

Post-Performance Assessment of Nigerian Centre for Disease Control (NCDC) Communication Strategies for Adherence to COVID-19 Safety Protocols among Non-Literates in Southwest Nigeria

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Abstract

This study assesses the post-performance of Nigeria Centre for Disease Control (NCDC) communication strategies in raising awareness and promoting adherence to COVID-19 safety protocols among individuals with low literacy levels in Southwest Nigeria. Quantitative and Qualitative data were collected through surveys (comprising 420 respondents) and 6 focus group discussion sessions (involving 54 participants) respectively in three selected states (Lagos, Osun and Oyo). The results show high level of awareness and knowledge of COVID-19. Also, results show that more than half (51.67 %) of the respondents did not adhere to COVID-19 safety protocol due to distrust in government. Findings further reveal insights into the accessibility, comprehensibility, and cultural appropriateness of communication materials and channels used by NCDC, as well as the effectiveness of community engagement approaches in fostering behavior change among non-literates. Results from the multinomial regression analysis show that age, sex, and information from radio and community health workers significantly predicted the probability of adhering to COVID-19 safety protocols ($p < 0.05$). The study recommends that during pandemic, health communicators should prioritize culturally sensitive communication, train and incorporate influencers that are regarded within the community. Government should foster trust among the population by empathizing with the needs of the population to make public health campaigns effective.

Keywords: COVID-19, Communication Strategies, Public Health Communication, Vulnerable Population, Reduced Inequalities, Mass Communication

Introduction

The ever-evolving trends in global health have paved the way to redefine strategies in health systems globally. Four years have elapsed since the outbreak of the COVID-19 pandemic in 2020. Nonetheless, the discourse surrounding this health crisis continues to persist within the realm of academic research. This is because, among other reasons, the pandemic is a focal point for researchers to examine the efficacy of public health messaging, risk communication, and the role of media in disseminating information. Though communication strategies are parts of broader societal measures needed to respond to public health emergencies (Kreps, 2021), the effectiveness of these measures in creating massive awareness which provides the requisite information needed to empower proper health decisions among the populace cannot be downplayed. Communication has been recognized as an essential aspect of human life (Ajakaiye et al., 2024; Nicely, 2008) and its significance has become even more pronounced when conveying health messages to vulnerable populations. As a result, it is considered one of the most valuable ways to promote good health in society by informing and educating the public about healthy habits and healthcare (Crawford & Okigbo, 2014).

According to McGuire, (2001, p. 22) a pervasive error in evaluating a program or agency is to judge it by the effort expended rather than by the effect produced. Meanwhile, scholars have also assessed the performance of public health initiatives intended to bring about behavioral change, discoveries are that many campaigns targeted at influencing behavior change have not achieved the desired outcome because they have only focused on providing factual and scientific information about the disease and its prevention without addressing cultural barriers, sociodemographic peculiarities and nuances that could impede the reception of such health messages as intended (Kreps & Neuhauser, 2015; Wakefield et al., 2010).

Communication approaches by the Nigeria Centre for Disease and Control (NCDC) during the COVID-19 pandemic have been documented (Adebisi et al., 2021; Ihekweazu et al., 2022; Jacobs & Okeke, 2022). Studies revealed that during the pandemic, the NCDC integrated a holistic approach to communicating COVID-19 safety protocols. This involved community-based engagement such as house-to-house visits, town hall meetings, and religious outreach for grass root population; the use of intensive media campaigns on TV and radio; as well as leveraging on digital media like social media, websites, blogs, podcasts and webinars; to disseminate information and engage with Nigeria's diverse population (Ihekweazu et al., 2022; Jacobs & Okeke, 2022).

In the midst of all these, communicating the risk of disease within the Nigerian populace, where diverse linguistic and cultural nuances prevail is a daunting

task. In Nigeria, illiteracy is still a major concern out of the over 200 million population, about 76 million adults are non-literates (Erunke, 2022). Amid these realities, NCDC faces the challenge of ensuring that health messages not only reach but also resonate with individuals lacking formal literacy skills. Non-literates find themselves within complex communication systems, facing significant impediments in accessing and comprehending information, particularly during times of public health crises (Ojeka-John et al., 2023b; Sanusi et al., 2021). This clog in the wheel of progress was capable of frustrating the NCDC efforts to curb the spread of disease.

Although NCDC employed various communication strategies to influence adherence to COVID-19 safety protocols (Adebisi et al., 2021) across all socio-demographic segments of Nigeria's population, assessment of these strategies especially among the non-literate population is yet to be carried out empirically. This post-performance study is necessary because focusing on NCDC's communication strategy alone may not engender positive assessment, attention toward an influence-driven approach is required for positive assessment, especially among the understudied population. The motivation for this study comes from dearth of studies on holistic post-performance assessment of NCDC communication strategies toward adherence to COVID-19 safety protocols among the non-literate population.

Objectives

Specifically this study is guided by the following objectives, which are:

- To assess non-literates' level of awareness of COVID-19 safety protocols
- To identify the channels of COVID-19 safety protocols used by NCDC for non-literate populations
- To assess non-literates' level of adherence to COVID-19 safety protocols
- To evaluate the extent to which NCDC communication channels influenced adherence to COVID-19 safety protocols among non-literate population
- To evaluate how NCDC communication channels influenced adherence to COVID-19 safety protocols.

