

The Appropriateness and Usefulness of COVID-19 Short Message Services Directed at the Public in Nigeria

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Abstract

The study carried out an assessment of the perceptions of health professionals in Nigeria on the awareness messaging on COVID-19 directed at the public using the SMS (Short Message Service) Technology. The researcher focused on health professionals in the metropolitan areas of Nigeria as the respondents. A structured questionnaire titled “health professionals’ perception on awareness of messaging on COVID-19” was used to collect data from the respondents. The mode of data collection was a questionnaire survey administered online. The findings suggest that health professionals who participated in the survey have a very positive perception of the usefulness and appropriateness, coverage, and impact of the COVID-19 broadcast messages from the Nigerian Centre for Disease Control (NCDC); their responses show that the short messages were sent to Nigerians from different backgrounds and locations to inform the populace about the outbreak of COVID-19, prevention, knowledge about early symptoms, how to reduce the spread of COVID-19 in case of infection and what to do in case of emergency. Additionally, the research outcomes show that SMS broadcast was the leading channel of information dissemination and reception for COVID-19 response as against the traditional channel of information dissemination on radio, TV, and others. These findings have highlighted the importance and value of digital health services such as SMS technology in responding to health emergencies.

Keywords: COVID-19, GSM, Outbreak, risk communication, SMS.

Introduction

The management of natural disasters and public health emergencies has always included a significant communication component in the form of warnings, risk messages, evacuation notifications, messages regarding self-efficacy, information regarding symptoms, and medical treatment, among many others [1, 2]. Different kinds of crises, however, manifest different forms of threat and different communication exigencies. In the case of public health, health departments, agencies, ministries, and organizations track the sources of the disease, undertake actions to stop the transmission, issue warnings and recalls, and provide the public with information about symptoms, treatments,

and ways to avoid exposure [3, 4]. Heath and Covello defined risk communication as the exchange of information about the nature, magnitude, significance, or control of risk, whether they are appropriately tolerable, and the risk consequences [5, 6]. The outbreak of COVID-19 brought about outbursts in the use of technology as an additional layer to the traditional methods of information dissemination and reception – an example is the use of GSM (global system for mobile communication) services like short messages (SMS), voice caller tones, chatbots, etcetera.

The technology of SMS began as a tool for system up-keeping and customer notices in 1991 in Finland and was later on made available globally sometime in the year 1994

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[7, 8, 9]. Afterward, SMS was picked up by the zealous youth in the West and was subsequently made to become an integral part of mobile communication even in the era of the smartphone [10, 11]. The three main categories of text-messaging or texting language (TL) include microblogging, Instant Messaging (IM), and SMS [12]. As a rapid communication outlet, SMS is assessed as a phenomenon that has grown and spread around the globe at an amazing speed [13]. It is considered the most popular communication tool, with approximately 2.4 billion users worldwide [14]. It is so adopted due to its instantaneous nature, location independence, and privacy [8]. In addition to these, it was projected that in the year 2011 alone, eight trillion text messages would be sent worldwide [15].

In Nigeria, the GSM revolution began in 2001 following a successful Digital Mobile License (DML) issued to Nigeria; this changed the face of information and communication technology in the country. Within a year of the introduction of GSM in the country, subscribers exceeded a million, making the possession of a mobile phone no longer the exclusive preserve of the affluent minority. The National Bureau of Statistics (NBS) data as of the closure of 2020 shows that there are about 190 million active SIM cards in circulation among the 200 million population in Nigeria [16]. The widespread usage of GSM among Nigerians (about 85% of the populace) and the teledensity rate of about 95% (the number of telephone connections for every hundred individuals living within an area), this high coverage of GSM penetration in Nigeria has made SMS to become an integral part of mobile communication [17].

Globally, health departments of nations have started incorporating the SMS technology into the public health system, especially for disease outbreak response to bring risk communication messages to the populace [18]. However, the traditional channel of information dissemination and reception (TV, radio, prints,

etc.) still exist – SMS technology has come to complement the traditional channel of information dissemination, its advantages include vast and extensive connectivity of communities, affordability of GSM device (s), the literacy level of Nigerians (English and major local language), immediate delivery of SMS and others. Before the COVID-19 outbreak in Nigeria, SMS has been in use. One of those areas is the use of SMS for the transmission of immunization data of the number of clients immunized from the health facilities to the national level, which becomes available on a central server in real-time. In Nigeria, the Nigeria's Centre for Disease Control (NCDC), through its coordinated outbreak response for the risk communications pillar, composed and delivered short messages to the populace to counter rumors and provide accurate and up-to-date information about the prevention, knowledge about early symptoms, how to reduce the spread of COVID-19 in case of infection and what to do in case of emergency. The message contents were developed based on available intelligence gathered from the public through online scanning of web pages and social media listening and triangulated with insights gathered from the data collected from the direct visit to the various communities and telephone assisted interviewing of individuals, groups, and institutions, hence, to guide risk communication and community engagement activities. Despite the concerted efforts of the health authorities in Nigeria, disinformation on COVID-19 has continued to spread, causing confusion and panic in the population and affecting negatively the demand for health services [19]. Hence, the need to assess the appropriateness and effectiveness of the SMS messaging tailored by the NCDC to the public as an outbreak response in bringing awareness messaging on COVID-19 transmission, spread, and prevention precautions using the perception of health professionals nationwide. While the SMS technology has been implemented in Nigeria in

the domain of health services, little or no research studies have been done concerning the subject matter in Nigeria.

