

Social Media's Influence on Vaccine Hesitancy among Students of Higher Education Institutions in Cameroon: The Case of COVID-19 Vaccines

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Abstract

Individuals are increasingly using social media sites to disseminate messages about vaccines. The messages can stir either vaccine confidence or hesitancy. This research examines the role of social media messages on COVID-19 vaccine hesitancy in Fako Division, Southwest Region of Cameroon. The Agenda Setting Theory was used to support the body of literature. The study adopted a quantitative approach and the survey method. Data were collected from students at Biaka University, Tiko University, Higher Institute of Professional Studies, and final-year students in the Department of Journalism and Mass Communication, University of Buea. Findings revealed that social media messages have significantly enhanced students' knowledge of COVID-19 vaccines. The result, $t(df = 258) = -9.9, p < 0.05 (p = 0.001)$, was statistically significant at a 0.05 level with a 95% confidence interval. Descriptively, 77.2% of the students affirmed that social media has enhanced their knowledge of COVID-19 vaccines. Equally, the results disclosed that social media messages have significantly influenced students' attitudes toward COVID-19 vaccines, $t(df = 258) = 9.6, p < 0.05 (p = 0.001)$ and promoted vaccine-hesitant behaviour among students, $t(df = 258) = 10.4, p < 0.05 (p = 0.001)$. Furthermore, the students significantly ($p = 0.001$) affirmed that COVID-19 preventive measures like regular hand washing, use of hand sanitizers, wearing of face masks, and social distancing effectively mitigate the spread of the pandemic. To boost vaccine confidence and acceptance, the researchers recommend that the government of Cameroon should organise intensive COVID-19 health campaigns in Higher Learning Institutions to educate students on the importance of vaccines.

Keywords

Social Media, COVID-19, Vaccine Hesitancy, Cameroon

1. Introduction

Social media platforms are inundated with numerous messages on COVID-19 vaccines. The messages promote anti-vaccine and pro-vaccine campaigns. Anti-vaccine campaign messages consist of falsehood and conspiracy theories about COVID-19 vaccines. Falsehoods range from fake cures such as salt water, lemon, and injections to conspiracy theories. Conspiracy theories suggest that the virus was invented as a biological weapon to reduce the world's population (Andersen, Rambaut, Lipkin, Holmes, & Garry, 2020).

Political leaders also spread COVID-19 misinformation on social media. Former presidents, like Jair Bolsonaro and Donald Trump, recommend the use of hydroxychloroquine as a remedy for the COVID-19 virus (Constine, 2020). Still, the recommendation is not scientifically justified (Geleris, Sun, Platt, Zucker, Baldwin, Hripcsak, Labella, Manson, Kubin, Barr, Sobieszczyk, & Schulger, 2020).

Several COVID-19 vaccines were developed to contain the virus. As of 14th January 2022, the World Health Organisation (WHO) approved COVID-19 vaccines like AstraZeneca, Astrazeneca-SK Bio, Pfizer, Sinopharm, Moderna, Sputnik V, Sinovac, Sinovac-CoronaVac, Covaxin and Johnson and Johnson (Polack, Thomas, Kitchin, Absalon, Gurtman, Lockhart, Perez, Pérez Marc, Moreira, Zerbini, Bailey, Swanson, Roychoudhury, Koury, Li, Kalina, Cooper, Frenck, Hammitt, Türeci, Nell, Schaefer, Ünal, Tresnan, Mather, Dormitzer, Şahin, Jansen, & Gruber, 2020). Of these vaccines, Sinopharm, AstraZeneca, Johnson and Johnson, and Sputnik V are the four approved vaccines by Cameroon's Scientific Council. The first batch of 200,000 doses of China's Sinopharm vaccine arrived Nsimalen Airport, Yaoundé on Monday, April 12, 2021 (Abongwa, Sumo, Ngum, Muhammed, Njiwale, Nakuh, & Nayah, 2022).

The Prime Minister and Head of Government, Chief Dr Joseph Dion Ngute received the consignment on behalf of His Excellency President Paul Biya. The vaccines were dispatched to 243 vaccination centres across the ten regions of Cameroon. On the advice of the Scientific Council and the National Immunisation Technical Advisory Group (NITAG), the priority groups were frontline health workers, people over 50 years of age, individuals suffering from pre-existing health conditions and vulnerable groups.

On Saturday April 17, 2021, Cameroon's health officials, led by the country's Minister of Public Health, Manaouda Malachi, received another consignment of 391,200 doses of AstraZeneca at the Nsimalen International Airport, Yaounde, through the COVAX Advance Market. Upon arrival, the government said that the vaccines were free and not compulsory. Cameroon's Health Minister was the first to receive the vaccine. Cameroon targets 5,400,000 people to be vaccinated by the

end of 2021 and 15 million people by December 2022. However, as of February 19, 2023, less than five million doses of COVID-19 vaccines were administered in Cameroon (WHO, 2023). This is equivalent to 15.6% of the vaccine acceptance rate. This reveals the prevalence of COVID-19 vaccine hesitancy in Cameroon.

Measures were adopted to accelerate vaccine acceptance among Cameroonians. Cameroon Radio Television (CRTV) has continued to broadcast the president's statement that calls on Cameroonians to respect COVID-19 barrier measures and to be vaccinated. Another strategy to encourage Cameroonians to get vaccinated was to ensure that only vaccinated persons were to be allowed to enter football stadia during the 2022 Africa Cup of Nations in Cameroon (World Bank Groups, 2022). The World Health Organisation (2021) adds that meetings were also held with local authorities and communities to encourage people to get vaccinated against COVID-19. Local chiefs were also encouraged to galvanise their community members to get vaccinated.