Hypotheses

H1: There is a significant relationship between socio-demographic characteristics (age, sex, and marital status) and adherence to COVID-19 safety protocols.

H2: There is a significant relationship between NCDC communication channels (radio, community health workers, television and religious leaders) and adherence to COVID-19 safety protocols.

H3: Socio-demographic characteristics and NCDC communication channels significantly influence adherence to COVID-19 safety.

Theoretical Framework

The Communication-Persuasion matrix is used as a theoretical construct in this study because it is found to be most applicable to public health communication (Atkin, 2012). The theory was proposed by James H. McGuire in 1968. Also known as the input-output model, the theory finds its applications in diverse fields where persuasive communication plays a crucial role. It is well-suited for public health communication campaigns that must reach large audiences to change their beliefs, attitudes, and behaviors (Dillard & Shen, 2013). McGuire's Communication-Persuasion matrix explains components in the input and output model, whereby the former is manipulated to achieve the latter. The input variables focus on the source, message, channel, audience and destination, while the output variables focus on exposure, processing, learning, yielding, and behavior (Aghazadeh et al., 2022).

McGuire advanced that three important characteristics- credibility, attractiveness and power inform the choice of the source selection. The channel variable refers to the medium, delivery style, and context of the message, while receivers are the target audience. Destination variables focus on the specific attitudes, beliefs, actions, or behaviors that the message aims to influence or change in the target audience. The output variables are the endpoints of the communication process; through them, the communication campaign's effectiveness can be measured (Dillard & Shen, 2013). Exposure refers to the extent to which individuals come into contact with a message, while attention involves engaging the audience sufficiently. It involves comprehension, mental engagement, and emotional reactions triggered by the message. Behavioral intentions involve audience members planning or anticipating action based on their exposure to the campaign message (Aghazadeh et al., 2022). By factoring in these characteristics, campaigns can deliver more targeted, relevant, and persuasive messages, ultimately leading to better health outcomes (Grundy & Murphy, 2021)

The applicability of McGuire's communication matrix in NCDC's communication strategies helps to systematically assess the campaign approaches in driving behavioral change among non-literates of Southwest Nigeria. This can be clearly understood in the following ways. First, the appropriateness of health messages can be measured by evaluating the context-specificity of NCDC messages communicated to the targeted population, and determine if they are tailored to the unique needs and circumstances of target population. Also, the level of non-literates' awareness and perception of the

COVID-19 safety protocol messages, as well as their ability to recall the message is key: whether they find it convincing, persuasive and actionable. Third, in terms of channels used by the NCDC, the source credibility and accessibility need to be ascertained to attract and persuade target population toward adherence. More importantly, evaluating the level of non-literates' adherence to COVID-19 safety protocols will reveal the extent to which NCDC's communications efforts are effective in influencing behavioral change.

Materials and Methods

Study Location and Population

This study's location is Southwest Nigeria because it was the epicenter of the COVID-19 outbreak in the country (Adegboye et al., 2020). The region, which consists of six states (Ekiti, Lagos, Ogun, Ondo, Osun and Oyo), had the most COVID-19 cases among all the geopolitical zones in Nigeria (Statista, 2022). The study population comprises non-literate adults (25 years+), who live in the rural areas of Southwest Nigeria, and who are without formal education. Education, age, and residency therefore serve as inclusion/exclusion criteria, while the focus is on individuals in occupations such as petty trading, labor, artisanal work, farming and homemaking, given their prevalence among the non-literate population (Ingwu & Okey, 2013).

Research Method

The study adopts a concurrent mixed methods research design to assess the influence of NCDC communication strategies on adherence to COVID-19 non-medical protocols among non-literates in the study location. Specifically, qualitative and quantitative data are collected independently and the results were brought together for an overall interpretation. The questionnaire served as a primary data collection tool for gathering quantitative data on participants' knowledge, attitudes, and behaviors related to COVID-19 safety protocols. The focus group discussion (FGD) guide was used to facilitate qualitative data collection with selected participants. It consisted of open-ended questions and prompts designed to explore participants' perceptions, experiences, and insights related to COVID-19 communication strategies employed by NCDC.

Sampling Technique and Size

A purposive multistage sampling technique was adopted both for the survey and the FGD. This was to have adequate representation from the study population. In the first stage, three states (Lagos, Oyo and Osun States) were selected out of the six states in the region using a purposive sampling technique based on the number of COVID-19 cases. To have a wider representation in each state, two Senatorial districts were selected out of the three senatorial districts in each state based on illiteracy level. In each of the senatorial districts, one local government

area (LGA) was selected purposely based on non-literacy level. In the fourth stage, a rural area was selected in each LGA based on accessibility. Hence, the six rural communities that were represented in this study include Makoko, Ijora-Badia, Fiditi, Iware, Ayedire and Irewe. In each rural community, 70 respondents were selected based on the level of their literacy and availability. Hence, a total of 420 respondents were represented in this study and this has been considered to be a good representative of more than 10,000 study population based on Fisher's formula (Thomas & Conlon, 1992). In guiding the selection of the participants for the FGD, a multistage sampling technique was adopted. Significant clusters of the selected people were divided into sub-groups at various stages of this sampling method to facilitate primary data collection in the study area.

