



Employing Early Warning and Pre-Bunking Strategies as means of Managing Information on Health Emergencies in Nigeria: The COVID-19 vaccine Experience

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Abstract: The management of information during public health emergencies, particularly in the wake of the COVID-19 pandemic and subsequent COVID-19 vaccine introduction posed significant challenges for all countries, including Nigeria. Managing vaccine information is crucial to avoid misinformation, disinformation and rumours which escalate fears about, and negatively impact trust and confidence in vaccine and its acceptability. Early Warning and Pre-bunking are noted strategies for timeliness and proactive actions that can be employed in times of emergencies. This paper investigates the role of information in the management of public health emergencies in Nigeria. It particularly examines the importance of employing early warning and pre-bunking strategies to manage information during health crises, focusing on the COVID-19 vaccine experience in Nigeria. Through a review of relevant literature and analyses of data from quantitative and qualitative sources, the study investigates how these strategies can proactively enhance public health communication. Managing information related to COVID-19 vaccines by employing early warning and pre-bunking strategies is crucial in ensuring accurate, reliable, and responsible reporting. These strategies help to combat misinformation and disinformation, which can have serious public health consequences. The study also identifies critical factors influencing the success of these strategies. These include community engagement, governmental support, and media and civil society collaboration. This paper submits that both early warning and pre-bunking strategies should be fully integrated into public health emergency and vaccine related communication in Nigeria and the world at large and that successful management of vaccine information should be multi-faceted and involve all relevant stakeholders.

INTRODUCTION

The World Health Organisation (WHO) reported that the Coronavirus disease had resurfaced in December 2019. According to the World Health Organisation (2020), the first human cases of novel coronavirus, the disease caused by the novel coronavirus producing COVID-19 and subsequently named SARS-CoV-2, were reported by officials in Wuhan City, China. In January 2020, WHO declared COVID-19 a 'Public Health Emergency of International Concern' (PHEIC). With this declaration by WHO, COVID-19 officially became a global health pandemic. What started as a health emergency quickly escalated and affected the economic, social, and psychological well-being of individuals across the globe. It brought in its wake disruption to the health, social, and economic stability of nations and their citizens.

Nigeria recorded her index case on February 27, 2020. The index case was discovered in Lagos State South West Nigeria. Lagos State is generally regarded as the commercial nerve centre of the country and one can imagine the implication of the discovery on all spheres of life, not only in the state but all over the country. The COVID-19 outbreak hurt society and the aftermath was still felt, years after the outbreak. As a result of the impact of the disease, public health professionals agreed that it was important to develop vaccines as soon as possible because vaccines help curb the spread of diseases. It is widely acknowledged that vaccines are the fastest, most effective, and safest ways to protect and prevent the spread of diseases.

However, what was assumed would be the solution to the threat that the pandemic posed to lives, livelihoods and economies became 'suspect' on account of how information about the vaccine was managed or mismanaged as the case may be; and how information about the vaccine traversed across countries and territories to impact the vaccine roll-out in far-out and far-flung countries. Information about the virus and vaccination was largely mismanaged because people consume fake news on a daily. Consequently, cases of distortion of information, rumour, myth, disinformation, and misinformation about COVID-19 and the vaccine increased and spread, leading to fear, mistrust, and vaccine hesitancy. 'Information is power' is a popular maxim. Information can be positive or negative, depending on how and when it is handled or managed. Information, when properly and timely managed, is positive power because then, people can use it to benefit themselves and their communities. However, when information is shabbily handled, communication becomes dysfunctional. In that case, a power that information seeks to give to people becomes an albatross; communication breaks down and people do not or refuse to understand issues. A breakdown in the communication chain leads to rumor-mongering, misinformation, disinformation, and chaos as was widely experienced in the COVID-19 vaccine administration across the world.

Before the development of the first set of COVID-19 vaccines in early 2021, information about COVID-19 emanated from other countries and filtered into Nigeria. The information was negative, and scary, especially coming from China and Western countries where the effect of the disease was severe. This information did not just trickle to African countries such as Nigeria, but came in torrents and deluges, and led to what is commonly referred to as an infodemic. 'Infodemic' became more popular in the wake of the COVID-19 outbreak. 'Infodemic' has been defined by the World Health Organisation (WHO) as "too much information including false or misleading information in digital and physical environments during a disease outbreak. It causes confusion and risk-taking behaviours that can harm health. It also leads to mistrust in health authorities". 'Infodemic' negatively impacted the development of COVID-19 vaccines as the vaccines were dogged by rumours, myths, misinformation, and disinformation. Many people seemed to believe every and all information about the vaccines in their totality. This brings to the fore the importance of management of information on COVID-19 vaccine development and administration, especially in Nigeria; and the role of pre-bunking or 'inoculating' and early warning strategies in managing COVID-19 vaccine information. Both pre-bunking and early warning aim at **'timely warning, timely response, timely preparation, and subsequent arming'** people against potential misinformation, rumours, and disinformation about a situation, as it was in the case of the COVID-19 vaccine.

