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Research article

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Influence of Source Credibility on COVID-19 Vaccine Acceptance and Hesitancy in Selected States of South-East Nigeria

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Abstract

Vaccination remains one of the effective ways of stopping the spread of infectious diseases such as COVID-19. However, people have shown resistance and hesitancy towards these vaccines because of lack of trust in the vaccines fueled by misinformation and fake news about the vaccines as well as distrust of some sources of vaccine information. Therefore, this study investigated the influence of source credibility on COVID-19 vaccine acceptance and hesitancy in selected states of South-East Nigeria. The study adopted the survey research method with questionnaire as the instrument for data collection. A sample size of 384 respondents from three states in Nigeria's South-East was used. Findings showed that social media and health practitioners were mostly used in sourcing information on the vaccines. Also, the respondents had a positive attitude towards the vaccines. The social media, traditional media, blogs, health practitioners, family and friends, WHO, and pharmaceutical companies were considered as credible sources of vaccine information, while opinion leaders, religious leaders, and NCDC were regarded as non-credible sources. Similarly, all the sources perceived as credible by the public influenced the acceptance of vaccination while those perceived as less credible boosted hesitancy. Based on the findings, it was recommended, inter alia, that vaccine messaging campaigns should be shared more through the social media and health practitioners; social media

platforms should be more active and transparent in fact-checking misinformation on their sites; government and mass media should leverage credible sources in disseminating accurate COVID-19 vaccine information using the 6-point guideline of the CERC Model.

Keywords: Source, Credibility, COVID-19, Vaccine Hesitancy, Nigeria

1. Introduction

Vaccine hesitancy, according to the World Health Organisation (WHO), was one of the top 10 threats to global health in 2019 (WHO, 2020). It has been defined as the delay in acceptance, reluctance, or refusal of vaccination despite the availability of vaccination services (WHO, 2020). Vaccine hesitancy and in some cases outright refusal, is not something peculiar to COVID-19 as this had been identified as a challenge with previous immunisations with proven track-records of safety and effectiveness, such as measles or polio vaccines (Allcott *et al*., 2020).

Available literature shows that hesitancy towards vaccination across the world is a product of many factors such as religion; culture; gender; socio-economic, political and geographical barriers; uncertainty about their safety, potential side effects and efficacy, sometimes triggered by misinformation and disinformation across various media sources and lack of trust in government and medical systems (MacDonald *et al*., 2015; Figueiredo *et al*., 2020; Martinez-Bravo & Stegman, 2021).

The media are believed to be important vehicles for spreading vaccine-related information, improving awareness and preparing the public for well-informed decisions about health (Casciotti *et al.*, 2014). The information received from the mass media has the capacity to mould the public's perception of issues and events, opinions, attitudes and even behaviours (Cacciatore *et al.*, 2012; Priest, 2013). It therefore becomes a problem when the mass media also become the vehicle and carrier of fake news, misinformation and disinformation on health-related matters. One of the effects of such unverified and distorted information will be lack of trust resulting in hesitancy or outright refusal of vaccination as the case is with the COVID-19 vaccines.

Trust is vital in mobilising compliance with public health measures (Devine *et al.*, 2020; Jennings *et al.*, 2021). Since the media have the power to mobilise people to comply with public health measures through the information, they share on a given issue, it behooves the media at all times to provide scientific, factual and data-based information on health-related issues leveraging on source credibility. This is because it is believed that information disseminated via source(s) perceived as credible have a better effect than the same information delivered by sources not perceived as credible (Hovland *et al.*, 1953; Telg *et al.*, 2012; Lamm *et al.*, 2016).

Hovland *et al.* (1953) defined source credibility as the perceived expertise and trustworthiness of an information source. The expertise dimension shows the level to which the receiver sees the source as possessing knowledge or skill in the subject area of the message (Lowry *et al.*, 2014), while source trustworthiness is "the degree of confidence audience has in a given source to

communicate, factual, scientific and data-driven information"(Lamm *et al.,* 2016). Source credibility and credible source are used interchangeably throughout the study.

Although researchers previously looked at "source" from the angle of "the message communicator," the increase of computer-based communication studies has blurred the line of the initial theoretical differentiation that existed between the source and the medium of a message. The source and medium have been examined by some researchers to be a similar or related construct in technologically mediated communication studies such as the following cited in Hocevar *et al.*, (2017) – (Metzger *et al*., 2003; Sundar & Nass, 2001 and Wathen & Burkell, 2002).

For instance, in the case of a health website, someone may regard both the source and the medium of a message disseminated to be the website on which it is shared. The differences between the source and the medium thus may not have much importance in research on credibility in the modern-day media space than it had in the mid-20th century when most of the research on credibility and persuasion began. This study chooses to approach information source from both the angles of source as the "medium" and the "communicator." Therefore, this study holds that when COVID-19 vaccine information is relayed to the public through perceived credible sources, there is high likelihood that people would accept vaccination.

2. Statement of the Problem

With the level of damage caused by the novel coronavirus globally, it would have been expected that the arrival of vaccines would be embraced by the public with excitement as the best means of tackling the pandemic. However, COVID-19 vaccines were met with high levels of resistance and hesitancy in different countries, including Nigeria. Fake news, rumours. and conspiracy theories on the vaccines spreading in the media and lack of trust in various information sources have been identified as some of the factors triggering such vaccine hesitancy.