Therefore, for this research, 6 focus group discussion sessions were conducted in all, where two were organized from each state. Hence, a simple random sampling procedure was further used in selecting two FGD sessions conducted from two different communities in two local government areas from any of the three (3) senatorial districts in the selected (Lagos, Oyo Osun) states.

Data Collection Procedure

The service of six research assistants was employed for the survey study. Each of the research assistants was familiar with at least one local government area of the study location, and each eventually served as a gatekeeper in their respective rural community. This allowed for gradual community entry and easier identification of study participants. The survey questionnaire was designed to collect data on four different aspects; first of all respondents' demographic characteristics. Researchers focused the sources of information on COVID-19 safety protocols to directly address the goal of identifying where non-literate populations receive NCDC's COVID-19 messages. Thirdly, the awareness level was assessed and this aligns with evaluating participants' understanding of NCDC's communication strategies. Finally, the level of adherence to COVID-19 safety protocols, is critical for assessing the influence of NCDC communication strategies on compliance with safety measures. On the measures and scales used, a set of multiple-choice questions and simple recognition tasks were used to assess the understanding of specific COVID-19 safety messages. Regarding sources of information, respondents selected from a predefined list of common sources or added any not listed.

A 4-point Likert scale (Always, Often, Rarely, Never) was employed to evaluate the frequency of compliance. For the FGD, an interview guide was developed to probe whether NCDC messages were delivered in a way that can be understood and if it was persuasive enough to compel behavioral change. Also, the FGD guide investigated the challenges faced in complying with the safety protocols.

Method of Data Analysis Procedure

The quantitative data was analyzed using SPSS software and findings were displayed using descriptive statistics, categorical variables were tested using the Chi-square test, and multinomial regression was used to understand how socio-demographic characteristics and other variables predicted adherence to safety protocols. FGD findings were presented verbatim and analyzed using a narrative summary technique. The data generated from both the survey and FGD were analyzed independently, and results were brought together for an overall interpretation. In sum, quantitative data was to provide measurable insights into adherence levels and information sources, while qualitative data offered nuanced explanations of participants' experiences, challenges, and suggestions for improvement.

Findings

Survey & FGD Demographic

Table 1: Descriptive statistics of respondents based on socio-demographic characteristics

Variables	n (%)	Mean	SD
Overall	420 (100.0)	.4833	.50032
Age			
26-35years	101 (24.0)	.2475	.43373
36-45 years	170 (40.5)	.5059	.50144
46-55 years	91 (21.7)	.6044	.49169
56-65years	38 (9.0)	.6053	.49536
66 and above	20 (4.8)	.7000	.47016
Sex			
Male	168 (40.0)	.2976	.45858
Female	252 (60.0)	.6071	.48936
Marital Status			
Single	197 (46.9)	.3807	.48680
Married	219 (52.1)	.5753	.49542
Divorced	4 (1.0)	.5000	.57735
Religion			
Christian	248 (59.0)	.4798	.50060
Islam	162 (38.6)	.5062	.50151
Indigenous religion	10 (2.4)	.2000	.42164
Average monthly Income			

	5000-15000	100 (23.8)	.4900	.50242
	16000-25000	274 (65.2)	.4854	.50070
	26000-35000	26 (6.2)	.5000	.50990
	36000-40000	20 (4.8)	.4000	.50262
Residence				
	Bungalow	78 (18.6)	.5385	.50175
	Storey Building	43 (10.2)	.3721	.48908
	Face me I Face you	299 (71.2)	.4849	.50061

Table 1 presents a summary of respondents' socio-demographic characteristics, a total of 420 participants were included in this study. The variables analyzed under the socio-demographic characteristics are age, sex, marital status, religion, average monthly income and residence type. Results showed that more of the population falls between the ages of 36-45 years (40.5%), while respondents with the least representation are 66 years and above (4.8%). Regarding Sex, more females (60%) were represented than males (40%). The majority of the respondents were married (52.1%) while divorced individuals made up of 1% and single (46.9%).

Christianity appeared to be the predominant religion (59.0%) followed by Islam (38.6%) and Indigenous religion (2.4%). The largest proportion of respondents (65.2%) reported an income range of 16,000–25,000 Naira. The average and median monthly income were N 18,864 and N 18,100 respectively, with almost one-third (65.2 per cent) earning between N 16,000 and N 25,000. On residential type, majority of the respondents (71.2%) lived in “Face me I face you” apartments while only 10.2% lived in ‘storey building’ apartments.

Table 2: Socio-demographic Profile of FGD Discussants

Informants' profiles	Oyo State		Osun State		Lagos State		Total	%
	FGD 1	FGD 2	FGD 3	FGD 4	FGD 5	FGD 6		
Sex								
Female	5	5	-	3	5	5	23	42.5
Male	5	5	9	5	4	3	31	57.4
Age Group								