COVID-19 and COVID-19 Vaccines

Coronaviruses are a large virus family that can cause disease in both animals and humans (Hafeez, Ahmed, Siddiqui, Ahmad, Mishra 2020:116). The first strain of coronavirus, the avian infectious bronchitis virus was discovered in 1937, while the Severe Acute Respiratory Syndrome Coronavirus (SARS CoV) and Middle East Respiratory Syndrome Coronavirus (MERS-CoV) were discovered in 2002 and 2012 respectively (Anjorin 2020); and SARS-CoV-2, the virus that causes COVID-19 was discovered in China in 2019. COVID-19 was declared a global pandemic by the World Health Organisation (WHO), and this necessitated the implementation of non-pharmaceutical control measures by all countries around the globe (WHO, 2020). These control measures included the use of face masks, social distancing, lockdowns, border closure, and hygiene protocols (Ilesanmi, Oguntayo & Afolabi, 2020; Ilesanmi, Ariyo & Afolabi, 2020; NCDC, 2020). The rise in COVID-19-related cases and fatalities was an indication of the inadequacy of mitigation measures put in place to control the spread of the virus. This reinforced the need for the rapid development and deployment of COVID-19 vaccines across the globe.

The importance and efficacy of vaccines in the elimination of many infectious diseases cannot be over-emphasised. Vaccines prevent the spread of contagious, dangerous, and deadly diseases (Ripsey P, 2022) and have demonstrated an excellent historical capacity for the elimination of many infectious diseases such as tetanus, diphtheria, polio, rabies, pertussis, measles, and yellow fever (Chukwuocha et al., 2018). The European Commission states that "vaccines protect people and communities against deadly diseases. Vaccination builds up a person's defenses to common diseases that they are exposed to." The World Health Organisation (WHO) in recognition of the importance of vaccines to public health, states that "the 2 public health interventions that have had the greatest impact on the world's health are clean water and **vaccines**." Public health aims to prevent disease and it's easier and more cost-effective to *prevent* a disease than to treat it. That's exactly what immunisations or vaccinations aim to do. Immunizations or vaccinations protect persons from serious diseases and also prevent the spread of those diseases to others (Steve Goodman; 2020). COVID-19 vaccines were introduced into Nigeria on 2 March 2021 when the first batch of 3.9 million doses of AstraZeneca COVID-19 vaccines were brought into the country (Usigbe, 2021). Since 2021, the country has also received other brands of COVID-19 vaccines.

COVID-19 vaccine apathy and hesitancy are still ingrained in many communities and these affected the uptake of the vaccine in Nigeria. Nigeria has yet to meet its target of vaccinating 70 percent of its eligible population against COVID-19 (Adebawale-Tambe, 2023). Reasons for COVID-19 vaccine apathy in Nigeria are varied but according to Olu-Abiodun et.al (2022), misinformation, disinformation, anti-vaccine sentiments and conspiracy theories around the vaccine are some of the main reasons for it.

COVID-19 vaccine hesitancy: Social media, Fake News, Misinformation, Disinformation, and Rumors

COVID-19, COVID-19 vaccine development and the vaccination exercise were dogged by quite several real and false information, deliberate misinformation, rumors, conspiracy theories, and myths; all of which caused vaccine hesitancy and affected the uptake of the vaccine in many parts of the world including Nigeria. According to (Rozenbeek, 2021), COVID-19 myths and conspiracies posed serious threats to vaccination programs in almost every country. It is in this light that the World Health Organisation

states in Ali et al. (2021) that “the war against the pandemic is the war against misinformation as it is rapid and highly influential due to ease of access availability” (2020b).

In Nigeria, the National Primary Health Care Development Agency (NPHCDA) states that rumours, misinformation, and disinformation on social and mainstream media influenced COVID-19 vaccine trust and uptake in Nigeria. “There is a lot of ‘fake news’ and hate speech on social media platforms such as WhatsApp, Facebook, Twitter, blogs, websites and Instagram. These have gained a lot of traction among Nigerians. This has exploded significantly since the pandemic with mis/disinformation on COVID-19 and COVID-19 vaccines widely circulating on social media, leading to vaccine hesitancy and influencing confidence in COVID-19 vaccine” (NPHCDA CRICC document, 2021). Corroborating with the above submission by NPHCDA, a study conducted by Wonodi C, Obi-Jeff C, Adewumi F, et al. (2022) also posits that “exposure to unsubstantial claims about COVID-19 was universal among our participants, confirming the ubiquity of these false narratives.”

Tracing the negative effect of rumours fake news and conspiracy theories on immunisation in Nigeria, Wonodi C, Obi-Jeff C, Carleigh K, et al (2021) state that:

“Conspiracy theories, fake news, and rumours about vaccines are not new in Nigeria. Their disruptive effects have previously exerted a heavy financial and programmatic burden on the country. The widespread rejection of polio vaccination in Northern Nigeria in 2004 following false rumours that the vaccine sterilizes Muslim girls is still fresh in people's memories. It took Nigeria more than a decade of concerted effort and significant funding to overcome vaccine hesitancy and interrupt wild polio transmission.