Cameroon government also launched a series of vaccination campaigns. But the campaigns always witnessed low turnout. Some persons who received the vaccines were compelled to do by their employers. For instance, the Mobile Telephone Network (MTN) and many non-governmental organisations made vaccine administration and monthly COVID-19 testing compulsory for employees. Employees were compelled to receive COVID-19 or resign from their jobs. Educational institutions are one of the vulnerable places that facilitate the spread of COVID-19 virus. In response to this, Cameroon's Prime Minister, on Tuesday, March 17, 2020, shut all public and private training establishments of the various levels of education: from nursery school to higher education, including vocational training centres and professional schools, School and university competitions, like the FENASSCO and University games were equally postponed. Schools were reopened seven months after on Monday, October 5, 2020 (Kindzeka, 2020). The government equally introduced a 3T (Track, Test and Treat) strategy on May 1, 2020 to prevent the spread of the virus. However, observation shows that some students in Higher Learning Institutions are not vaccinated and the respect for COVID-19 preventive measures were inconsistent.

Vaccination programmes have greatly reduced the toll of infectious and communicable diseases by preventing infection or reducing the severity of symptoms. However, vaccination programmes can only be effective when they are accepted and adopted by large population segments. Eskola, Duclos, Schuster and MacDonald (2015) equally explain that vaccines have saved countless lives and improved health and well-being around the world. However, vaccines can only improve health and prevent deaths if they are used. This implies that individuals need to accept vaccination to prevent themselves from pandemics like COVID-19.

The World Health Organisation highlights that vaccination is paramount in fighting the spread of COVID-19.

“The COVID-19 vaccines produce protection against the disease, as a result

of developing an immune response to the SARS-Cov-2 virus. Developing immunity through vaccination means there is a reduced risk of developing the illness and its consequences. This immunity helps you fight the virus if exposed. Getting vaccinated may also protect people around you because if you are protected from getting infected and from disease, you are less likely to infect someone else. This is particularly important to protect people at increased risk for severe illness from COVID-19, such as healthcare providers, older or elderly adults, and people with other medical conditions.” (World Health Organisation, 2020).

The World Health Organisation (WHO) estimates that vaccination saves 2 to 3 million lives worldwide every year (WHO, 2017). Nevertheless, a considerable number of children, adults and aged are not getting vaccinated (Omer, Orenstein, & Koplan, 2013), leading to outbreaks of vaccine-preventable diseases and avoidable deaths, such as from measles or pertussis. Carrieri, Madio and Principe (2019) also disclose that although vaccines are safe and effective in preventing life-threatening diseases, vaccine hesitancy is still prevalent globally.

The role of social media in promoting COVID-19 vaccine intake is disputed. Chukwuere (2022), and Bode and Vraga (2021) observe that social media messages have positively influenced COVID-19 vaccine acceptance and reduced the spread of vaccine falsehood, whereas Özdemir (2021), and Muhammad (2020) aver that social media messages promote vaccine hesitancy. The existence of variances in previous findings evokes reflections on whether social media messages promote or retard COVID-19 vaccination in Cameroon. More so, there is a paucity of scientific knowledge on the status quo in Cameroon, thus, limiting a fair comprehension of the subject. The foregoing situation is a clarion call for more research to be conducted on the influence of social media messages on COVID-19 vaccine hesitancy to align, contrast or rewrite existing literature on COVID-19 vaccination in Cameroon. This leads to the following research questions and hypotheses.

1.1. Research Questions

RQ1. To what extent do social media messages enhance students’ knowledge of COVID-19 vaccines?

RQ2. To what range do social media messages influence students’ attitudes toward COVID-19 vaccines?

RQ3. To what degree do social media messages promote COVID-19 vaccine hesitancy behaviour among students?

1.2. Hypotheses

H1: Social media messages have significantly enhanced students’ knowledge of COVID-19 vaccines.

H2: Social media messages have significantly influenced students’ attitudes toward COVID-19 vaccines.

H3: Social media messages have significantly promoted COVID-19 vaccine hesitancy behaviour among students.

This study is significant because it provides contemporary evidence on the influence of social media messages on vaccine hesitancy among university students in Fako Division, South West Region of Cameroon. The results can inform policies on how to accelerate vaccine intake among student population. The study also highlights the need for individuals to assess the credibility of social media messages before spreading.

2. Literature Review

2.1. Social Media

Valentini (2018) defines social media as internet-based applications that allow users to create, exchange, or simply consume user-generated content. Social media users can create and disseminate content centre on various societal issues including areas where they have limited knowledge of a subject matter. There is limited regulation to check the quality of social media content from users before they are posted or shared. Social media is built on the ideological and technological foundations of Web 2.0 (Kaplan & Haenlein, 2010).

Darcy DiNucci initiated the concept of Web 2.0 in 1999. But it became popular through Tim O'Reilly and Dale Dougherty's presentation during the 2004 O'Reilly Media Web 2.0 Conference (Hinton & Hjorth, 2013). Web 2.0 is an advanced version of Web 1.0. Web 1.0 did not offer users the opportunity to interact, create, post and share content. Its advanced version provides users with such opportunities. Murugesan (2007) explains the functionalities of Web 2.0: Web 2.0 guarantees flexible web design, provides a rich responsive user interface, eases collaborative content creation and modification, facilitates the creation of new applications by reusing and combining different applications on the web or by combining data and information from different sources, establishes social networks of people with common interests and supports collaboration and helps gather collective intelligence. Coombs (2011) affirms that social media is characterised by participation, openness, conversations, communities and connectedness.

Social media shapes communication. It facilitates the production, consumption and circulation of information. Also, the spread and adoption of social media technology has made it to become an attractive marketplace for organisations wishing to gain visibility and reach out directly to large groups of the public and stakeholders (Valentini, 2018). It also equally opens up opportunities for users to voice out concerns and opinions on societal issues. Interestingly, the technology is not time or space-bound. Users' content is generated and distributed across borders and time zones within seconds and with the absence of censorship (Qualman, 2009). Individuals use various social media platforms like Facebook, Twitter, Instagram, WhatsApp and LinkedIn to stay connected and interact with friends, family, colleagues and dispersed communities.

