6):558–70. doi: https://doi.org/10.1111/acps.12953

41. Obiała J, Obiała K, Mańczak M, Owoc J, Olszewski R. COVID-19 misinformation: Accuracy of articles about coronavirus prevention mostly shared on social media. Heal Policy Technol. 2021;10(1):182–6. doi: https://doi.org/10.1016/j.hlpt.2020.10.007

42. Bekele D, Tolossa T, Tsegaye R, Teshome W. The knowledge and practice towards COVID-19 pandemic prevention among residents of Ethiopia. An online cross-sectional study. PLoS One. 2021;16:1–13. doi: https://doi.org/10.1371/journal.pone.0234585

43. Rao LN, Shetty A, Latha Senthilkumar P, Shetty KS, Shetty B, Natarajan S, et al. Knowledge, attitude and practice of dental students and practitioners during the early days of COVID-19 pandemic in India: A cross-sectional study. Int J Clin Pract. 2021;75(11):1–10. doi: https://doi.org/10.1111/ijcp.14858

44. Liu Q, Luo D, Haase JE, Guo Q, Wang XQ, Liu S, et al. The experiences of health-care providers during the COVID-19 crisis in China: a qualitative study. Lancet Glob Heal. 2020;8(6):e790–8. doi: https://doi.org/10.1016/S2214-109X(20)30204-7

45. Silva SM, Rosa AR. The impact of Covid-19 on the students' mental health and the role of teaching institutions to protect and promote their emotional well-being. Praksis. 2021;2:189–206. doi: https://doi.org/10.25112/RPR.V2I0.2446

46. Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, et al. Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus–Infected Pneumonia. N Engl J Med. 2020;382:1199–207. doi: https://doi.org/10.1056/nejmoa2001316

47. Lwin MO, Lu J, Sheldenkar A, Schulz PJ, Shin W, Gupta R, et al. Global sentiments surrounding the COVID-19 pandemic on Twitter: Analysis of Twitter trends. JMIR Public Heal Surveill. 2020;6(2):1–4. doi: https://doi.org/10.2196/19447

48. Curcio CSS, Moreira-Almeida A. Investigação dos conceitos de religiosidade e espiritualidade em amostra clínica e não clínica em contexto brasileiro: Uma análise qualitativa. Interação Em Psicol. 2019;23(2):281–92. doi: https://doi.org/10.5380/psi.v23i02.65434

49. Moore CA, Ruisch BC, Granados Samayoa JA, Boggs ST, Ladanyi JT, Fazio RH. Contracting COVID-19: a longitudinal investigation of the impact of beliefs and knowledge. Sci Rep. 2021;11:1–12. doi: https://doi.org/10.1038/s41598-021-99981-8

50. Carvalho KM, Silva CRDT, Felipe SGB, Gouveia MT de O. A crença em saúde na adoção de medidas de prevenção e controle da COVID-19. Rev Bras Enferm. 2010;74(1):1–4. doi: https://doi.org/10.1590/0034-7167-2020-0576

51. Vasco SADJ. Aplicabilidade do marketing digital como meio de promoção do marketing social em meio à pandemia da covid-19 no contexto moçambicano. Rev Cient UEM. 2020:1–10.