Fake news, rumours, misinformation, disinformation, and other negative forms of information are threats to immunisations or vaccinations, especially in emergencies as witnessed during the COVID-19 era. Fake news has been defined as “news articles that are intentionally and verifiably false and could mislead readers” (Allcott & Gentzkow, 2017, p. 213). It is also sometimes referred to as information pollution (Wardle & Derakshan, 2017), media manipulation (Warwick & Lewis, 2017), or information warfare (Khaldarova & Pantti, 2016). Misinformation has been defined variously as “misleading information created or disseminated without manipulative or malicious intent” (Ireton & Posetti, 2018, p. 1); “false information that is spread, regardless of intent to mislead” (<https://www.dictionary.com>); and “False Information, but the person who is disseminating it believes that it is true (UNESCO, 2018, P.18).

Disinformation has been defined as deliberate (often orchestrated) attempts to confuse or manipulate people by giving false information to them (Ireton & Posetti, 2018, p. 1); “deliberately misleading or biased information; manipulated narrative or facts” (<https://www.dictionary.com>) and “False Information, and the person who is disseminating it knows it is false. “It is a deliberate, intentional lie, and points to people being actively disinformed by malicious actors” (UNESCO, 2018, P.44-5). Misinformation occurs because people unknowingly spread false information without knowing and meaning, while disinformation is deliberate. It has been described as very powerful, destructive, and divisive. Rumors are unsubstantiated information i.e., information that cannot be traced to any specific or verifiable source. They are “pieces of information or a story that has not been verified; and can be said to be the root of fake news, misinformation, and disinformation. Oftentimes, people who spread rumors do not bother to determine if there is any truth to what they are saying” (Gordon S, 2020).

Fake news, rumours, and disinformation are dangerous because of how they are deliberately orchestrated and resourced by malicious actors and reinforced by digital technologies and platforms, including social networks (Ireton & Posetti, 2018). Fake news, misinformation, and disinformation are often prevalent during pandemics and emergencies. They permeate every fiber of society and can put people at risk such as what was experienced during the COVID-19 pandemic. Misinformation, disinformation, rumors, and fake news on COVID-19 were disseminated through various channels such as the media, astute politicians, and social commentators as well as the social media (Frenkel et al., 2020; Russonello, 2020) in Ahinkorah et al (2020). Pennycook et al. (2020) in Ali et.al (2021) opines that out of these channels, the media was strongly responsible for misinformation on COVID-19 globally. This view is supported by Ali et al. (2021) who note that “media dependency and accessibility are the primary mechanisms of false information during the COVID-19 outbreak.”

Though both mainstream and social media were primary mechanisms of false information during the COVID-19 outbreak, social media is believed to have been guilty of causing panic. Obi-Ani et al, (2020) believe that aside from “social media being a source of information, it has also been a base from where panic relating to Covid-19 draws its strength”. To Rothschild and Fischer (2020) “social media contributed immensely in the spread of panic among users”; Pazzanese (2020) comments on the effect of social media on health guidelines on COVID-19 ... “accurate health guidelines are being eroded as a result of the sheer proportion of misinformation and disinformation across online platforms.” This position is shared by Ahinkorah et al (2020 p.2) who believe “that this misinformation or fake news are drowning official public health advice on COVID-19, making it extremely problematic for the voices of healthcare professionals to be heard, the implications of which may be enormous as the virus spreads between and within diverse populations.” Inobemhe (2021, p.42) and Nguyen and Nguyen (2020) think that though the world has always experienced epidemics, no era saw a concentrated global panic like the Covid-19 era, because of the magnitude and spread of myths, fake news, and conspiracies which were amplified through modern new media tools made possible by evolving digital communication technologies and how thousands of online media users disseminated these myths, rumours, misinformation, and disinformation.

Nigeria Health Watch (2021) opined that social media escalated misinformation, fake news, and rumors on the COVID-19 vaccine specifically in Nigeria. It majorly shaped how people perceived the vaccine and made some Nigerians distrust the vaccine as evidenced in the comments below:

Nobody can convince me to take the COVID-19 vaccine. I don't trust the government to give me anything free and good for me. Nothing is free in Nigeria. I know they want to insert a microchip in us so that they can control us.

Vaccines cause infertility in men and women, different vaccines are being developed for Africa that encourage depopulation, the COVID-19 vaccine is not safe because it was developed so quickly, and the vaccine contains aborted fetuses” (Aroh, Asaolu and Okafor, 2021).

Misinformation, disinformation, fake news, and rumours on the COVID-19 vaccine majorly spread through social media and significantly impacted vaccine acceptability. False claims about vaccine safety, efficacy, and side effects affected COVID-19 vaccine hesitancy.