2.2. Vaccine Hesitancy

Vaccination saves 2 to 3 million lives worldwide every year (World Health Organisation, 2017). However, a considerable number of children, adults and the aged are not interested in vaccination (Omer, Orenstein & Koplan, 2013). This attitude and behaviour facilitate lead to the outbreaks of vaccine-preventable diseases and avoidable deaths. Vaccines save lives and prevent life-threatening diseases. Despite these benefits, vaccine hesitancy is prevalent worldwide (Carrieri, Madio & Principe, 2019). The term *vaccine hesitancy* refers to delay in acceptance or refusal of vaccines despite the availability of vaccination services (Dubé, Gagnon, Nickels, Jeram, & Schuster, 2014). Vaccine hesitancy manifests in two forms: delay and rejection. In terms of delay, individuals may exercise deferral to accept vaccination due to concerns over vaccine safety and effectiveness. Rejection implies a complete refusal to accept vaccination.

Vaccine hesitancy is an aged problem (Callender, 2016). Since the development of the first smallpox vaccine in 1796 by Edward Jenner, scepticism and suspicion about vaccine safety and effectiveness existed. Edward Jenner advocated for using the milder cowpox virus in a child to stimulate an immune response in 1796 after observing that milkmaids rarely contracted smallpox. Jenner tested his hypothesis on his gardener's son (Stewart & Devlin, 2006) and 23 more individuals (Lantos, Jackson, Opel, Marcuse, Myers, & Connelly, 2010). In 1797, Edward Jenner presented his experiment to the Royal Society, who rejected it, citing insufficient evidence and the revolutionary nature of his results. Jenner's eventual publication of the results drew immediate public criticism and significant opposition. The local clergy argued that mixing animal matter with human flesh was a direct violation of God's will (Nuwarda, Ramzan, Weekes & Kayser, 2022).

Durbach (2000) asserts that in 1853, the British Compulsory Vaccination Act proclaimed obligatory smallpox vaccine for infants during their first 3 months of life. This created the world's first mandatory vaccination programme. It sparked widespread resistance and riots in several towns in the United Kingdom. In 1867, the act prescribed the mandatory vaccination age to 14 years, with penalties for non-compliance. Opponents of the 1867 law cited concerns about personal freedom and choice, and, in response, the Anti-Compulsory Vaccination League was founded the same year in London (Nuwarda, Ramzan, Weekes & Kayser, 2022). In the 1870s and 1880s, several anti-vaccination movements emerged in Europe.

In the North West Regional Capital of Cameroon, Bamenda, Abongwa, Sumo, Ngum, Muhammed, Njiwale, Nakuh and Nayah (2022) assert that COVID-19 vaccine hesitancy was 97.6%. They realise that safety concern is the principal cause of vaccine hesitancy. In a survey carried out in Hong Kong SAR, Chan, Cheng, Tam and Huang (2015) found that personal anxiety, previous vaccination history and inadequate knowledge about the A/H7N9 influenza vaccine resulted to a 50% reduction in vaccine acceptance. Abbas, Kang, Chen, Were and Marathe (2018) equally realised that the acceptance of the hypothetical influenza vaccine in America is dependent on income level, with lower-income groups less willing to take

the vaccine when compared to those in the higher-income groups. Younger individuals were hesitant to take the vaccines as well. Thus, income level, demographics, societal influences and health insurance influence the acceptance of hypothetical influenza in America.

Recent studies (Figueiredo, Simas, Karafillakis, Paterson, & Larson, 2020; Roozenbeek, Schneider, Dryhurst, Kerr, Freeman, Recchia, van der Bles, & van der Linden, 2020) shown that vaccine safety, effectiveness concerns, religious beliefs, misinformation and level of income are retarding vaccine acceptance in several countries. Anxiety about vaccine administration also causes hesitancy. This consists of fear of syringe (McLenon & Rogers, 2019) or concerns about the possible side effects (Herman, McNutt, Mehta, Salmon, Bednarczyk, & Shaw, 2019). Abongwa et al. (2022) assert that vaccine hesitancy is considered by the WHO as one of the top ten threats to global health. They further observe that morbidity and mortality rates of COVID-19 can significantly be reduced if vaccine acceptance is high.

2.3. COVID-19 Vaccines' Conspiracy Theories on Social Media

There are concerns that the human rapid spread of 'false or misleading information' in digital and physical environments causes confusion and risk-taking behaviours that can harm health and lead to mistrust in health authorities and undermine the public health response (Harvey, 2021, in Osuagwu, Mashige, Ovenseri-Ogbomo, Envuladu, Abu, Miner, Timothy, Ekpenyong, Langsi, Amiebenomo, Oloruntoba, Goson, Charwe, Ishaya, & Agho, 2023). For instance, in Pakistan, vaccine hesitancy and resistance made it almost impossible to reach the population (Mehmood, Ullah, Hasan, Kazmi, Ahmadi, & Lucero-Prisno, 2020, in Osuagwu et al., 2023, p.2). Despite widespread concerns about the potential impact of misinformation on vaccination, little is known about the magnitude of the impact and its differential effects across countries in sub-Saharan Africa (SSA). The United Nations International Children's Emergency Fund (2022) asserts that social media is used to circulate vaccine myths, misconceptions and misinformation leading to the rapid spread of anti-COVID-19 vaccine campaigns. This situation is worsened by the lack of accurate information through COVID-19 health communication (Kabakama, Konje, Dinga, Kishamawe, Morhason-Bello, Hayombe, Adeyemi, Chimuka, Lumu, Amuasi, Acheampong, & Dzinamarira, 2022).