Credibility of information sources is vital in the mobilisation of the public towards taking heath-safety measures like vaccination. This is because people are more likely to be persuaded when the sources of information are seen as credible. Therefore, this work seeks to examine the influence of source credibility on COVID-19 vaccine acceptance and hesitancy among residents of selected states of South-East Nigeria.

3. Research Questions

The following questions were raised by the study:

1. What are the media/source(s) from which the public gets COVID-19 vaccine information most?

2. What is the attitude of the public towards COVID-19 vaccines?

3. Which of the information sources does the public consider credible?

4. Does the source credibility of messages on COVID-19 vaccines influence public acceptance or hesitancy towards the vaccines?

5. What other factors, besides source credibility, contribute to public acceptance or hesitancy towards COVID-19 vaccines?

4. Literature Review

4.1 Source Credibility

Source credibility has been identified as one of the most vital factors that distinctly affect people's attitude and behavioral intentions in communication (Haley, (1996) in Hu (2015). Most of the credibility research and theory arose from persuasion literature. The findings of many studies showed that a source or message with high credibility will induce more persuasion and attitudinal change (e.g., Berlo et al., 1969; Hovland & Weiss, 1951; Pornpitakpan, 2003).

The development of the concept of source credibility began from Aristotle in his book, *The Rhetoric*, in which he separated persuasive means into three groups: ethos, logos, and pathos. In his view, ethos which plays the most crucial function in influencing people's thoughts and beliefs deals with the perceived expertise, knowledge or trustworthiness of the message source in the eyes of the audience (Umeogu, 2012). Logos deals with the content and organisation of an argument and how to create logical connections through arrangement of facts in an argument. Pathos on the other hand is concerned with making appeals to the values and beliefs of the audience to get them emotionally tied to the speaker. The overall objective is to emotionally sway the audience to make them accept the speaker's position. While these three rhetorical appeals play important roles in persuasion, our study is more concerned with ethos which dwells on source credibility.

Source credibility was highlighted by Hovland, Janis and Kelly in 1953. According to them, there is greater tendency to influence or persuade the audience if the message source presents itself as credible. To test this assumption, Hovland et. al., (1953) carried out studies on the influence of sources in persuasion by presenting both credible and non-credible sources. Their findings confirmed the assumption that credible sources of information create the desired attitude or behaviour in the audience (Umeogu, 2012). Similarly, McCroskey *et al*. (1974) showed that information sources with high perceived credibility elicit more respect and acceptance.

Lafferty and Goldsmith (1999) view source credibility as the extent to which the source is viewed as having the expertise relevant to the communication topic and can be trusted to give an objective opinion on the subject (cited in Selman & Sims, 2022). It has also been described as judgments made by a receiver of a message regarding the believability of a communicator (O'Keefe, 2002).

Having understood the relevance and effect perceived source credibility has on people's behaviours and attitudes, scholars began developing source credibility measures in different

areas of communication. For instance, Ohonian (1990) held that the credibility of a celebrity endorser could be seen from three dimensions: expertise, source attractiveness and trustworthiness. Expertise is associated with the source's competence and knowledge, skills or experience in a specific field (McGinnies & Ward, 1980; Ericsson & Håkansson, 2005). For example, using an athlete to endorse sports-related products or using a medical doctor when endorsing pharmaceutical products are perceived as more persuasive than using ordinary people for such endorsements. Furthermore, Ohonian (1990) saw attractiveness in source credibility as something to do with physical characteristics perceived of the information source. These include facial and body looks, the way the source dresses, and postures (Baker & Churchill, 1977; Caballero & Pride, 1984). These characteristics of a source are said to induce likeability which early literature suggested as the first dimension of attractiveness. That is to say, receivers are more likely to be influenced by sources they find likable (Ericsson & Håkansson, 2005).

It is important to note that Li & Yin, (2018) suggested another dimension of attractiveness which they identified as "closeness." While acknowledging the importance of what the eyes can behold of a source, the scholars explained that closeness has to do with the effective bond that may exist between the source and the receiver. Closeness is seen from two angles, namely, similarity and familiarity (McQuire, 1985; 1989). Similarity connotes resemblance between the source and the receiver while familiarity deals with the receiver having knowledge of the source through exposure (Eredogan *et al.*, 2001). This gives us an understanding that receivers of a message who share similar features with a message source or are familiar with the source, having known the source overtime, are likely to be persuaded to act positively towards the message received (Kareklas *et. al*., 2015; Lamm *et. al.*, 2016; Hocevar *et. al*., 2017).

It cannot also be denied that many people in this modern age fall back on the internet to seek for health-related information even though the information may come from different sources with varied accuracy. With this rise in people utilising the internet as a means of getting health-related and other information, scholars have shown interest in putting to use areas of the persuasion literature to help in guiding studies of credibility assessment online. As a result, there has been research over time to further understand the influence of source credibility, especially from the angle of expertise, given the rise in the usage of social media and user-generated information (Metzger & Flanagin, 2013; Warnick, 2004). For example, having qualifications like medical degrees or clinical experience are still used as criteria for the assessment of source expertise in online information. But personal experience of someone who has a health problem has the capacity of giving some levels of perceived expertise to those who disseminate information using the internet but do not have the traditional credentialed expertise (Eysenbach, 2008; Eysenbach *et al.*, 2002). This credibility attached to a source based on their experience has been identified as having the ability to potentially influence the way online user-generated information is evaluated (Metzger & Flanagin, 2013). Although experiential credibility can be attached to offline sources of health information like friends and family, or fellow patients, most of the time people may likely not have offline friends and family in their close social circle with whom they share very similar health experiences. As a result, people may be specifically pulled to reading about the experiences of others who share health information that they are interested in online (Sillence *et al*., 2007). A ready example could be an ordinary person who suffers from the same health problem (Metzger & Flanagin, 2013).