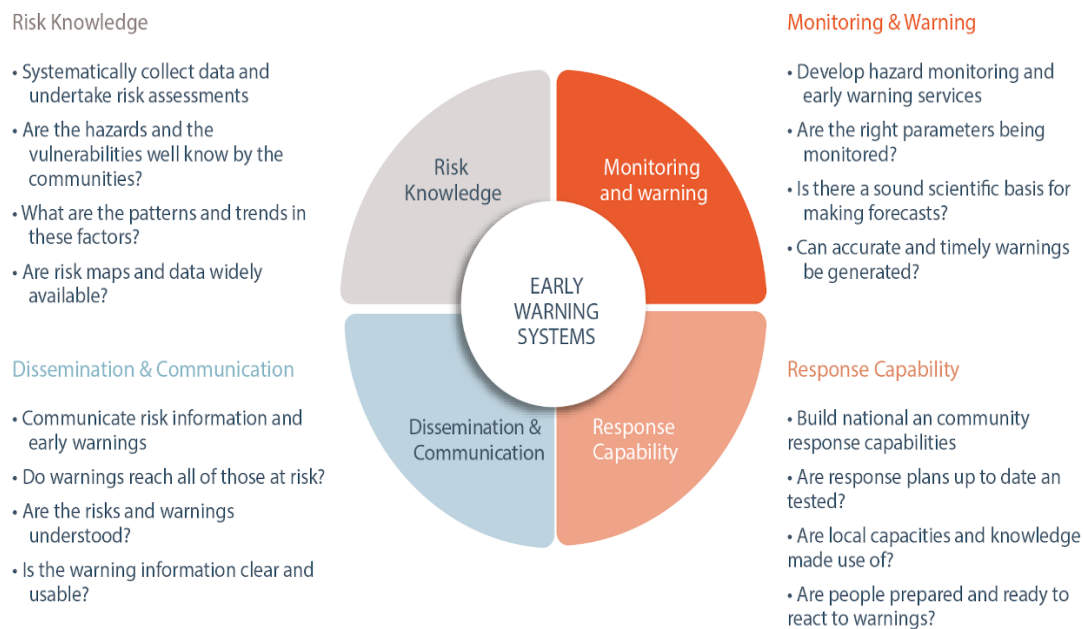
Early Warning (EW)

Early Warning has been defined as “the set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities, and organisations threatened by a hazard to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss” (UNISDR, 2009); and in Jongman and Schmid (1994) in Ajibola (2010) as the “prognosis (forecasting) or projection based on collected and processed information... it is designed to have an alerting function, identifying critical situations with a high escalation potential so that timely action can be taken to reverse the trend or, at least to soften its impact through contingency planning...”.

Early Warning Systems have been designed and implemented for conflict and crisis, geological, hydrometeorological, biological, and health hazards as well as forest fires. They can be community or people-centered, national, regional, or global (<https://www.un-spider.org/risks-and-disasters/early-warning-systems#no-back>). Factors to consider in early warning are the risk potential of a situation (identifying the important variables to be monitored), and using these variables to collect information or data that will confirm the risk potential of that situation (Ajibola, 2013). There are four elements of Early Warning Systems. These are Risk Knowledge, Monitoring and Warning Service, Dissemination and Communication, and Response Capability(<https://www.un-spider.org/risks-and-disasters/early-warning-systems#no-back>).

Eliot Christian, Carolina Cerrudo, Elizabeth Viljoen et. al (2022) captures these elements in an integrated view of Early Warning Systems in Figure 1 below:

An integrated view of early warning systems



Source: International Telecommunication Union (ITU)

Early Warning is not an end in itself but rather an instrument "for preparedness, prevention, and mitigation about disasters, emergencies, and conflict situations, whether long or short-term ones" (Rupensinghe & Kuroda, M, 1992, p.217). This means that data collected in Early Warning must generate appropriate responses. Timely response and action to mitigate or prevent threats from escalating to disasters and emergencies "require partnerships, enabling environments, enhanced communication, capacity building, and effective messaging using all available media. Good communication practices build trust. Broadcasters and other media play a crucial role in disseminating relevant information before, during, and after disasters” Eliot Christian, Carolina Cerrudo, Elizabeth Viljoen et. al (2022).

Pre-bunking

Pre-bunking is derived from the word 'debunk'. Debunk means "to prove to be false" (Merriam-Webster Dictionary, 2022). Debunking occurs after information has been disclosed or disseminated. However, pre-bunking addresses or refutes anticipated misinformation, disinformation, rumors, and other forms of negative information before they occur. Pre-bunking attempts to warn people about misinformation and other negative forms of information before they occur. Pre-bunking is proactive rather than reactive.

Pre-bunking is shaped by the 'psychological inoculation theory' (Roozenbeek, et al, 2020). Van der Linden S, et.al (2017) state that "Psychological inoculation closely follows the biomedical analogy: just as exposure to a weakened dose of a virus helps the body immunologically resist future infection, so can preemptively exposing people to a weakened dose of misinformation help people psychologically "resist" that misinformation should it be encountered in the future." Garcia, L & Shane, T (2021) draw a correlation between medicine and misinformation, "the idea of inoculating people against false or misleading information is simple..... Much like vaccines train your immune response against a virus, knowing more about misinformation can help you dismiss it when you see it." They believe that "it is better to prevent misinformation from spreading at all than to debunk once it spreads." Continuing Garcia and Shane (2021) identify types of pre-bunks:

1. fact-based: correcting a specific false claim or narrative
2. logic-based: explaining tactics used to manipulate
3. source-based: pointing out bad sources of information

It is believed that pre-emptive action against misinformation is preferable to reactive response to misinformation, especially in responding to COVID-19 vaccine information management. Roozenbeek (2021) opines that pre-bunking initiatives are relevant to combating misinformation and fake news when he states that "COVID-19 falsehoods and conspiracies pose a real threat to vaccination programmes in almost every nation. Every weapon in our arsenal should be used to combat fake news, which threatens herd immunity. Pre-bunking initiatives are critical in this global battle".