Some social media messages assert that occult societies and hidden power structures are championing the development of COVID-19 vaccines (The Ministry of Communication and Informatics, Kominfo, 2021). The structures are believed to be networking with big pharmaceutical companies to make money or to depopulate the world. Equally, information spread on social media platforms that COVID-19 vaccines, such as Pfizer and Moderna are harmful to human organs because they contain Potassium Chloride.

The vaccines can lead to death and miscarriages (Kominfo, 2021, cited in Skafle,

Nordahl-Hansen, Quintana, Wynn, & Gabarron, 2022). In 2019, To, To, Huynh, Nguyen, Ngo, Alley, Tran, Tran, Pham, Bui, and Vandelanotte (2021) asserted that about 31 million Facebook users and about 17 million YouTube users followed the anti-vaccines campaign. Jamison et al. (2020) also found that there were more anti-vaccine messages on Twitter than pro-vaccine messages about COVID-19 vaccines. Equally, viewers were likely to encounter anti-vaccine videos on YouTube (Wu, Lyu, & Luo, 2021). Continuous exposure to anti-vaccination messages on social media platforms increase hesitancy (Germani & Biller-Andorno, 2021). Wang, Lu, Lai, Lyu, Zhang, Fenghuang, Jing, Li, Yu, and Fang (2021) affirmed that most people who decide whether to reject or accept vaccinations are influenced by information about the level of effectiveness and safety of vaccines. Authentic information promotes vaccine acceptance, while conspiracy theories promote vaccine hesitancy.

Pulido, Ruiz-Eugenio, Redondo-Sama and Villareji-Carballido (2020) reveal that some social media sites like Facebook and Instagram are trying to overcome falsehood about COVID-9 vaccines by providing valid link recommendations when a user posts about COVID-19 or COVID-19 vaccine. The valid links enable users to have access to authentic information about the pandemic or the vaccines. However, not all social media sites provide such links. Dinga and Titanji (2022) asserted that in countries like Cameroon, Tunisia, Morocco, Ghana, South Africa and Zimbabwe, several circulating myths, misconceptions, and rumours regarding the origins of SARS-CoV-2 and the dangers of the vaccines have spread disproportionately despite sensitization and strict media laws prohibiting the circulation of misinformation through social media.

Rumours about the pandemic circulated faster than the virus. Some factors have spearheaded the rising influence of misinformation on COVID-19 vaccines on social media. Ngai, Singh, Lu and Koon (2020) assert that lockdowns rendered individuals to have ample time to access social media sites, thereby increasing the likelihood of exposure to misinformation about COVID-19 vaccine. Also, some misleading news about vaccines were amusing and novel. This encouraged sharing behaviour among social media users (Lockyer, Islam, Rahman, Dickerson, Pickett, & Sheldon, 2021) from one site to another. Equally, some social media sites like Twitter adopted a strict limit on characters. This means some information on COVID-19 vaccines presented on social media sites was incomplete and misleading (Jamison et al., 2020). Equally, in the early phase of the COVID-19 pandemic, social media companies did not adopt timely actions against misinformation on their sites (Wardle & Singerman, 2021). This created a fertile arena for social media users to circulate misinformation about COVID-19 vaccines.

2.4. The 3T Strategy for COVID-19 Response in Cameroon

Cameroon government adopted the 3T (Track, Test and Treat) strategy to mitigate the spread of COVID-19. The 3T strategy is reinforced by three 3 objectives: stop, if not, control community transmission; controlling morbidity and mortality

in particular for health personnel; reduce the impact of COVID-19 on Cameroon's health system (MINSANTE, 2020). On July 2020, Cameroon's Minister of Public Health, Dr. Manaouda Malachie, announced that specialised treatment centres would be constructed in all ten regions of the country. To ensure COVID-19 testing and treatment is accessible to all Cameroonians, the government made it free (Atabong, 2020) Cameroonians were encouraged to visit assigned health establishments for COVID-19 testing and treatment.

Atabong (2020) asserts that some unscrupulous health personnel and structures were charging vulnerable patient for COVID-19 testing and treatment. This made Cameroon's Health Minister to establish a commission, comprising of the Ministry of Public Health and the General Delegation for National Security, to investigate corruption in relation to the campaign against the pandemic. The shortage of qualified health personnel posed a challenge to the implementation of the 3T strategy for COVID-19 response in Cameroon. The shortage of health personnel in the nation is orchestrated by factors such as brain drain. For instance, the Cameroonian Medical Association, states that 4200 Cameroonian doctors, mostly specialists, are working abroad and only 800 are left in the country with a doctor-patient ratio of 1: 10,000 - 20,000 in the cities and 1: 40,000 - 50,000 in rural areas (Afrol News, 2021).

To provide a temporal solution to the shortage of health personnel, Cameroon's president, Paul Biya, signed a decree increasing the retirement age of civil servants of the public health corps to 60 years for Categories "A" and "B" (Senior), and 55 years for Category "C" and "D" (Junior). This was to retain skills, given the shortage of younger staff (themselves due to poor policy and implementation in the long term) (Atabong, 2020). Also, the Prime Minister of Cameroon and Head of Government increased by five years the retirement age of state medical and paramedical personnel governed by the Labour Code.

The Government received aids from International Organisations to facilitate the implementation of the 3T (Track, Test and Treat) strategy. Organisations like the World Health Organisation and the Jack Ma Foundation donated COVID-19 kits to Cameroon. The Public Health Minister received 183 oxygen concentrators. The oxygen concentrators were dispatched to various health facilities for the care of coronavirus patients and others suffering from respiratory illnesses (Atabong, 2020).