Online information providers on health-related issues who do not possess the skills or expertise can be assigned experiential credibility. Some research dealing with experiential health information provision shows that while source credibility is perceived to be higher for a credentialed health institution, experiential information from an ordinary person can have a tremendous effect on attitudes and self-efficacy towards health behaviours (Neubaum & Kramer, 2014). Also, because the social media and websites carry more of the information from these types of information providers, experiential expertise may have significant influence on health information seekers.

Other source factors such as the likeability, familiarity and similarity have also been examined as possible influences on persuasive effects both online and offline. Research shows that sources perceived as having similarity with the receiver influence credibility judgment over different topic domains, online and offline inclusive (Hocevar *et al*., 2017). For instance, the similarity that exists between the source and the receiver has been found to positively predict credibility judgment of user-generated online information as well as the tendency that the evaluators will also act on the information received (Flanagin *et al*., 2013).

In spite of the foregoing studies, it seems there is no generalised measure for the construct of source credibility with respect to all its dimensions (Berlo *et. al*., 1969; O'Keefe, 2002) as different angles of source credibility might work differently depending on the circumstances (Cronkhite & Liska, 1976). Nevertheless, there was an agreement on two dimensions of source credibility; perceived expertise and trustworthiness (Whitehead, 1968; Berlo *et. al*., 1969; McCracken & Teven, 1999; O'Keefe, 2002; Umeogu, 2012; Hocevar *et al.*, 2017). These two dimensions of credibility are said not to necessarily be empirical realities but perceptions that can be formed. In other words, while the credibility of a source may be associated with the receivers' notion of the message's accuracy, it may still not have such a bearing on the message's factuality (Umeogu, 2012; Metzger & Flanagin, 2015; Hocevar *et al.*, 2017). This helps us better understand McLuhan's proposition that "the medium is the message" (*McLuhan, 1966)*. McLuhan was not trying to undermine the power of the message in persuasion but to stress that the user's perception of a message is shaped by the source through which it is experienced.

Since evidence from previous research showed that a source perceived as credible influences audience attitude or behaviour positively towards a desired goal, it is important that while communicating health-related issues such as COVID-19 vaccines, perceived credible sources of information dissemination should be greatly utilised bearing in mind that this pertains to both the communicators and the platforms used to communicate the messages.

4.2 Review of some Related Studies around the World

Anorue *et. al*. (2021) examined knowledge and attitude towards COVID-19 vaccine safety media messages. The study adopted a cross-sectional descriptive survey method using structured self-administered questionnaire to collect data from 399 respondents in both rural and urban communities of South-East, Nigeria. Their result revealed that 35% of the respondents were exposed to COVID-19 vaccine information through social media; 26.3% via radio; 21.8% via TV and 16.5% through friends and families. This implies that the majority of the people relied on social media as their information source on COVID-19 vaccine. They also reported that

respondents' attitude towards the vaccines were negative as 15.89% of the respondents had a positive attitude towards the safety of the vaccines while 60.10% had a negative attitude, and 24.01% of the respondents were not sure.

Similarly, Bara *et. al*. (2021) conducted a study in Harare Zimbabwe among healthcare workers in which they tried to find out the people's perception and confidence on COVID-19 vaccines. The study used an analytical cross-sectional research method with structured questionnaire as the instrument for data collection. The findings showed that out of 513 respondents, 88 used social media, 67 used television, 53 used radio, 51 respondents relied on health workers, 39 respondents relied on workmates, 38 used newspapers, while 8 respondents used ministry of health outlets. The implication of this is that the majority of the respondents use social media as their information source. Findings also showed that fears about COVID-19 vaccine safety constituted the major challenge for vaccine acceptance, while sex was a predictor of vaccine willingness.

Also, Fakonti *et. al*. (2021) investigated COVID-19 vaccination intention among nurses and midwives in Cyprus using an Internet-based cross-sectional survey method and questionnaire as instrument for data collection. The study showed out of the 437 respondents sampled, 35% selected the internet and social media as their source of information while 22% and 17% selected colleagues/associates and educational conferences/seminars respectively as their primary source of information. These findings show that the internet and social media are the major sources of information for COVID-19 vaccines. Also, 70% of respondents were hesitant to accept vaccination. This implies that the majority of the population had a negative attitude towards COVID-19 vaccines.