NEED OF THE STUDY

This paper intends to ascertain how information on the COVID-19 vaccine shaped the acceptability of the vaccine among Nigerians. It will also provide insights and proffer suggestions on how COVID-19 vaccine information could have been managed; and in particular, how rumours, misinformation, and disinformation on health emergencies and vaccines, can be nipped in the bud or managed using early warning and pre-bunking strategies.

THEORETICAL FRAMEWORK

Inoculation theory

Based on the analogy of medical inoculation, the Inoculation Theory proposes that individuals can be "vaccinated" with a variety of pre-treatments to help fight future persuasive attacks on their beliefs and attitudes. The theory argues that individuals can be "inoculated against counter-attitudinal attacks like immunisation against viral attacks" (Banas & Miller, 2013, p. 186), and that "it is possible to build psychological resistance against unwanted persuasion attempts, much like medical inoculations build physiological resistance against pathogens" (Roozenbeek et.al. 2022).

It believes that when individuals are exposed to weakened versions of arguments against attitudes they currently hold, they can build up resistance and counter-arguments to future threats to those attitudes (Kitsch et al. 2020, p. 7). Roozenbeek and van der Linden (2019) suggest that fake news should be treated like a virus and the inoculation theory be used to fight it.

RESEARCH METHODOLOGY

3.1 Population and Sample

The population of the study are Nigerians between the ages of 18 and 60 years. Three hundred and ninety-three (393) respondents from different backgrounds and between the ages of 18 and 60 participated in the online survey. These age groups were selected for the survey because that was the official age groups targeted for the COVID-19 vaccination exercise in Nigeria.

3.2 Data and Sources of Data

The study utilised an anonymous structured online questionnaire and content analysis coding sheet to generate data for the study. Structured online questionnaire: The questionnaire contained both open and close-ended questions. It comprised four sections; Section A provided demographic information of respondents, which included information on age, gender, education, and religion. Section B provided information on the knowledge, attitudes, and beliefs of respondents to the COVID-19 vaccine. Section C provided information on respondents' trusted and preferred sources of COVID-19 vaccine information and how these impacted their vaccine and vaccination choices, while Section D provided information on respondents' knowledge of early warning and pre-bunking, especially as it relates to information on COVID-19 vaccine.

The questionnaire was put in a Google form format and purposively shared with respondents through WhatsApp and Facebook. This design was found to be appropriate because it was easy for respondents to access and fill at their own time and pace. It also afforded

respondents the opportunity to reflect on their choices and amend them if they needed to. This improved the quality of data collected and made the collection and analyses of data easy, efficient, and easily manageable for the researcher.

3.2.1 Content Analysis

A coding sheet of Five (5) newspapers, namely, 'The Punch', 'The Nation', 'The Guardian', 'Daily Trust', and 'The Sun' were content analysed. Six hundred and sixteen (616) daily editions of these newspapers published between March 2020 and February 2021 were content analysed. Though selected newspaper reports focused on both the disease and the vaccine, however, more emphasis was placed on COVID-19 vaccine stories because that is the focus of this research.

3.4 Statistical tools and econometric models

The data were analysed using descriptive statistics and presented using graphs and diagrams.

RESULTS AND DISCUSSION

Table 1: Demographic Analysis- Age, Education, Gender and Religion

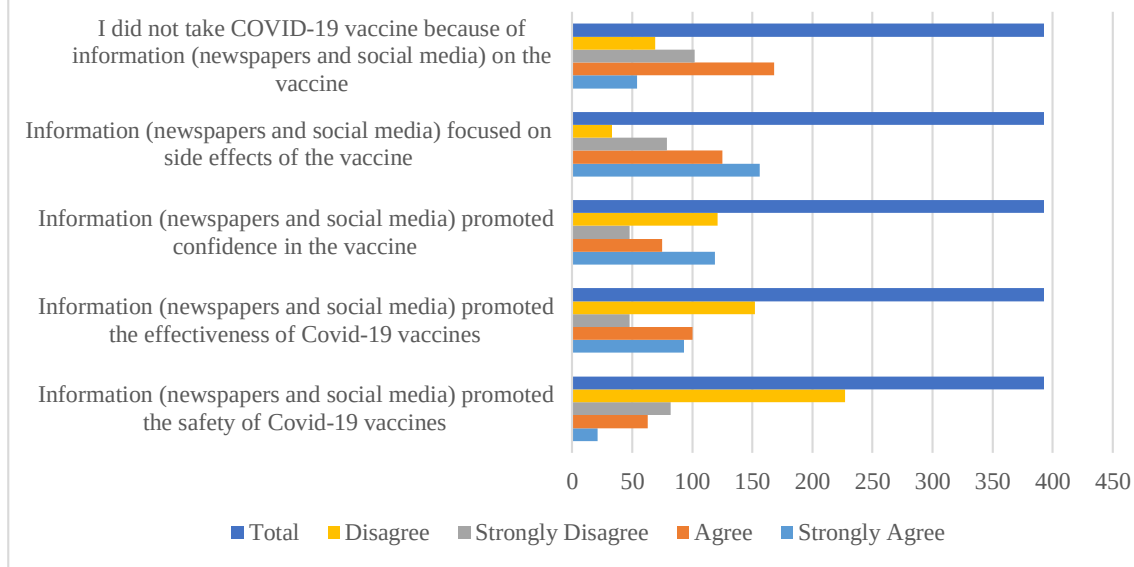
Variable	Category	Frequency	Percentage
Gender	Female	211	53.7
	Male	182	46.3
Age	18 - 25	52	13.2
	26 - 35	181	46.1
	36 - 45	18	4.6
	46 - 60	72	18.3
	Above 60	70	17.8
Educational Qualification	Primary school	0	0
	Junior secondary school	5	1.3
	Senior secondary school	42	10.7
	First degree	203	64.4
	Postgraduate degree	93	23.7
Religion	Christianity	195	49.6
	Islam	125	31.8
	Others	73	18.6
N		393	100