25 – 34 years	4	7	3	5	6	4	29	53.7
35 – 44 years	3	3	3	3	1	2	15	27.7
45 – 54 years	2	-	3	-	2	1	9	16.6
55 – 64 years	1		-	-	-	-	1	1.8
Marital Status								
Married	6	7	6	6	5	4	34	62.9
Single	4	4	3	4	3	4	20	37.0
Religion								
Christian	6	6	5	5	5	5	32	59.2
Islam	4	4	4	4	3	3	22	40.7
Traditional	-	-	-	-	-	-		
Occupation								
Apprentice	-	-	-	-	1	1	2	3.7
Artisan	1	1	2	2	2	2	10	18.5
Carpenter	1	-	-	1	-	-	2	3.7
Cleaner	-	-	-	-	-	1	1	1.8
Daily laborer	-	-	1	1	-	1	3	5.5
Driver	-	-	-		1	1	2	3.7
Farmer	2	2	2	1	-	-	7	12.9
Hairdresser	-	1	-	1	-	-	2	3.7
House Wife	1	-	-	-	-	-	1	1.8
Nightguard	1	-	-	-	-	-	1	1.8
Okada Rider	-	-	4	1	-	-	5	9.2
Tailor	1	2	-	-	1	1	5	9.2
Trader	3	4	-	1	3	1	13	24.0
Total							54	

Source: *Researcher's Field Survey, 2023.*

A total of 54 respondents participated in the sessions, with an average of 8 to 10 participants. 51.9 per cent of the respondents were between the ages of 25-34, while 31.5 per cent were between 35-44 years, 21.1% (n=9) of the respondents represented the 46-54 group, and only 1.9% (n=1) fell between 55 and above.

This implies that most respondents are between the ages of 25-30, which depicts a more youthful population. Regarding the gender distribution of the respondents, slightly more females (51.5%) participated in the study, also more (63%) of the respondents were married than unmarried. On the religion of the respondents, 59.2 percent of the population are Christians and 40.7 per cent are Muslims. Based on the responses, Trading has 24.1 per cent of the surveyed population. Other occupations include artisans (18.5%), farmers (13.0%), and daily laborers (5.6%). Additionally, occupations such as okada riders, tailors, and carpenters each constitute 9.3% of the respondents. This suggests a significant presence of individuals engaged in commercial activities and entrepreneurial endeavors. Each session lasted for an average of 60 to 90 minutes.

Hypotheses Testing

H₁: There is significant relationship between some socio-demographic characteristics (age, sex, marital status) and adherence to Covid-19 safety protocols.

Table 3

Variables	n (%)	Adherence to COVID-19 safety protocols			
		Mean	SD	Cramer's V	Chi-square
Overall	420 (100.0)	.4833	.50032		
Age				.285	$\chi^2 = 34.199$ $df = 4$ $p = .000$
26-35years	101 (24.0)	.2475	.43373		
36-45 years	170 (40.5)	.5059	.50144		
46-55 years	91 (21.7)	.6044	.49169		
56-65years	38 (9.0)	.6053	.49536		
66 and above	20 (4.8)	.7000	.47016		
Sex				.303	$\chi^2 = 38.672$ $df = 1$ $p = .000$
Male	168 (40.0)	.2976	.45858		
Female	252 (60.0)	.6071	.48936		
Marital Status				.194	$\chi^2 = 15.737$ $df = 2$ $p = .000$
Single	197 (46.9)	.3807	.48680		
Married	219 (52.1)	.5753	.49542		

	Divorced	4 (1.0)	.5000	.57735		
Religion					.092	$\chi^2 =$ 3.565 $df = 2$ $p =$.168
	Christian	248 (59.0)	.4798	.50060		
	Islam	162 (38.6)	.5062	.50151		
	Indigenous religion	10 (2.4)	.2000	.42164		
Average monthly Income					.038	$\chi^2 =$.608 $df = 3$ $p =$.895
	5000-15000	100 (23.8)	.4900	.50242		
	16000-25000	274 (65.2)	.4854	.50070		
	26000-35000	26 (6.2)	.5000	.50990		
	36000-40000	20 (4.8)	.4000	.50262		
Residence					.086	$\chi^2 =$ 3.083 $df = 2$ $p =$.214
	Bungalow	78 (18.6)	.5385	.50175		
	Storey Building	43 (10.2)	.3721	.48908		
	Face me I Face you	299 (71.2)	.4849	.50061		

The results (Table 3) showed that respondents' means and median ages were 40 and 39 years respectively, with 40.5 per cent of them between the ages of 36 and 45 years. More females (60.0 per cent) and Christians (59.0 per cent) were represented, while more than half (52.1 per cent) of them were married. Also, while 31.2 per cent of the respondents were traders, 26.7 percent were farmers. The average and median monthly income were N18,864 and N18,100 respectively, with almost one-third (65.2 per cent) earning between N16,000 and N25,000. In terms of the association between socio-demographic characteristics and adherence to Covid-19 safety protocols, findings further revealed that the elderly persons (66 years and above) adhered mostly to Covid-19 safety protocols considering the mean value of 0.7, representing the highest among the respondents' socio-demographic characteristics. This was followed by female (0.60), respondents between 56 and 65 years (0.61), 46 – 55 years (0.60) and married (0.58). The least standard deviations of 0.42 and 0.43 indicated that most respondents who practiced Indigenous religions and who were between 26 – 35 years respectively did not adhere to Covid-19 safety protocol, as indicated by their mean values of 0.20 and 0.25 respectively. However, the highest standard deviation of 0.58 showed that most respondents who were divorced

were indifferent ($\bar{x} = 0.5$) to adherence to Covid-19 safety protocols. A stronger correlation (Charmer's $V = 0.303$) was found between sex and adherence to Covid-19 safety protocols than any other socio-demographic variables, and the association was statistically significant, $\chi^2(1) = 38.672$, $p < 0.001$. Pearson Chi-square further showed that the relationship between adherence to Covid-19 safety protocols on the one hand as well as age [$\chi^2(1) = 34.199$, $p < 0.001$] and marital status [$\chi^2(1) = 15.737$, $p < 0.001$] on the other hand were statistically significant. However, findings showed that there was no statistically significant relationship between adherence to Covid-19 safety protocols on the one hand as well as average monthly income [$\chi^2(3) = 0.608$, $p > 0.05$], religion [$\chi^2(2) = 3.565$, $p > 0.05$] and residence [$\chi^2(2) = 3.083$, $p > 0.05$] on the other hand. Detailed information on descriptive statistics of respondents' socio-demographic characteristics and adherence to Covid-19 safety protocols is provided in Table 3.