Similarly, El-Elimat *et. al*. (2021) carried out a study which aimed at investigating the acceptability of COVID-19 vaccines and its predictors and attitudes towards these vaccines among the public in Jordan. The study adopted an online, cross-sectional survey method using questionnaire as the instrument for data collection. Findings showed that out of 3,100 respondents, 2,062 (66.5%) strongly agreed/agreed that it was necessary to get a vaccine to keep people safe from COVID-19; about 1,819 (58.7%) agreed that pharmaceutical companies will be able to develop safe and effective COVID-19 vaccines. One thousand, five hundred and thirty-eight (49.6%) accepted that side effects will keep them from receiving a COVID-19 vaccine and that 1,528 (49.3%) will refuse to accept COVID-19 vaccines once licensed. It can be deduced from the above findings that the majority of the respondents had a positive attitude towards COVID-19 vaccines. Findings also showed that out of the 3100 respondents, (45.4%) trusted healthcare providers as their source of information on COVID-19 vaccines, (30%) respondents trusted pharmaceutical companies, (17%) trusted the internet while (16%) trusted the media sources of information on COVID-19 vaccines. This implies that the majority of the people see healthcare providers as the most credible source of information on COVID-19 vaccines. Concern for vaccine safety, affordability and availability, influenza vaccination during the past season, age, employment, belief in the conspiracy theories on COVID-19, gender, and lack of trust in the Jordan government were also found out as factors encouraging or discouraging COVID-19 vaccination.

In addition, Hajure, *et. al*. (2021) carried out a review aimed at assessing healthcare workers' attitudes toward the COVID-19 vaccination and its contributing factors globally. This they achieved by peer-reviewed surveys through electronic databases. Out of 24 studies reviewed, two-thirds of the respondents in the studies demonstrated 50% positive attitude toward COVID-19 vaccination while in about one-quarter of the studies, a 50% negative attitude against vaccination was reported. This implies that the majority of the studies showed a positive attitude towards COVID-19 vaccines. The study also recommended the need for increased efforts to change the attitudes of the uncertain healthcare workers in order to boost the uptake of the vaccine and deal with the varied impact of infection. The findings of the study also showed that factors such as sex, age, profession, worries about how safe the vaccines are and fear COVID-19, trust in the correctness of the measures taken by the government, comorbid chronic illness, race, education, living with nuclear family, income level, history of recommendation, and depression signs in the past week, absence of adequate clinical trials and lack of adequate time for the decision, workplace, being vaccinated against flu during the previous season, and willingness to take a rapid test were the factors behind the acceptance and hesitancy towards the vaccines.

AFRICA CDC (2020) carried out a study in 15 countries on the perception of people on COVID-19Vaccine. The study adopted a mixed methodology with a combination of face-to-face and telephone interviewing approach of data collection and found out that across the 15 countries studied, (64%) of respondents selected television as one of their most trusted sources for information about COVID-19 vaccine; (51%) choose radio; (41%) chose online sources, (23%) chose health bodies while (18%) chose government sources as their most trusted sources of information except for Morroco and Tunisia that chose government sources and healthcare bodies as one of their most trusted sources of information. This finding shows that the majority trusted the mainstream media most. Also, it was found that among the hesitant groups, online channels, specifically social media, was their most trusted source of information. In addition to their findings, the common factors for not wanting to accept the vaccines were lack of trust in the vaccines, belief in the nonexistence of the disease, vaccine safety concerns, not feeling at risk and not having sufficient information to make decisions.

Again, Malik *et. al*. (2020) conducted a study on determinants of COVID-19 vaccine acceptance in the United States. The research adopted the survey method using online questionnaire as instrument for data gathering. The findings showed that the majority (67%) of the respondents have a positive attitude towards the vaccines as they are willing to accept vaccination. Trust in healthcare professionals (75%) ranked highest, as a credible source of COVID-19 vaccine information with (21%) trust on social media as a reliable source.

Allington, *et. al*. (2021) did a study on "Coronavirus conspiracy suspicions, general vaccine attitudes, trust and coronavirus information source as predictors of vaccine hesitancy among UK residents during the COVID-19 pandemic." The study centred on whether coronavirus vaccine hesitancy will have a negative relationship with reliance on mainstream media together with national government, scientists and medical professionals as a source of COVID-19 vaccine information and whether it will also have a positive reliance on the use of social media as a source of COVID-19 vaccine information. Their findings showed that those who relied on the mainstream media, scientists, medical professionals and government showed a strong negative relationship with COVID-19 vaccine hesitancy while those that depended on social media

showed strong positive relationship on vaccine hesitancy. This is as a result of misinformation and disinformation flying across social media handles. These findings imply that credible sources such as mainstream media, scientists, healthcare providers and government increased vaccine acceptance while the less credible source such as the social media increased vaccine hesitancy.

5. Theoretical Framework

5.1 Source Credibility Theory

Source credibility theory was propounded by Hovland *et al.* (1963). The theory posits that consumers of a message are more likely to be persuaded when they see or perceive the information source as credible. Source credibility theorists approached the credibility of a source from different dimensions such as expertise, trustworthiness and attractiveness.

The expertise dimension deals with how experienced or knowledgeable a source is in the field of discussion (McGinnies & Ward, 1980). Trustworthiness angle of the source's credibility speaks of the integrity and honesty of the source and the attractiveness dimension considers the likeability, similarity and familiarity of the source to the receiver (Ohanian, 1990; Hocevar, *et, al.,* 2017). h In sum, therefore, this theory holds that information that is delivered by a source considered to be credible will probably have more influence on receivers (Telg *et al.*, 2012).

The theory is relevant to this study as its tenets imply that COVID-19 messages delivered by sources perceived to be credible are expected to have more influence on vaccination than the same messages delivered by sources perceived to be less credible and this influence is needed to overcome hesitancy towards COVID-19 vaccination. Thus, this theory draws attention to the fact that disseminating COVID-19 vaccine-related information leveraging on credible sources of information will likely influence and persuade the people to accept vaccination.