Source: Field Survey, 2022

COVID-19 vaccine Information Management using Early Warning and Pre-bunking strategies

There are many ways of addressing deficits in a health emergency such as the COVID-19 pandemic and its attendant vaccine issues. Top of these are information dissemination and communication. Information played a significant role in shaping the acceptability of COVID-19 vaccines in Nigeria and the acceptability of these vaccines was influenced by negative forms of information such as rumours, misinformation and disinformation as relevant literature indicated. This paper supports these submissions because respondents believe that information on COVID-19 vaccines affected their confidence and trust in the vaccines (Fig. 2 below).

Fig. 2: Respondents on how information on COVID-19 vaccines affected their choices

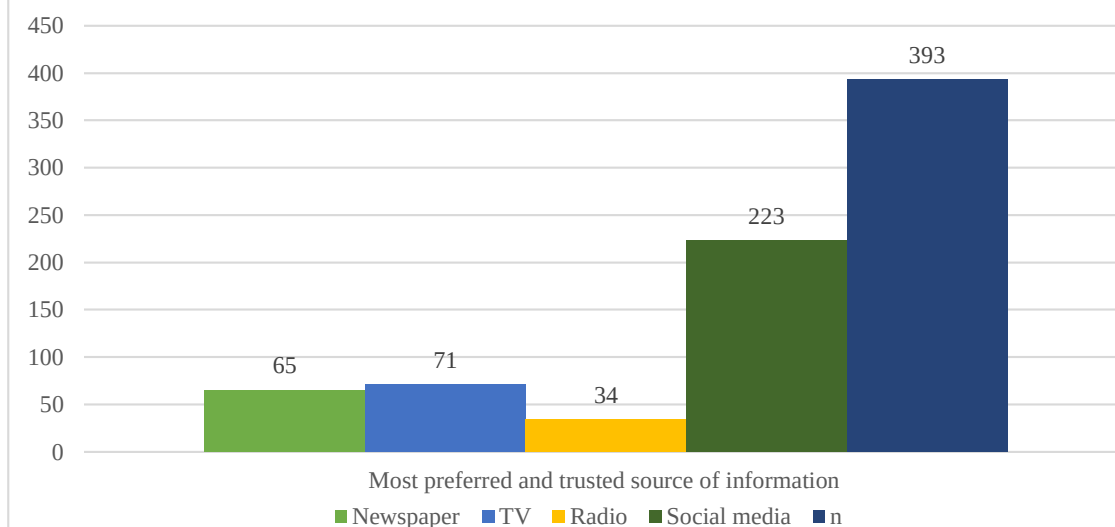


Source: Field Survey, 2022

Information, including negative forms of information on COVID-19 vaccines, was disseminated through various channels and platforms. As Frenkel et al., 2020; Russonello, 2020 in Ahinkorah et al (2020) opine, misinformation, disinformation, rumors, and fake news on COVID-19 were disseminated through various channels such as the media, astute politicians, social commentators, as well as social media.

Some channels of information were more trusted by respondents as data from this research indicates that respondents' most preferred and trusted source (s) of information on COVID-19 vaccines are the media, comprising newspaper, television, radio, and social media (figure 3 below):

Fig. 3: Respondents on most and least preferred and trusted sources of information



Source: Field Survey: 2022

However, Frenkel et al., 2020; Russonello, 2020 Ahinkorah et al (2020) think that misinformation, disinformation, rumors, and fake news on COVID-19 were majorly disseminated through different communication channels including traditional media forms and social media; and Nigeria Health Watch (2021) states that social media escalated misinformation, fake news and rumours on COVID-19 vaccine, it was observed that respondents had a lot of confidence in COVID-19 vaccine information posted on social media. The reasons given for this are multi-faceted. These include "accessibility, easy verification, multimedia, credibility, no interference from government, and complete details" (Source: Field Survey, 2022).

Because respondents could not differentiate between real and true information on COVID-19 vaccines from rumours, misinformation, and disinformation about the vaccines on social media, they believe that all information about the vaccines on social media is majorly true (Source: Field Survey, 2022).

Early Warning and Pre-bunking:

Early Warning and Pre-bunking are strategies that can be used to manage information and communication for effective health emergency mitigation. They are both important to building public trust in public health emergencies by providing timely and accurate communication to prevent or counter misinformation, disinformation, and other negative forms of communication.