An inter-ministerial consultation was organised on the 17th of March 2020 by the prime minister, to assess COVID-19 situation and identify appropriate actions to be implemented. At the end of session, several measures were adopted to contain the spread of the virus. A toll-free number "1510" was made known to the public. Atabong (2020) asserts that the advent of COVID-19 pandemic reveals Cameroon's lack of adequate health resources to respond to it. Healthcare workers also reported shortages in thermometers, disinfectants, medicines, ventilators, oxygen and protective gear for doctors and nurses. Ezzo et al. (2021) enunciate that the primary challenge facing Cameroon is to strengthen the health system for the

next pandemic with greater investment in medical regulation, telehealth and homecare services. On March 31, 2020, the government launched a Coronavirus Response Special National Solidarity Fund to raise funds from public donation to treat and contain the virus. The Public Health Minister disclosed that FCFC 3.5 billion was raised by May 14, 2020.

After the implementation of the 3T Strategy of Track, Test and Treat, the government announced the launch of a pilot phase of mobile caravans in private companies, schools, universities and markets in Yaounde (OCHA cited in Mbah, Bang, Ndi, & Ndzo, 2020). These measures yielded some fruits and this was evidenced by the Minister of Public Health, stating on July 22nd 2020 on the State-owned television channel (CRTV) that the country has succeeded in stabilising the epidemic curve and that the peak of the pandemic has been reached

2.5. Theoretical Framework

Agenda Setting Theory: This study is based on Agenda setting theory by McCombs and Shaw (1972). It postulates that the mass media prioritises issues in the minds of the public. The agenda setting model is founded on the idea that the topics the media selects for attention, the attention and priority they give to the topics selected, has a matching effect upon what the audience perceives as important. McCombs and Shaw wrote:

“Audiences not only learn about public issues and other matters through the media, they also learn how much importance to attach to an issue or topic from the emphasis the media places upon it. E.g., in reflecting what candidates are saying during an election or campaign, the mass media apparently determines the important issues” (McCombs & Shaw, 1972: p. 146)

The underlying issue of Agenda setting is that in choosing and displaying news, social media users play a vital role in shaping health realities. This implies that users learn not only about a given issue but how much importance to attach to that issue from the amount of information in a social media post and the underlying reactions thereafter (McCombs & Shaw, 1972). They believe that the media intentionally or unintentionally influences the relative importance of news events, issues or personages in the public mind by the order of presentation (relative silence in a news report).

Social media users set various agendas for and against COVID-19 vaccines through the coinage of social media post headlines and hashtags. Frequent positioning of inflammatory headlines, articles and stories about COVID-19 vaccines instigate anti-vaccine sentiments among Cameroonians, including students, while the sharing of educative and informative contents about the vaccines can promote vaccine acceptance rate among users.

3. Methodology

This research adopts a quantitative approach. The approach is used to address the

research problem. It enables the researchers to gather information from a wide sample. Many University students are exposed to COVID-19 misinformation on social media platforms. It was important to sample their views to know the extent to which social media messages influenced their attitudes and behaviours toward COVID-19 vaccines. Alternatively, this research could have used in-depth interviews (qualitative approach) by conducting interviews with university students. However, the interviews could not have permitted the gathering of huge data as in the case here.

Survey constituted the research method. This method is appropriate for measuring attitude and behaviour of a wider population. Students in the Department of Journalism and Mass Communication of the University of Buea, Biaka University students, Higher Institute of Professional Studies students and Tiko University students measured the extent to which social media enhanced their knowledge, changed their attitudes and behaviours of COVID-19 vaccines. The population size of the aforementioned institutions was gotten from reliable sources. The Record Office of Biaka University and Higher Institute of Professional Studies disclosed that there were 659 and 352 undergraduate students respectively for the 2022/2023 academic year. Equally, the Director of Tiko University revealed that there were 26 undergraduate students in the institution. While the department of JMC disclosed that there were 216 final-year JMC students for the 2022/2023 academic year. The population size consists of 1,229 undergraduate students and a sample of 291 students was derived from it using the [Krejcie and Morgan \(1970\)](#). The researchers used purposive sampling to select students who are exposed to COVID-19 vaccine messages on social media platforms.

A questionnaire was the research instrument. It consisted of four sections: knowledge of COVID-19 vaccine information, influence of social media messages on students' attitudes toward Covid-19 vaccines, influence of social media messages on students' behaviour toward covid-19 vaccines, and demographics. In the first section, the respondents were asked to indicate how often they get information about COVID-19 vaccines from Facebook, YouTube, WhatsApp, Twitter, TikTok, Twitter and Instagram. The section also examined the influence of social media messages on students' knowledge of Covid-19 vaccines using the five-point agreement scale: Strongly agree (100%), Agree (75%), Neutral (50%), Disagree (25%) and Strongly disagree (0%). The second and third sections also used the five-point agreement scale measure the influence of social media messages on students' attitudes and behaviours towards COVID-19 vaccines. The fourth section examines the effectiveness of regular hand washing, use of sanitizers, wearing of facemask and maintenance of social distancing in mitigating the spread of COVID-19 virus. The demographic characteristics consisted of sex, age, marital status and school. The data were collected within two weeks. Out of 291 undergraduate students, 259 participated in the study. The data were coded, entered into the Statistical Package for Social Sciences (SPSS) version 21, and cleaned analysed. Descriptive and inferential tests were conducted. The Cronbach alpha

stood at 0.69. Validity was ensured through face validity, content validity and construct validity. The questionnaire was developed after the researchers studied available literature related to this study. Ethical considerations like voluntary participation, confidentiality, and informed consent were employed.

4. Findings

4.1. Demographic Characteristic of Sample

Out of the 259 respondents, 77 (29.7%) are male and 176 (68%) are female. 6 (2.3%) respondents did not respond to the question. In terms of age, 139 (53.7%) are less than 21 years, 108 (41.7%) are between 21 and 30 years, 5 (1.9%) are between 31 and 40 years, 1 (0.4%) is 41 years and above while 6 (2.3%) respondents did not disclose their age brackets. Singles dominated in this study: 232 (89.6%) are single, 19 (7.3%) are married, 1 (0.4%) is divorced and 7 (2.7%) did not respond. The findings also showed that 172 (66.4%) respondents are from the University of Buea, 35 (13.5%) from Biaka University, 23 (8.9%) from Tiko University, 22 (8.5%) from HIPS and 7 (2.7%) did not respond to the question.