5.2 Crisis and Emergency Risk Communication (CERC) Model

Crisis and Emergency Risk Communication (CERC) model (Figure 1) is a five-stage theory that combines established public health practices with tenets of crisis communication (Sellnow & Seeger, 2013). The model was introduced by the US Department of Health and Human Services and Centers for Disease Control and Prevention in 2018, but it was fully developed in 2022 as a response plan in time of crisis. It has been adapted by the WHO’s guidelines for disease outbreak communication. CERC is based on the idea that the public demands immediate and credible communication in real time during a crisis response. It has been employed to analyse both traditional and new media reporting on several outbreaks of disease such as Ebola, bird flu, winter storm and depleted uranium exposure (Kieh *et al.,* 2017; Vos & Buckner, 2016; Rice & Spence, 2016; Thomas *et al*., 2016). CERC models divide public health crises into five stages: pre-crisis, initial event, maintenance, resolution, and evaluation stages and stipulates that communication strategies to be used at each point for effective public response (Reynolds & Seeger, 2005, cited in Miller *et al*., 2021). The model holds that lives can be saved when the right message is communicated at the right time from the right source (Manuel, 2014). For effective communication during crises, the model holds six principles: (a) be first, (b) be right,

(c) be credible, (d) express empathy, (e) promote action, and (f) show respect (US Dept. of Health and Human Services and CDC, 2018).

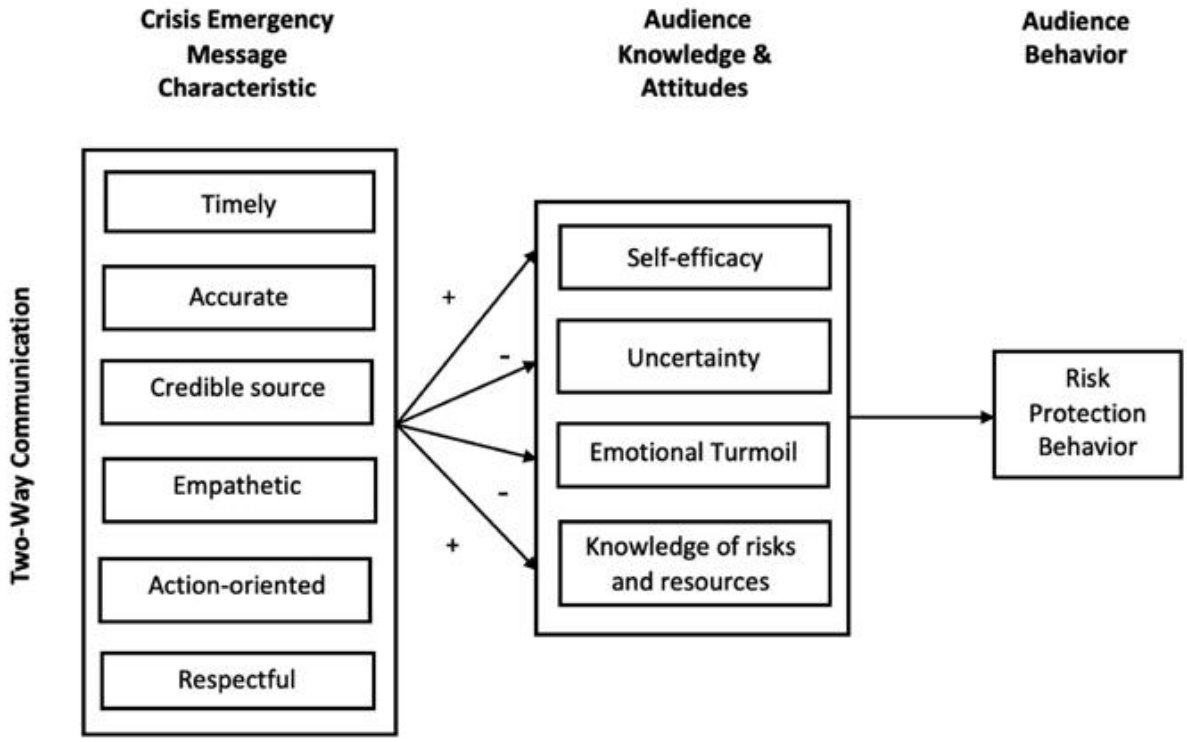

Figure 1: CERC Model Diagram (Source: Miller *et al*., 2021)

This model relates to the study given that COVID-19, a health crises issue, requires mass vaccination as a quick response measure. Since the public already have fear and mistrust in the vaccines resulting in vaccine hesitancy as a result of information from various sources, employing the tenets of CERC Model will enable the media to communicate timely, factual, and credible COVID-19 vaccine information. This will in turn douse public fear and build public trust in the information disseminated thereby influencing or persuading them to take health safety measures such as vaccination.

6. Methodology

This study adopted the survey research method with questionnaire as the instrument for data collection. The survey research method was used because it is best suited for determining audience responses on issues such as vaccine hesitancy and acceptance. The questionnaire contained 23 items comprising both open-ended and close-ended questions, including a 4-point Likert scale to test the respondents' attitudes towards the COVID-19 vaccines. The responses to the items were coded as 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree. The decision mean was set at 2.0, implying that the mean scores that are significant would be greater

than 2.0. Thus, higher scores indicate greater agreement while lower scores mean greater disagreement with the statement.