Both Early Warning and Pre-bunking aim to address, prevent, or manage the negative effect(s) of emergencies on society. They aim at alerting, timely warning, timely response, timely preparation, and subsequently equipping people against potential misinformation, rumours, and disinformation prevalent during emergencies. Information is the cornerstone for Early Warning and Pre-bunking. The mass and social media were primary sources of information on COVID-19 vaccines.

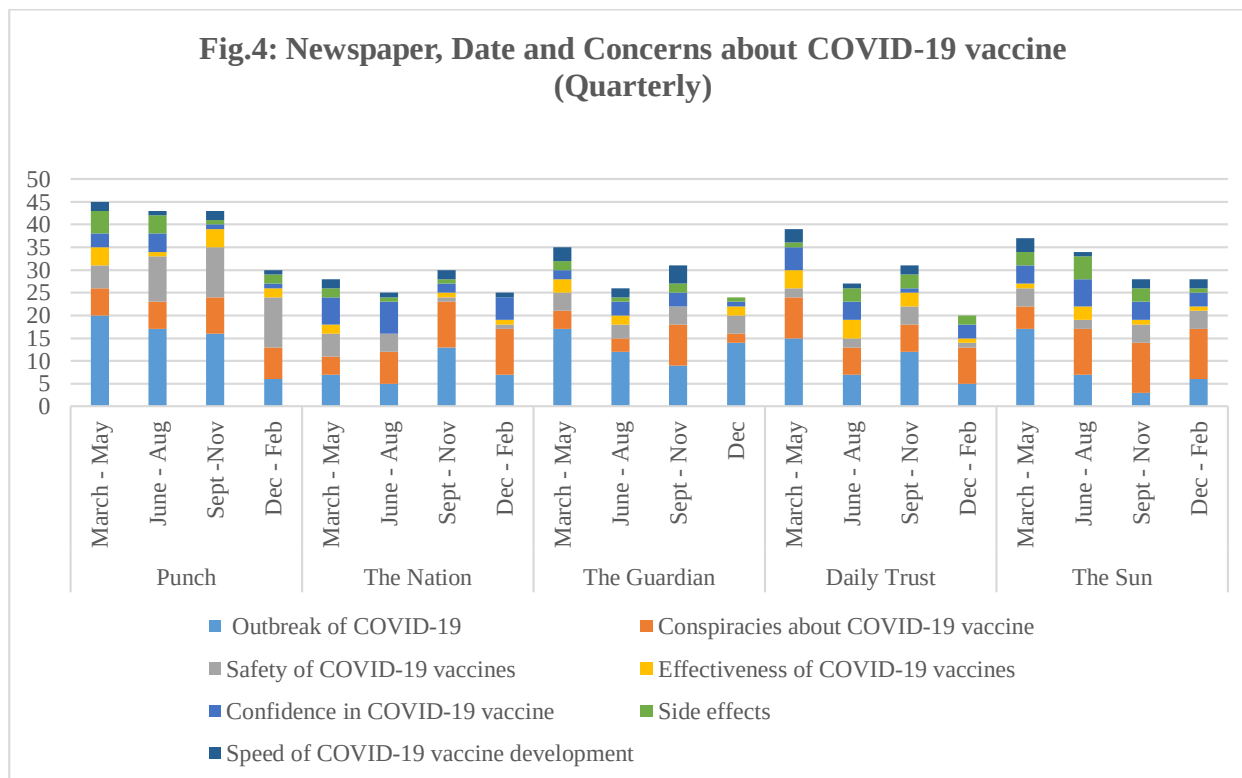
Early Warning:

It is important to note that Early Warning is not an end in itself but rather an instrument "for preparedness, prevention, and mitigation about disasters, emergencies, and conflict situations, whether long or short-term ones" (Rupensinghe & Kuroda, M, 1992, p.217). This means that data collected in Early Warning must generate an appropriate response. Timely response and action to mitigate or prevent threats from escalating to disasters and emergencies "require partnerships, enabling environments, enhanced communication, capacity building, and effective messaging using all available media.

This means that information alone does not constitute 'Early Warning' but data collected in Early Warning must generate appropriate response. Data can be generated from different sources, including the media. As Eliot Christian, Carolina Cerrudo, and Elizabeth Viljoen et. al (2022) state, "Broadcasters and other media play a crucial role in disseminating relevant information before, during, and after disasters". Nigeria newspapers reported activities relating to the pandemic globally and in Nigeria specifically across different seasons as the pandemic unfolded.

At the onset of the pandemic in China, Nigerian newspapers had few stories on the China outbreak. However, this changed upon the discovery of the index case in Nigeria in 2020. Nigeria newspapers as evidenced by selected newspapers reviewed, started to widely report the pandemic and these reports continued till WHO-approved COVID-19 vaccines were brought into, and when vaccination commenced in the country in 2021.

Figure 4 below shows how newspapers reported areas of concern of many Nigerians about the vaccine. As widely known, the media captures and reflects the opinions and concerns of citizens regarding pertinent issues in every society, as well as allows different voices to contribute to public discourse on issues, such as that of the COVID-19 vaccine.