The analysis revealed a significant relationship between some socio-demographic characteristics and adherence to COVID-19 safety protocols. This finding highlights the association between some socio-demographic factors and compliance with public health measures.

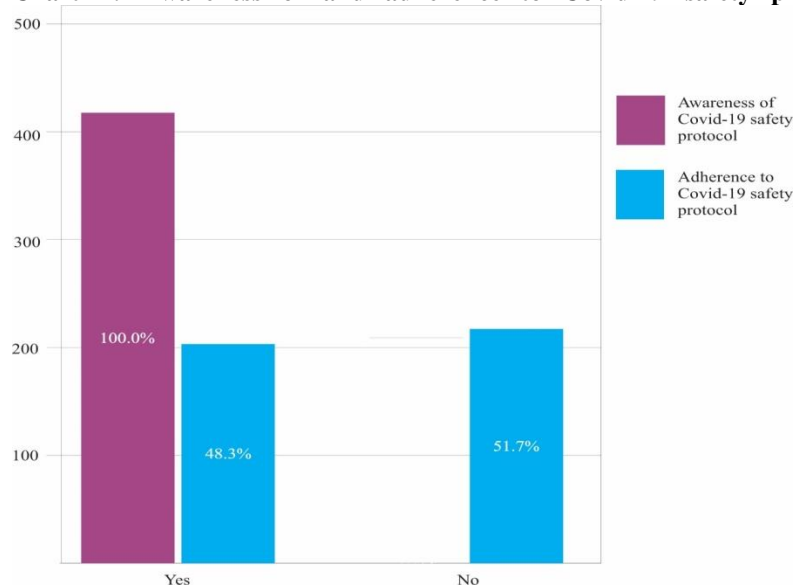
H₂: There is significant relationship between NCDC communication channels (radio, community health workers, television, religious leaders) and adherence to Covid-19 safety protocols.

Table 4: NCDC Communication channels and adherence to COVID-19 safety protocols

Variables	N (%)	Adherence to COVID-19 safety protocols			
		Mean	SD	Cramer's V	Chi-square
Overall		.4833	.50032		
Information from television				.276	$\chi^2 = 32.069$ $df = 1$ $p = .000$
Yes	28 (6.67)	1.0000	.00000		
No	392 (93.33)	.4464	.49776		
Information from radio				.495	$\chi^2 = 102.802$ $df = 1$ $p = .000$
Yes	303 (72.14)	.6370	.48167		
No	117 (27.86)	.0855	.28078		
Information from community health workers				.688	$\chi^2 =$

	Yes	253 (60.24)	.7628	.42618		199.067 <i>df</i> =1 <i>p</i> = .000
	No	167 (39.76)	.0599	.23798		
Information from community leaders					.086	$\chi^2 = .086$ <i>df</i> =1 <i>p</i> = .770
	Yes	210 (50.0)	.4762	.50063		
	No	210 (50.0)	.4905	.50110		
Information from posters					.014	$\chi^2 = .079$ <i>df</i> =1 <i>p</i> = .433
	Yes	105 (25.00)	.4952	.50238		
	No	315 (75.00)	.4794	.50037		
Information from religious leaders					.112	$\chi^2 = 5.238$ <i>df</i> = 1 <i>p</i> = .014
	Yes	198 (47.14)	.4242	.49548		
	No	222 (52.86)	.5360	.49983		

Chart 1: Awareness of and adherence to Covid-19 safety protocols



Sources of information on, awareness of, and adherence to Covid-19 safety protocol

Findings on sources of information on, awareness of, and adherence to Covid-19 safety protocol are presented in Table 4 and Chart 1. The results showed that respondents received information on Covid-19 safety protocols mostly from radio as 72.14 per cent of them selected radio as their main source of information. “Most of us here are using radio all the information I had on Coronavirus was through radio” (Male 44, Oyo 1, FGD 1). This indicated that radio was a major source of information on Covid-19 safety protocol among the respondents. The second and third sources of information on Covid-19 safety protocol were through community health workers and community leaders as selected by 60.24 per cent and 50.0 per cent of the respondents respectively. “Although I saw pictures on posters on the safety protocols, community health workers were able to show us the best way to observe the safety measures by their explanation” (Female 38, Lagos, FGD 2). Community health workers as a source of information on Covid-19 safety protocol were considered instrumental among the participants as explained by another discussant who said:

I saw Community health workers within our neighborhood, explaining how to wash hands properly. That was how I knew about the best way of washing hands. I think they explained it better to us the way it was demonstrated. (Male 43, Oyo 2, FGD 2)