Nigerians residing in the selected states of South-East Nigeria, namely, Enugu, Ebonyi, and Anambra formed the population of this study. Going by the 2006 Nigeria national census figures, the three selected have a total population of 9,622,612. However, we adopted a projection of 15 years using an annual growth rate of 3.2 per cent (UNDP) to arrive at the total population of 14, 241, 465.Based on this projected population, a sample size of 384 respondents derived from Cochran (1977) sample size formula was used. The choice of this formula is informed by the fact that the study has a heterogeneous and finite population.

Sampling Technique

This study adopted the multi-stage sampling technique. The three states, Anambra, Ebonyi and Enugu were selected from the five South-East states in Nigeria using the simple random sampling technique in which the five states were wrapped and put in a bowl and afterwards, three out of the five states were picked. Simple random sampling was done to give the states an equal chance of being selected. Since the states already contain clusters known as senatorial districts, the simple random sampling technique which allows for equal chances for all the senatorial districts to be picked was used in selecting one senatorial district from each of the states which gave a total of three (3) senatorial zones. Thereafter, two local government areas (LGAs) were selected from each senatorial district using simple random sampling technique. This gave a total of six (6) LGAs for the study. One community was subsequently selected from each LGA using the simple random sampling technique to give six (6) communities in general. Convenient sampling technique was used in administering the questionnaire to the respondents in the communities studied.

The validity of the instrument was established through face validation. It was submitted to three lecturers at the Mass Communication Department of the University of Nigeria, Nsukka to ensure the questions raised were relevant and appropriate for eliciting the required information. The reliability of the instrument was ensured through the test re-test approach. Twenty copies of the questionnaire were administered to 20 respondents. After two weeks, the same number of copies of the questionnaire was administered to these subjects again. Pearson's Correlation Coefficient was used to subject the two sets of observations to a reliability test. With the aid of SPSS version 22, the reliability was determined to be 0.085, which was considered high reliability.

Three research assistants were trained for one week to facilitate the gathering of data in each state. Information gathered from the respondents formed the basis for the quantitative analysis of data which was done using tables, frequencies, percentages, mean and standard deviation. The results from the analysis were used to answer the research questions as well as draw inferences for the study.

7. Results and Discussions

For proper analysis and discussion of findings, we go back to the research questions raised at the beginning of the study.

1. RQ1: What are the media/source(s) from which the public gets COVID-19 vaccine information most?

To establish the predominant media sources of COVID-19 vaccine information, we adopted, first, two broad categorisations of these sources into: social media and traditional media. From the responses generated, the social media were the most used source of COVID-19 vaccine information for the public, as indicated by 238 (62%) of the respondents, while 146 (38%) got COVID-19 vaccine information from the traditional media. In addition to these two broad categories, we tested for how "other" sources accounted for COVID-19 vaccine information. Results in Table 1 show that health practitioners (26.5%) were the most used source of information on COVID-19 vaccines.

Table 1. Other sources of COVID-19 vaccine information

Sources	**Frequency**	Percentage (%)
Health Practitioners	102	26.5
Family and Friends	87	22.6
Opinion Leaders	16	4.2
WHO	98	25.5
Pharmaceutical Companies	4	1.0
Religious Leaders	11	2.9
NCDC	66	17.1
Total	384	100

The findings imply that the majority of the respondents got COVID-19 vaccine information mostly from social media (62%) and health practitioners (26.5%). The social media ranking highest could be an indication of their popularity for sourcing and dissemination of information in recent times by the public. In the case of health practitioners, COVID-19 is a health matter, therefore, people are more likely to be cautious to get the right information about the vaccines from those they consider as having adequate knowledge and expertise on the vaccines. This could possibly explain why health practitioners were mostly used more than the other sources. This finding is consistent with prior studies (Anorue *et. al*., 2021; Bara, *et al*., 2021; Fakonti *et al*., 2021). However, it contradicts the finding of Belsti *et al*., (2021) who reported that the mainstream media was the most used source of information by the public on COVID-19 vaccines.

RQ2: What is the attitude of the public towards COVID-19 vaccines?

We test this question using a 4-point Likert scale ranging from "Strongly Agree" to "Strongly Disagree." Data presented in Table 2 indicate that all the items except "I will encourage family and friends to accept COVID-19 vaccines" had their mean range above 2.0. This implies that the public attitude towards the vaccines was significantly positive.

Table 2: Public attitudes towards COVID-19 vaccines

Response item	Strongly Agree	Agree	Disagree	Strongly Disagree	Mean (SD)	*Decision*
I believe COVID-19 vaccines are reliable for tackling the disease	55	182	84	63	2.93(.92)	Significant
I will accept vaccination if made compulsory by the government	51	189	57	87	2.8(.99)	Significant
I will encourage my family and friends to accept COVID-19 vaccines	34	38	103	203	1.77(.89)	Not Significant
I believe the vaccines have serious side effects	134	118	120	12	2.97(.89)	Significant
I believe COVID-19 vaccines reduce the chances of contacting the disease	82	208	53	41	2.86(.87)	Significant

The findings on the attitude of the respondents towards COVID-19 vaccine show that the majority of the respondents have a positive attitude towards the vaccines. Nevertheless, most of the respondents would not encourage their family and friends to receive vaccination. This could be attributed to the fact that the majority of the respondents believe that the vaccines have serious side effects and only reduce the chances of contracting the disease. This finding could have several implications, one of which is the necessity for the media to focus their public health campaigns on increasing vaccine advocacy within social circles and providing clear and accurate information about vaccine safety data as well as addressing potential side effects to alleviate these worries and increase vaccine acceptance.