4.2. Social Media Use to Obtain COVID-19 Vaccine Information

Table 1. Frequency of using social media platforms for COVID-19 vaccine information.

Social media	Measurement of Frequency					Total
	Always (7 days)	Often (5 - 6 days)	Sometimes (3 - 4 days)	Rarely (1 - 2 days)	Never (0 day)	
Facebook	33.2% (86)	22% (57)	19.7% (51)	16.2% (42)	8.9% (23)	100% (259)
WhatsApp	24.7% (64)	15.8% (41)	20.1% (52)	22% (57)	17.4% (45)	100% (259)
YouTube	8.1% (21)	20.5% (53)	20.5% (53)	29.3% (76)	21.6% (56)	100% (259)
TikTok	7.3% (19)	10.4% (27)	27% (70)	24.7% (64)	30.5% (79)	100% (259)
Instagram	6.2% (16)	10.4% (27)	30.5% (79)	21.2% (55)	31.7% (82)	100% (259)
Twitter	5.4% (14)	7.7% (20)	25.5% (66)	23.9% (62)	37.5% (97)	100% (259)

Table 1 reveals the students are using various social media platforms to obtain COVID-19 vaccine information. The most used social media platforms are Facebook, followed by WhatsApp, YouTube, TikTok, Instagram and Twitter.

Table 2 illustrates the result on the influence of social media platforms in shaping students' knowledge of COVID vaccines. The findings demonstrate that social media platforms, to a greater extent, increased students' knowledge of COVID-19 vaccines (77.2%), enabled them to detect fake news about COVID-19 vaccines (67.6%), created awareness of conspiracy theories and the side effects of the vaccines (63.3%). To a lesser extent, some students learned how to prepare natural medicines against COVID-19 virus on social media platforms (44.4%), and made some students to understand that the vaccines were not thoroughly tested and they are ineffective (38.6%).

Table 2. Influence of social media in shaping students' knowledge of COVID-19 vaccination.

Knowledge of COVID-19 vaccine	Measurement of Agreement					Total
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	
Social media messages have increased my knowledge of COVID-19 vaccines	35.9% (93)	41.3% (107)	16.6% (43)	5% (13)	1.2% (3)	100% (259)
Social media sites have helped to detect fake news about COVID-19 vaccines	34% (88)	33.6% (87)	18.1% (47)	8.5% (22)	5.8% (15)	100% (259)
Social media messages have enabled me to be aware of conspiracy theories about COVID-19 vaccines	22.4% (58)	40.9% (106)	25.9% (67)	7.7% (20)	3.1% (8)	100% (259)
Social media messages have informed me about the side effects of COVID-19 vaccines	29.3% (76)	31.3% (81)	25.1% (65)	10.8% (28)	3.5% (9)	100% (259)
Social media messages have taught me how to prepare natural medicine against COVID-19	19.7% (51)	24.7% (64)	22.8% (59)	12% (31)	20.8% (54)	100% (259)
I know the different COVID-19 vaccines thanks to social media messages	16.6% (43)	22.4% (58)	31.7% (82)	17.4% (45)	12% (31)	100% (259)
Social media messages have helped to know that the vaccines were not tested thoroughly	14.3% (37)	24.3% (63)	32% (83)	17% (44)	12.4% (32)	100% (259)
Social media messages have made me understand that COVID-19 vaccines are not effective	6.6% (17)	24.7% (64)	31.7% (82)	20.1% (52)	17% (44)	100% (259)

4.3. Hypothesis One: Social Media Messages Have Significantly Enhanced Students' Knowledge of COVID-19 Vaccines

Table 3. Social media messages have significantly enhanced students' knowledge of COVID-19 vaccines.

One-Sample Statistics		One-Sample Test (CI: 95%)	
N	259	Df	258
Mean	2.0	T	-9.9
Std. Deviation	0.9	Sig. (2-tailed)	0.001
		Test Value	2.5
		Mean Difference	-0.6

Table 3 illustrates the result of a One-Sample T-test performed to determine whether or not social media messages have significantly enhanced students' knowledge of COVID-19 vaccines. The result, $t(df = 258) = -9.9, p < 0.05$, reveals that social media messages have significantly enhanced students' knowledge of COVID-19 vaccines. The result of the test was statistically significant at the 0.05 level with 95% confidence interval. This result supports the descriptive analysis, where 77.2% (35.9% strongly agreed and 41.3% agreed) of the students affirmed that social media platforms have enhanced their knowledge of COVID-19 vaccines as opposed to 6.2% (5% disagreed and 1.2% strongly disagreed) of the students who refuted the statement and 16.6% that were neutral.

Table 4. Influence of social media messages on students' attitude towards COVID-19 vaccine.