The fourth source of information on Covid-19 safety protocol was religious leaders such as Pastors and Imam, as confirmed by 47.14 of the respondents. “In church, our pastor also explained it [Covid-19 safety protocol] to us” (Female 54, Lagos, FGD). However, only 6.67 per cent of the respondents claimed to have received information on Covid-19 safety protocols from television, indicating the least among NCDC communication strategies that were utilized for non-literates (radio, community health workers, community leaders, religious leaders, posters, and television). Importantly, television as a source of information on Covid-19 safety protocol was considered a privilege among the participants as not many rural dwellers could afford televisions to watch news. For example, a female discussant stated as follows:

I had the privilege to watch it [Covid-19 safety protocol] on television, I saw the proper way to dispose of nose masks and to wear them properly, they said it is important to remove the nose mask properly,

but there was nothing difficult to understand it, I understood what I saw. (Female 42, Osun 2)

In terms of awareness of Covid-19 safety protocols, as presented in Chart 1, findings showed that all (100 percent) of the respondents were aware of Covid-19 safety protocols. This result is complemented by participants in focus group discussion sessions, as many of them could recall about six safety protocols and also demonstrated some of them (such as elbow greetings, sneezing into the elbow and proper washing of hands). “I remembered that time they said we should wear nose mask, wash our hands frequently, cover your nose with your elbow when sneezing, use hand sanitizer and maintain social distancing” (Female 33, Osun State 2). This suggests that regardless of educational status and location, the respondents were aware of Covid-19 safety protocols. The results of the investigation on adherence to Covid-19 safety protocols further showed that less than half (48.33 per cent) of the respondents adhered, while the remaining higher proportion (51.67 per cent) did not adhere. This means that despite non-literates’ high level of exposure to Covid-19 safety protocols, almost half of the respondents did not adhere to Covid-19 safety protocols. While supporting non-adherence among non-literate population, a female participant stated that observing the protocols was difficult, especially social distancing and wearing nose mask (Female 40, Lagos State 2).

The results of the cross-tabulation and Chi-square test (Table 4) between source of information and adherence to Covid-19 safety protocols showed that that all (100 per cent) of the respondents who received information from television adhered to Covid-19 safety protocols as indicated by the mean value of 1.0. Following this (in terms of adherence to Covid-19 safety protocols) were the respondents who received information from community health workers, considering the mean value of 0.76. However, the respondents who did not receive information from community health workers and radio were those who did not adhere to Covid-19 safety protocols mostly based on their mean values of 0.06 and 0.09 respectively. The least standard deviation of 0.0 indicated that all (100.0 per cent) of the respondents who received information from television adhered to Covid-19 safety protocols ($\bar{x} = 1.0$). Also, findings showed a statistically strong association between adherence to Covid-19 safety protocols and information from community health workers (Cramer’s $V = 0.69$), and a statistically moderate relationship between adherence to Covid-19 safety protocols and information from radio (Cramer’s $V = 0.50$). In addition, findings showed that a statistically significant relationship exists between adherence to Covid-19 safety protocols on the one hand and information from community

health workers [$\chi^2(1) = 199.067, p < 0.001$], radio [$\chi^2(1) = 102.802, p < 0.001$], and television [$\chi^2(1) = 32.069, p < 0.001$].

The analysis confirmed a significant relationship between the NCDC communication channels and adherence to COVID-19 safety protocols. This finding underscores the pivotal role of strategic communication in influencing public health behavior.

H₃: Some socio-demographic characteristics and NCDC communication channels significantly influence adherence to Covid-19 safety protocols

Table 5: Multinomial Regression for Analyzing NCDC Strategy and Socio-demographic to Covid-19 Safety Protocol

Variables	B (SE)	Wald	95% Confidence Interval for Odds Ratio		
			Lower	OR	Upper
Age					
26-35 years	RC				
36-45 years	1.358 (.468)**	8.422	1.554	3.890	9.737
46-55 years	1.670 (.516)**	10.485	1.933	5.311	14.592
56-55 years	1.329 (.648)*	4.206	1.061	3.777	13.452
66 years & above	3.478 (1.008)**	11.900	4.490	32.393	233.687
Sex					
Male	RC				
Female	.885 (.368)*	5.783	1.178	2.422	4.982
Marital Status					
Divorced	RC				
Single	1.109 (1.309)	718	.23 3	3.033	39.479
Married	1.204 (1.306)	850	.258	3.332	43.061
Television					
No	RC				

Yes	22.383 (.000)		52553825 72.251	525538257 2.251	5255382 572.251
Radio					
No	RC				
Yes	2.808 (.482) ^{***}	33.874	6.438	16.572	42.660
Community Health Workers					
No	RC				
Yes	4.273 (.466) ^{***}	84.016	28.762	71.714	178.807
Religious Leaders					
No	RC				
Yes	.020 (.352)	.003	.512	1.020	2.033

Factors Influencing Adherence to Covid-19 Safety Protocols

Table 5 presents the results of the influence of socio-demographic characteristics and sources of information on Covid-19 on adherence to Covid-19 safety protocols. The findings from the multinomial regression analysis showed that seven significantly correlated variables (age, sex, marital status, information from television, radio, community health workers and religious leaders) explained 57 percent of the variability in adherence to Covid-19 safety protocols ($R^2_{CS} = 0.57$), and was considered to be statistically significant, $\chi^2(11) = 353.996$, $p < .001$ (Cox & Snell, 1989). Generally, findings showed that age, sex, and information from radio and community health workers significantly predicted adherence to Covid-19 safety protocols ($p < 0.05$).