The findings therefore show that the respondents have a positive attitude towards the vaccines even though fear of the side effects could possibly prevent them from accepting vaccination unless made compulsory by the government. This finding is in line with what was reported by Danabal *et. al*., (2021) that half (50%) of those sampled in their study had a positive attitude towards COVID 19 vaccines. Similarly, it supports the findings of El-Elimat *et al*., (2021) who also found out that 66.5% of their respondents had a positive attitude towards the vaccines. Our result, however, is in contrast to some prior studies that indicated that the majority of their respondents had a negative attitude towards the vaccines (Fakonti et al, 2021; Anorue et al., 2021).

RQ3: Which of the information sources does the public consider credible?

Table 3 presents the answer to this research question. Except religious leaders, opinion leaders and NCDC, all the other sources of information on COVID-19 vaccines were considered credible as their scores were all significant.

Table 3: Public trusted sources of information (TSI) for COVID-19 vaccines

Response item	Strongly Agree	Agree	Disagree	Strongly Disagree	Mean (SD)	*Decision*
Social media are $^{+}$CSI for COVID-19 vaccines	98	143	96	47	2.76(.99)	Significant
traditional media (Radio, TV, Newspapers, Magazines) are CSI for COVID-19 vaccines	93	234	46	11	3.07(.69)	Significant
Blogs are CSI for COVID-19 vaccines	35	160	160	29	2.52(.76)	Significant
Opinion leaders are CSI for COVID-19 vaccines	6	75	102	200	1.88(.55)	Not Significant
Health practitioners are CSI for COVID-19 vaccines	245	108	22	9	3.53(.71)	Significant
Family and friends are CSI on COVID-19 vaccines	35	184	141	24	2.60(.74)	Significant
WHO is a CSI on COVID-19 vaccines	140	192	40	12	3.20(.75)	Significant
Pharmaceutical companies are CSI on COVID-19 vaccines	58	184	119	23	2.72(.79)	Significant
Religious leaders are CSI on COVID-19 vaccines	34	38	182	138	1.97(.79)	Not Significant
NCDC is a CSI on COVID-19 vaccines	13	50	193	128	1.96(.87)	Not significant

($^{+}$CSI = Credible Source/s of Information)

From Table 3, all the sources except religious leaders, opinion leaders and NCDC were perceived as credible. The above findings support what was reported by AFRICA CDC (2020), Malik *et al.*, 2020, El-Elimat, 2021 and De Freitas *et al*., 2021. They all showed that TV, health practitioners and the WHO were the major perceived credible sources.

It is somewhat surprising to see respondents list the social media among the credible sources of information on COVID-19 in our study as it is contrary to the results of prior studies in this domain. For one thing, the social media have been indicted for spreading fake and unverified information about COVID-19. For instance, Malik *et al.* (2020) found out that only (21%) of the respondents trusted the social media as a reliable source. Elimat *et al.* (2021) also recorded the same result with just 16% trust on social media. A full-length study is required to establish why our respondents chose to express trust in the social media as sources of credible information on COVID-19 vaccines.

RQ4: Does the source credibility of messages on COVID-19 vaccines influence public acceptance or hesitancy towards the vaccines?

Table 4 shows that except religious leaders, NCDC and opinion leaders, all the other sources of information (which had been indicated as credible in Table 3) were more likely to induce public acceptance of COVID-19 vaccines.

Table 4: Influence of a message source on public acceptance and hesitancy towards COVID-19 vaccines

Response item	Strongly Agree	Agree	Disagree	Strongly Disagree	Mean (SD)	*Decision*
I will accept COVID-19 vaccine if the message is from health practitioners	76	204	89	15	2.88(.76)	Significant
I will accept COVID-19 vaccine if the message is coming from opinion leaders	34	130	182	38	1.42(.79)	Not Significant
I will accept COVID-19 vaccine if the information is from WHO	114	190	55	25	3.62(.84)	Significant
I will accept COVID-19 vaccine if the message is from NCDC	25	81	111	167.	1.90(.83)	Not significant
I will accept COVID-19 vaccine if the message is from pharmaceutical companies	22	156	135	71	2.34(.84)	Significant
I will accept COVID-19 vaccine if the message is from religious leaders	10	87	162	125	1.96(.81)	Not Significant
I will accept COVID-19 vaccine if the message is from family/ friends	31	135	169	49	2.39(.81)	Significant
I will accept COVID-19 vaccine if the message comes from traditional media (radio, TV, newspapers, magazines)	42	162	150	3	2.56(.79)	Significant
I will accept COVID-19 vaccine if the information comes from social media	79	191	83	31	2.17(.85)	Significant
I will accept COVID-19 vaccine if the information comes from Blogs	23	60	182	119	2.97(.84)	Significant

The results show that perceiving health practitioners, WHO, pharmaceutical companies, family and friends, traditional media, social media and blogs as trusted sources on COVID-19 vaccine

information lead to public acceptance of vaccination. On the other hand, considering opinion leaders, NCDC and religious leaders as less credible sources leads to hesitancy towards the vaccines. This implies that the more the public considers a source of information for COVID-19 vaccines to be credible, the more they will be encouraged to accept vaccination and the less they perceive a source to be credible, the less they are likely to accept vaccination based on the information coming from them. This finding supports the theory of source credibility which assumes that perceived credibility of a message source influences the acceptance of the message from the source. This also supports the findings of Allington, *et al*., (2021) that those who perceived the mainstream media, scientists, medical professionals and government as credible were more likely to accept COVID-19 vaccination.