Social media messages have made me to believe that:	Measurement of Agreement					Total
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	
COVID-19 vaccines have not been thoroughly tested	21.6% (56)	25.5% (66)	26.6% (69)	15.8% (41)	10.4% (27)	100% (259)
COVID-19 vaccines cannot protect me from COVID-19	10.4% (27)	26.6% (69)	29% (75)	22.8% (59)	11.2% (29)	100% (259)
The vaccines are meant for those affected	9.3% (24)	25.1% (65)	24.3% (63)	23.2% (60)	18.1% (47)	100% (259)
The vaccines will negatively affect my health	15.4% (40)	15.4% (40)	37.1% (96)	20.8% (54)	11.2% (29)	100% (259)
Authorities are promoting COVID-19 vaccines for political and financial gains	23.9% (62)	20.1% (52)	30.5% (79)	15.4% (40)	10% (26)	100% (259)
Traditional medicines are more effective than COVID-19 vaccines	25.1% (65)	23.9% (62)	26.6% (69)	12.7% (33)	11.6% (30)	100% (259)
My immune system is naturally strong against diseases	19.3% (50)	22.4% (58)	31.7% (82)	17.4% (45)	9.3% (24)	100% (259)
COVID-19 vaccine manufacturers want to harm Africans	12.7% (33)	18.5% (48)	31.3% (81)	22% (57)	15.4% (40)	100% (259)
Not to trust any activity that the government is involved	15.1% (39)	18.5% (48)	32.8% (85)	20.5% (53)	13.1% (34)	100% (259)
I can feel safe after being vaccinated against COVID-19.	16.2% (42)	32.4% (84)	25.5% (66)	17.4% (45)	8.5% (22)	100% (259)
Not to trust the effectiveness of our health systems to administer the vaccines	14.3% (37)	26.3% (68)	37.1% (96)	16.2% (42)	6.2% (16)	100% (259)
Syringes used for COVID-19 vaccination are painful	22% (57)	20.5% (53)	35.5% (92)	13.1% (34)	8.9% (23)	100% (259)

Table 4 shows that social media messages have both positive and negative effects on the attitudes of higher education students toward COVID-19 vaccines. It makes the students to believe that: the vaccines have not been thoroughly tested (47.1%), traditional medicines are more effective than COVID-19 vaccines (49%), and government authorities are promoting COVID-19 vaccines for political and financial gains (44%). Positively, the students learned, through social media platforms, that COVID-19 vaccines are meant for everyone (41.3%), the vaccines will improve their health conditions (48.6%) and COVID-19 vaccine manufacturers do not want to harm Africans (37.4%).

4.4. Hypothesis 2: Social Media Messages Have Significantly Influenced Students' Attitudes toward COVID-19 Vaccines

Table 5 illustrates the result of a One Sample T-test that was performed to determine whether or not social media messages have significantly influenced students'

attitudes toward COVID-19 vaccines. The result of the test, $t(df = 258) = 9.6$, $p < 0.05$ ($p = 0.001$), revealed that social media messages have significantly influenced students' attitudes toward COVID-19 vaccines. The result of the test was statistically significant at a 0.05 level with a 95% confidence interval.

Table 5. Social media messages significantly influenced students' attitudes.

One-Sample Statistics		One-Sample Test (CI: 95%)	
N	259	Df	258
Mean	34.0	T	9.6
Std. Deviation	6.7	Sig. (2-tailed)	0.001
		Test Value	30
		Mean Difference	4.0

4.5. Role of Social Media in Promoting COVID-19 Vaccine Hesitant Behaviour

Table 6. Influence of Social media messages on COVID-19 vaccine hesitant behaviour.

Statements	Measurement of Agreement					Total
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	
Social media messages have made me scared of accepting the vaccines	20.8% (54)	30.9% (80)	25.1% (65)	14.7% (38)	8.5% (22)	100% (259)
Based on social media messages, I cannot advise my loved ones to take COVID-19 vaccines	18.5% (48)	27.4% (71)	30.1% (78)	15.8% (41)	8.1% (21)	100% (259)
Social media messages have made me not take the vaccines because I know they were not thoroughly tested	17.0% (44)	24.7% (64)	31.3% (81)	15.8% (41)	11.2% (29)	100% (259)
I have read messages on social media where medical doctors are hesitant to take COVID-19 vaccines	12.0% (31)	27.4% (71)	30.1% (78)	19.3% (50)	11.2% (29)	100% (259)
Based on social media contents, my parents have instructed me to avoid the vaccines	11.6% (30)	22.8% (59)	27.0% (70)	17.8% (46)	20.8% (54)	100% (259)
Due to social media contents, my pastor has instructed us to avoid the vaccines	5.0% (13)	10.4% (27)	25.1% (65)	26.3% (68)	33.2% (86)	100% (259)

Table 6 reveals that social media messages promote vaccine hesitant behaviours. They make the students to be scared of accepting the vaccines (51.7%), to

refuse to advise loved ones to take the vaccines (45.9%), to see discouraging posts from medical doctors and media practitioners about COVID-19 vaccines (39.4%). The messages also made some parents (34.4%) and pastors (15.4%) to instruct their children and Christians not to take the vaccines.

4.6. Hypothesis 3: Social Media Messages Have Significantly Promoted COVID-19 Vaccine Hesitancy Behaviour among Students

Table 7. Social media messages have significantly promoted COVID-19 vaccine hesitant behaviour among students.

One-Sample Statistics		One-Sample Test (CI: 95%)	
N	259	Df	258
Mean	17.8	T	10.4
Std. Deviation	4.4	Sig. (2-tailed)	0.001
		Test Value	15
		Mean Difference	2.8

Table 7 demonstrates the result of a One Sample T-test that was conducted to determine whether social media messages have significantly promoted COVID-19 vaccine hesitant behavior among the students. The result of the test, t ($df = 258$) = 10.4, $p < 0.05$ ($p = 0.001$), revealed that social media messages have significantly promoted COVID-19 vaccine hesitant behavior among the students. The result of the test was statistically significant at a 0.05 level with a 95% confidence interval. This finding confirms hypothesis three.

Table 8. Students' engagement with COVID-19 messages that encourage vaccine hesitancy.

Statements	Measurement of Agreement					Total
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	
I always like social media messages that discourage vaccine acceptance	17.8% (46)	17.0% (44)	29.7% (77)	22.4% (58)	13.1% (34)	100% (259)
I always share social media messages that discourage vaccine acceptance	8.9% (23)	15.8% (41)	22.8% (59)	27.4% (71)	25.1% (65)	100% (259)
I relay social media messages that discourage vaccine acceptance to friends and relatives	7.7% (20)	20.1% (52)	34.4% (89)	21.6% (56)	16.2% (42)	100% (259)

Table 8 shows that most students did not like (35.5%), share (52.5%) or relay (37.8%) social media messages that discourage vaccine acceptance. They distant

themselves from social media messages that promoted vaccine hesitancy.