Source: Field Survey, 2022

From the figure above, it can be seen that in the quarterly review of selected newspapers for the study, there was more emphasis on the outbreak of COVID-19 and this is understandable considering the panic that the pandemic generated globally. However, the figure shows that in the quarter before the arrival of the first consignment of COVID-19 vaccines to Nigeria, the number of these reports generally declined, while there were more reports on concerns about the vaccine.

Figure 4 also shows that selected newspapers always had stories on concerns about the vaccine, and these reports went as far back as March to May 2020, when the vaccines were probably still at the developmental stage. This shows that newspaper reports were proactive and timely in terms of reporting concerns relating to the vaccine. They identified and reported sources of concern (indicators) of many Nigerians about the vaccine, and these were reported quite early and were consistently amplified throughout the period leading to the arrival of the first batch of vaccines into the country.

As noted earlier, Early Warning is not an end in itself but rather an instrument "for preparedness, prevention, and mitigation about disasters, emergencies, and conflict situations, whether long or short-term ones" (Rupensinghe & Kuroda, M, 1992, p.217). This means that information on COVID-19 vaccines, alone does not constitute an 'Early Warning' but information (data) collected to be used to fashion appropriate responses, to proactively address misinformation and disinformation, and to ensure that accurate information on COVID-19 vaccine reaches the public as early as possible.

Decision and policy makers play a crucial role in accepting Early Warning information and data on COVID-19 vaccines, for Early Warning to be effective. Once the action is deemed necessary, decision-makers are expected to introduce timely and proactive strategies to reduce vaccine hesitancy and build trust and confidence in the vaccines. These interventions should be introduced at relevant phases or periods in the health emergency cycle when such interventions will make a difference. These phases can be at points of emergence, tentative escalation, de-escalation, or crisis.

Pre-bunking

Pre-bunking as a strategy provides the public with accurate information about the COVID-19 vaccine before the public encounter misinformation about it. This is in line with the position of scholars like Van der Linden S, et.al (2017) who believe that, "just as exposure to a weakened dose of a virus helps the body immunologically resist future infection, so can preemptively exposing people to a weakened dose of misinformation help people psychologically "resist" that misinformation should it be encountered in the future." This proactive approach is believed to be highly effective in reducing the susceptibility of people to false claims about the vaccine.

In the COVID-19 vaccine scenario in Nigeria, it was surprising to find out that 53.6% of respondents sampled have some form of knowledge about pre-bunking as against the 46.4% that do not have any form of knowledge about it, while 74.8% of respondents sampled disagree with the notion that it could have been used to manage negative information on COVID-19 Vaccines, as against 25.2% who agree that it could have been used to manage the negative information (Source: Field survey, 2022).

From Figure 4 above, pre-bunking strategies could have been introduced at critical points before the escalation of the vaccine misinformation crisis, and at various points, that intervention could have led to the de-escalation of the vaccine misinformation crisis. These periods could have been from March to May 2020 when 'conversations' about the vaccine began to emerge and from September 2020 to February 2021 when anti-vaccine 'voices' became more strident. Also, the first consignment of vaccines was already being expected in Nigeria in early 2021.

Conclusion

Employing early warning and pre-bunking strategies to manage information on vaccine-related health emergencies like the one experienced during COVID-19 is crucial to ensure that timely, accurate, reliable, and science-based information reaches the public on vaccines. This will help combat misinformation, build trust, and promote vaccine uptake. This paper submits that both early warning and pre-bunking strategies should be fully integrated into public health emergency and vaccine related communication in Nigeria and the world at large.

Recommendations

Managing information related to COVID-19 vaccines by employing early warning and pre-bunking strategies is crucial in ensuring accurate, reliable, and responsible reporting. These strategies help to combat misinformation and disinformation, which can have serious public health consequences.

Such strategies include:

Early Warning:

1. Monitoring: Establish a comprehensive monitoring system to track the spread of COVID-19 vaccine-related misinformation and disinformation on traditional media, social media, websites, and other online platforms.

2. Community engagement: Actively identify and engage with communities and community influencers to identify concerns and rumors in real time.
3. Data Analysis: Use data analytics tools to identify emerging trends and key influencers of misinformation and disinformation.
4. Collaborate with health experts and other relevant stakeholders to develop early warning indicators and guidelines for identifying misinformation and disinformation.

Pre-bunking:

1. Public awareness campaigns: Develop and implement public awareness campaigns focused on the importance of vaccines and the risks of misinformation.
2. Trusted Messengers: Identify and train trusted messengers, such as healthcare professionals, the media, community leaders, and celebrities, to effectively communicate accurate vaccine information.
3. Awareness Programs: Launch awareness programs targeting specific demographics to address vaccine hesitancy and provide accurate information.
4. Fact-checking: Establish a fact-checking system to debunk false information promptly and provide evidence-based counterarguments.
5. Engage Traditional and Social Media: Use traditional media, social media, and other digital platforms to share accurate information, engage with the public, and respond to questions and concerns.
6. Encourage Critical Thinking: Encourage critical thinking and media literacy skills to help individuals assess information critically and be able to identify credible sources from unreliable ones.

Misinformation and disinformation about vaccines and vaccinations often spread and are easily believed when information comes from trusted sources and platforms. It is being suggested that successful management of vaccine information should be multi-faceted and involve all relevant stakeholders.

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