Specifically, it was found that the odds of respondents between the ages of 36 and 45 years to adhere to Covid-19 safety protocols was 4 times the odds of respondents between 26 and 35 years ($OR=3.890$, $p < 0.01$). Also, the odds of respondents between the ages of 46 and 55 years was 5 times higher to adhere to Covid-19 safety protocols ($OR=5.311$, $p < 0.01$) compared to respondents between 26 and 35 years. Instructively, respondents between the ages of 66 years and above were 32 times as likely to adhere to Covid-19 safety protocols as the reference category ($OR=32.393$, $p < 0.01$). Regarding sex, findings showed that female respondents were 2 times as likely to adhere to Covid-19 safety protocols as male respondents ($OR=2.422$, $1.178 - 4.982$, $p < 0.05$).

Moreover, respondents who received information from the radio were 17 times more likely to adhere to Covid-19 safety protocols than respondents who did not (OR=16.572, $p<0.001$). Lastly, the probability that respondents who received information from community health workers would adhere to Covid-19 safety protocols was almost the same as the probability that they would not adhere to Covid-19 safety protocols (OR=1.020, $p<0.001$).

These findings, therefore, support the hypothesis that socio-demographic characteristics and NCDC communication channels significantly influence adherence to COVID-19 safety protocols.

The results from Focus Group Discussions corroborated findings from the survey. Importantly, findings showed that elderly persons adhered to Covid-19 safety protocols more than any other age categories as all the elderly in the FGD said they adhered to the safety protocol, stating that their failure to adhere could endanger their health;

It was a strange disease..., we had never experienced it before, and they said older people could easily be infected, I had to take caution, I was always wearing nose mask and made sure I was always washing my hands. (Female 61, Oyo state 1)

Also, a male participant had this to say regarding adherence. “For me, I did not adhere to the safety protocols, but my mother was always adhering even when she is within the house she was always wearing her nose mask” (Male 35, Osun State 1).

“...it created fear at that time...for me I took it seriously o, I was always washing my hands and wearing nose mask, I even stayed away from anyone who coughed beside me” (Female 52 Osun State FGD 1).

Moreover, it was revealed that males adhered to Covid-19 safety protocols less than their female counterparts. “I only wore it [nose mask] when I had to go to places where it was made compulsory, like hospital and church” (Male 50, Oyo State, FDG 1). In support of this view, another middle-aged male participant spoke about non-adherence when he said: “We stopped adhering because we needed to go out to get food. The lock down was not easy...hunger drove us out, we had no choice.” (Male 40, Osun State, FGD 2)

In addition, many of the participants affirmed that radio was helpful and was a primary source of information during the pandemic.

During the crisis, I was so glued to my radio and followed information on how the virus was spreading. At that time there was so much confusion and people were so scared. But on the radio, they were always explaining the kind of disease it was and how it spread--, there were different kinds of programs talking about coronavirus and how to be safe. They brought doctors to also talk about it, and people were calling to ask questions about the disease. (Male 42 Oyo State, 2)

Discussion around participants' views on community health workers revealed that they were instrumental in conveying messages on Covid-19 safety measures:

The news of how coronavirus was spreading and killing people was always on the radio. Health workers in our community were going about from neighborhood to neighborhood advising us to comply and told us that it was not the disease for the oyinbo people [white folks] as people were saying but anybody could contract the disease. (Female 29, Lagos State 2)

Discussion

Quantitative data revealed that persons with low literacy levels had a very high level of awareness of Covid-19 safety protocols, and participant's ability to recall the safety measures also revealed they were well-informed. The high level of awareness is attributed to intensive media campaigns during the pandemic. For non-literates, NCDC tailored their communication to suit non-literates preferences. These information sources were radio, television, community health workers, religious leaders and posters as identified by respondents and are known to resonate with non-literates audiences in Southwest Nigeria. This is due to several factors: radio's efficacy in reaching broad and diverse audiences,

television's audio-visual benefits enhancing information credibility, community health workers' trusted status for personalized communication, the influential role of religious leaders, and posters' ability to convey health messages to non-literate (Ihekweazu et al., 2022; Ojeka-John et al., 2023a). McGuire's communication-persuasion matrix also emphasizes the need for campaigners to tailor the source and the message to audience characteristics like demographics, psychographics and prior knowledge and involvement (McGuire, 2001). Summarily, NCDC's communication choice of message channel was apt and suitable.

A brief examination of NCDC communication channels for Individuals with low literacy levels in the South-west showed that they were tailored to the respondents. Radio is highly rated among the respondents and their understanding of information sources is notable as it has also proven the effectiveness of the radio medium in reaching out to the non-literate population. It is conclusive that for non-literates especially in remote places radio is rated as the easiest channel to understand. This is because, to date, radio remains an irreplaceable tool in promoting health and well-being and delivering life-essential information to the uneducated and marginalized population in places without functional infrastructure like electricity, roads, health care, etc. (Hugelius et al., 2016).