5. Discussions

The findings revealed that social media messages have significantly enhanced students' knowledge of COVID-19 vaccination. They are instrumental in providing students with the necessary information about COVID-19 vaccines. This supports [Alfatease, Alqahtani, Orayj and Alshahrani \(2021\)](#), who revealed that social media has increased individuals' knowledge of the consequences of the pandemic. It has also enabled the students to detect fake news about COVID-19 vaccines. There are several conspiracy theories circulating on social media platforms. [The United Nations International Children's Emergency Fund \(2022\)](#) asserts that social media is used to circulate vaccine myths, misconceptions and misinformation, leading to the rapid spread of anti-COVID-19 vaccine campaigns. This situation has been made worse by the lack of accurate information through COVID-19 health communication ([Kabakama et al., 2022](#)). For instance, information easily spread that the vaccines were ineffective and meant to destroy Africans ([Ekwebene, Obidile, Azubuike, Nnamani, Dankano, Egbuniwe, 2021; Belingheri, Roncalli, Riva, Paladino, & Teruzzi, 2021](#)).

Rumours on social media platforms also claimed that COVID-19 pandemic was a trick to sell vaccines and microchips and that the vaccines contain poisonous substances. Although social media platforms enhance the circulation of COVID-19 vaccine falsehoods, they can also be used to correct and address them. [Gaborron, Oyeyemib and Wynnc \(2021\)](#) revealed that social media sites are instrumental in identifying and correcting disinformation and misinformation about COVID virus and its vaccines. They suggest that spreading reliable COVID-19 information, addressing, containing or debunking COVID-19 misinformation, increasing health literacy of social media users, quick health updates from government authorities, and regulating social media are some of the strategies for mitigating the spread of COVID-19 falsehood on social media.

The findings also revealed that social media messages made most students to believe that COVID-19 vaccines were not thoroughly tested. This means that the vaccines are not safe for individuals. Studies ([Ekwebene, et al., 2021; Belingheri, Roncalli, Riva, Paladino, & Teruzzi, 2021](#)) reveal that individuals are exercising hesitation towards COVID-19 vaccines because they are scared that the vaccines may adversely affect their health conditions. They doubt the efficacies of the various COVID-19 vaccines. As a result, most students considered traditional medicines more effective than COVID-19 vaccines. They equally believe their immune systems were naturally strong against diseases like COVID-19 (41.7%). This finding supports [Adebisi, Alaran, Bolarinwa, Akande-Sholabi and Lucero-Prisno \(2021\)](#), who revealed that beliefs in one's immunity have adversely affected African's willingness to accept COVID-19 vaccines.

The findings revealed that social media messages have promoted vaccine hesitancy behaviour among students in the selected Higher Learning Institutions. For

instance, 51.7% of the students affirmed that social media messages have made them scared of accepting COVID-19 vaccines. Due to the nature of some messages, the students are scared of taking the vaccines. Some social media messages stipulated that the vaccines were not thoroughly tested and are harmful. The messages created fright and made students shun the vaccines. In line with this finding, Andersen, Rambaut, Lipkin, Holmes and Garry (2020) revealed that social media messages created awareness of the side effects of COVID-19 vaccines and reinforced the circulation of conspiracy theories surrounding the vaccines.

Social media messages also made the majority of the students (39.4%) to understand that medical doctors were hesitant to take COVID-19 vaccines. This finding supports Agyekum, Afrifa-Anane, Kyei-Arthur, Addo and Achave (2021), who uncovered that global vaccination rate among health care providers has always been low. Contrarily, Ackah, Woo, Ukah, Fazal, Stallwood, Okpani and Adu (2021) explain that health providers are role models for vaccine uptake, especially for populations expressing low levels of trust towards vaccines.

6. Conclusion and Recommendations

The overall findings of the research indicate that social media platforms like Facebook and WhatsApp are instrumental in conveying information on COVID-19 vaccines to students at the University of Buea, Biaka University, Tiko University and Higher Institute for Professional Studies. Also, social media messages are instrumental in enhancing students' knowledge of COVID-19 vaccines. They have also positively and negatively influenced students' attitudes towards the COVID-19 vaccine. Positively, they made students to believe that they can feel safer after being vaccinated against the virus, the vaccines are meant for everyone (victims and non-victims), manufacturers of COVID-19 vaccines do not intend to harm Africans and the vaccines will not affect their health (32%). Negatively, the messages have made some students to believe that traditional medications are more effective than the vaccines, the vaccines are not thoroughly tested, government officials are promoting COVID-19 vaccines for political and financial gains, their immune systems are naturally strong against diseases like COVID-19 and Cameroon's health systems cannot effectively administer COVID-19 vaccines.

This research recommends that the government of Cameroon should organise annual intensive COVID-19 health campaigns in Higher Learning Institutions to educate students on the importance of COVID-19 vaccines. Also, the government should encourage lecturers, parents and religious authorities to take COVID-19 vaccines, and encourage others to do same. Equally, the government should work in collaboration with journalists, especially those with social media pages, to promote COVID-19 vaccine acceptance among students. Most students depend on social media sites for veritable information about COVID-19 vaccines. This explains the ability of social media messages to influence students' knowledge, attitude and behaviour towards the vaccine. Thus, the government should work with journalists to promote the dissemination of veritable COVID-19 news stories that

will increase vaccine confidence and acceptance among students. Furthermore, the government should sanction journalists who are crafting, promoting or relaying messages that encourage COVID-19 vaccine hesitancy among students in Cameroon. The sanctions will make those journalists to restrain from promoting messages that encourage vaccine hesitancy.

The main limitation of this study is the exclusion of a content analysis method to study COVID-19 messages on social media platforms. It would have been essential to content analyse the messages before measuring their implications on students' attitudes and behaviours.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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