RQ5: What other factors, besides source credibility, contribute to public acceptance or hesitancy towards COVID-19 vaccines?

As seen in Table 5, apart from religious beliefs, all other response items were significant.

Table 5: Factors (apart from source credibility) responsible for public acceptance or hesitancy towards COVID-19 vaccines

Response item	**Strongly Agree**	**Agree**	**Disagree**	**Strongly Disagree**	**Mean (SD)**	***Decision***
Rapid pace of COVID-19 vaccines development discourages me from accepting vaccination.	30	125	156	73	2.29 (.83)	Significant
My religious beliefs prevent me from receiving COVID-19 vaccines.	21	27	138	197	1.83(.41)	Not Significant
Concern that COVID-19 may be a hoax hinders me from receiving vaccination.	77	179	105	23	2.81(.82)	Significant
I will take the vaccine when I see my family and friends being vaccinated.	42	154	113	70	2.84(3.68)	Significant
Concern about safety, efficacy and side effects of the vaccines discourages me from accepting vaccination.	196	124	46	18	3.30(.86)	Significant
Fear of contracting COVID-19 makes me want to receive vaccination.	66	114	133	71	2.46(.98)	Significant

The findings in Table 5 show that people are discouraged from receiving the vaccine due to the rapid pace of its development, concern about safety, efficacy and side effects of the vaccines. This suggests that addressing these concerns through transparent communication about vaccine development processes and side effects could mitigate hesitancy by building public confidence in the vaccines. The use of testimonials can add impetus to efforts to increase public acceptance of vaccination as some advertising studies have shown about celebrity endorsement (Berkvist & Zhou, 2016). Our results corroborate those of Erubami *et al*. (2022), Sato (2022) and Dabla-Norris, (2021) who also found out that fear of the side effects of the vaccines boosted hesitancy towards the vaccines.

Although we report that religious beliefs did not have significant influence on vaccine acceptance, it is necessary to consider that this may be different in other geo-political zones in Nigeria. The people of South-East Nigeria are mostly Christians. The result may differ in other geo-political zones where the population is mostly Muslim. Also, results dismissing COVID-19 as a hoax hinders vaccination highlights the need for countering misinformation through effective risk communication and providing accurate information about the disease's symptoms, morbid effects and fatality rate to promote vaccine acceptance. It also underscores the importance of the use of the CERC model for effective communication during a crisis such as the COVID-19 pandemic.

Furthermore, as this study has demonstrated, most people are more likely to receive vaccination when they see their family and friends getting vaccinated, a testament to the influence of peer behaviour and social networks on vaccine acceptance. Thus, media health campaigns can tap into this strategy of social influence by getting those already vaccinated to share their positive experiences to persuade more people to accept vaccination.

8. Conclusion

The study has shown that the public used social media and health practitioners most as their sources of information on COVID-19 vaccines. The majority of the respondents had a positive attitude towards the vaccines. All the sources except religious leaders, NCDC, and opinion leaders were considered credible. The credibility source of a message has a significant influence on the acceptance or hesitancy towards the vaccines. Factors such as rapid pace of vaccine development, fear of safety and side effects of the vaccines, and COVID-19 being considered a hoax discouraged respondents from getting vaccinated while seeing family and friends accept vaccination and fear of contacting the disease encouraged acceptance of vaccination.

9. Suggestions for Further Studies

Firstly, this study was limited to selected states in South-East Nigeria. It will be interesting for other researchers to examine this topic using respondents from other geopolitical zones. Secondly, the sample size used was small compared to the population. In order to cover more participants and increase the generalisability of findings, the sample size should be increased by future researchers. Thirdly, the current study did not investigate the influence of some source

cues such as attractiveness, likeability, familiarity and similarity among others. Therefore, we encourage the examination of such variables in future research. Lastly, a comparative study across Nigeria's geopolitical zones is recommended to assess the role of religion and other socio-cultural factors in vaccine hesitancy.

10. Recommendations

Based on the findings of the study, the following recommendations are made:

Campaigns on COVID-19 vaccination should be shared more through social media and use mostly health practitioners. Similarly, social media platforms should take initiatives to prevent misinformation on their sites. This can be achieved by running transparent fact-checks like Community Notes on X (formerly Twitter). Also, the NCDC should leverage on other credible sources like health practitioners while disseminating information on COVID-19 since public distrust for government may be hampering the success of its information dissemination efforts on motivating people to accept vaccination. Finally, the government and the media, while leveraging all other named credible sources, should constantly design interventions in terms of awareness campaigns to spread more transparent and accurate information about the safety and efficacy of the vaccines, using the 6-point guideline of the CERC Model.

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