This assertion is in tandem with a study that probed the extent to which people in the South-western part of Nigeria were exposed to NCDC radio information on Covid-19, results reveal that they were exposed to NCDC campaign messages on Covid-19 through radio (Talabi et al., 2022). This also reinforces the tenets of risk communication in times of public health emergencies that messages ought to be channeled strategically to the targeted audience (Glik, 2007).

Second to NCDC communication strategies was the use of Health workers. Health workers are instrumental in the spread of Covid-19 awareness amongst the non-literate population and were also significant in influencing adherence. This explains the stronger association for community health workers compared to radio. A significant number of FGD participants regarded health workers for reinforcing information on Covid-19 safety protocols communicated through the radio. NCDC's engagement of Community health workers (CHWs) for the non-literate population is apt because they serve as a bridge between the government and the grassroots community and for the reason that these health paraprofessionals exist within their immediate community, they understand the best way to relate with the masses in the culturally appropriate context (Olaniran et al., 2019). For this, people tend to trust them when it comes to health information on disease.

Religious leaders can play an effective role in health communication in Africa, as they have the potential to influence the health behavior, attitudes, and practices of their followers and communities. NCDC recognize the role of religious leaders as influential figures in their community. The use of community leaders in conveying health messages also explained the imperativeness of involving a community-based approach in influencing the populace.

With all the potential inherent in NCDC's choice of information sources which were efficacious in influencing non-literate behavior positively, NCDC strategies seem to be more effective in creating awareness than compelling an absolute level of adherence. These results reveal that the strength of NCDC communication campaigns were more pronounced on knowledge and awareness than on corresponding behavioral change (Rossmann, 2014). An influence-driven health campaign should not only be information-centered but should be able to navigate through demographic and cultural barriers which shape individual cognitive orientation to influence behavioral change.

On the matter of adherence to health regulation, certain demographic variables interplayed with absolute adherence among the populace. Covid-19 messages were targeted at the general population however; results showed that adherence was higher among the older population than with the younger population. Research has shown that older populations are believed to be more receptive to health information compared to younger ones (Choi, 2019; Erickson et al., 2017; Zhang et al., 2021) because they may be more aware of their mortality than younger ones.

Also, NCDC communication strategies appear to have had more influence on Females than males as results showed there was a statistically strong correlation between sex/gender and adherence. Studies have also shown that women have higher fear and risk perceptions of disease than male folks as men may exhibit more risk-taking behavior (Alsharawy et al., 2021; Harris & Jenkins, 2006). Adherence appeared to be more common among those who were married than the unmarried. With a majority of the population not adhering this implies that the degree of adherence did not align proportionally with the level of exposure to messages on Covid-19 safety measures. Non-adherence was not as result of message ambiguity or information inadequacy among the populace; FGD findings showed that the population was well-informed messages on Covid-19 protocols were well-understood. The wide reach of Covid-19 messages is indeed laudable on the part of NCDC campaigns. However, one would expect that the high level of knowledge among the masses is expected to trigger adherence to the disease. Rossmann (2014), in his work 'Strategic Health Communication'

believes that a 'high reach has a positive influence on the effectiveness of campaign' (p. 411), Nevertheless, the findings of this study have demonstrated a different perspective. In essence, influence-driven campaigns do not just end at awareness creation the efficacy of a health campaign is gauged on the ability of the targeted population to align behavior as intended by the information source. This suggests that for information to be influence driven there are other elements that a source must incorporate to make it persuasive.

In this post-performance assessment, salient points indeed have emerged from FGD findings on factors that interfered with complete adherence to Covid-19 safety measures. Chiefly amongst those factors as focus group discussants revealed was infodemic, misinformation that spread widely among younger folks about the authenticity of the virus coupled with distrust in the government and neglect in the distribution of relief aid during the lockdown. Health communication operates within a very complex environment (Aken, 2008). It is responsible for encouraging and supporting people to adopt and sustain healthy behaviors, and for reducing inequalities among the populace (Oyekola & Oyeyipo, 2020). It should influence policymakers and professionals to introduce new policies and practices and ensure that healthcare professionals provide adequate and culturally competent information.

Conclusion and Recommendations

Findings show that NCDC's strategies were information-centered because of their effectiveness in massively raising public consciousness regarding health measures against COVID-19 disease among non-literates. However, these strategies did not successfully influence complete adherence as expected. Distrust in government, misconceptions about the pandemic, and socio-demographic factors intricately interplay with adherence. Based on the findings in this post-performance assessment, to effectively address public health challenges among non-literate populations, it is imperative to implement these recommendations without delay. Training and involving Patent Medicine Vendors (PMV) as frontline communicators can enhance accessibility to reliable health information. These individuals or businesses licensed to sell over-the-counter (OTC) medications are not formally trained medical professionals but often receive basic training or orientation on medication handling. Thus, when it has to do with health concerns, rural populations tend to make these *chemists* within their community a first point of call as a result of accessibility, affordability and perceived credibility. Hence, health information coming from them can increase message acceptability among individuals with low literacy. Also, establishing a context-specific, two-way communication platform will empower non-literate communities to clarify misinformation and actively participate in safeguarding their health. Furthermore, fostering trust through

empathetic grassroots support, welfare provisions, and accountable governance is critical to building resilience in times of crisis. These measures are not just steps forward—they are urgent priorities to ensure that no population is left vulnerable during public health emergencies.

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Availability of Data and Materials

All data generated or analyzed during this study are included in this published article.

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