The aim of the study was to assess the appropriateness and effectiveness of SMS technology as part of the COVID-19 national outbreak response targeted at meeting the information needs of the general public in Nigeria. We get the perspective of the health professionals on this issue, given their frontline status in patient care and their intimate knowledge of the country's health system and population. We would like to find out from them if they consider the SMS messaging campaign for COVID-19 to be appropriate and useful.

Materials and Methods

Quantitative research methods were used in the study, which analyzed data collected through questionnaires completed online by a sample of 384 health professionals from throughout Nigeria; the questionnaire was widely distributed using online marketing channels to reach a wider and diverse audience of health workers and professionals. The health professionals included in the survey included all the six types of health cadres in the country, namely doctors, professional nurses, pharmacists, biomedical lab technicians, community health workers, and informaticians – this health personnel were later grouped into 3 Health Care Staff, Health Care Academia and Health Care support Staff for the ease of responding to the questionnaire.

Inclusion and exclusion criteria for the study population was set up during the design of the instrument and implemented during the data analysis. Considering that it was web-based experimentation as such, the researchers were unable to exclude interested audiences who did not meet the set criteria for inclusion. The researchers used a check question that identifies non-health workers/professionals - Which of these bests describe your area of practice in the health care domain (available option “I am not

a health worker/professional”), while all the listed six type of health cadres were reflected in the instrument, the option “I am not a health worker/professional” was used for the exclusion during data analysis. Discarding of submissions that did not meet the study criteria for data completeness was carried out alongside discarding of duplicate submissions by using Microsoft Excel concatenation of some selected data elements and empty cells. A total of 428 submissions were received. However, during exclusion and discarding, the submissions returned 384 respondents' data.

The questionnaire was divided into two sections: socio-demographic and direct study questions. The questionnaire is self-answered by the respondent and completed online, and responses submitted and downloaded for analysis after three weeks so as to give room for respondents to access the link at their convenience. The respondents were assured of strict confidentiality of their identities. The questionnaire was developed in Google platform (google form), a platform that affords researchers to reach out to their target audience at their convenience and used as a flexible means of data collection for busy respondents like the target audience for this study. Convenience sampling, a type of nonprobability sampling in which people are sampled simply because they are “convenient” sources of data for researchers – simple marketing strategies to make the questionnaire link available to respondents was done using WhatsApp, Facebook, Twitter, Emailing and SMS. The questionnaire validity and reliability test were carried out among two seasoned researchers with presence in Nigeria and South Africa; feedbacks received were used to update the instrument to include and reflect the consent page and email address to share the study outcome with respondents who indicated an interest in the study. In the case where the instrumentation testing returned feedback to include the public members who directly received and benefited from the SMS broadcast

as against targeting the health professionals used in the study, the researchers identified this as the study limitation, however, it is worthy of note to state that the study population also received the targeted SMS, hence, the knowledge of the appropriateness and usefulness of the messages delivered to Nigerians.

This study adopts a descriptive survey design as used for the quick civil society survey on misinformation about the COVID-19 by the United Nations Department for Global Communications. The UN survey was rolled out as an effort to make sure the WHO communication campaign on situation reports, myth-busters, and other essential information regarding the disease on its website is effective, hence targeting civil society representatives across all countries on what they already know, have heard or have learnt from the media or other sources about COVID-19 and what they want and need to know [20].

Krejcie and Morgan's [21] sample size calculation technique, as shown in equation 1

below, was used to arrive at the sample size. From the estimated population of the health workforce in Nigeria, which ratio at 1.95 per 1,000 [22, 23], the model returned 384 as the required number of respondents to be used for this study. The researchers would like to observe that the 1.95 per 1,000 as published in the WHO global health workforce statistics for Nigeria may have improved due to the ongoing efforts of health system strengthening at all levels of care in the country. However, the ratio is found useful for this study.

$$S = \frac{X^2NP(1-P)}{d^2(N-1) + X^2P(1-P)} \quad (1)$$

S = required sample size

X^2 = the table of value of chi-square for 1 degree of freedom at the desired confidence level (3.841)

N = the population size

P = the population proportion (assumed to be .50 since this would provide the maximum sample size)

d = the degree of accuracy expressed as a proportion (50)

Table 1. Study Sample Size Calculation

Projected Nigeria population (2020)	Percentage of Health Workforce in Nigeria (1.95 per 1,000)	Number of Health Workforce	Population Size (N)	Sample Size (S)
217,971,548	0.195	425,045	425,045	384

Source: 2006 National Provisional Population Results with the State-specific Growth rate

The questionnaires were collected and checked for completeness. Data quality check was performed on the collected data to avoid repeated or incomplete data been used. Repeated, incomplete, and unclear responses were removed from the downloaded data, and the clean data were double-checked before they were subjected to analysis. Quantitative data were coded by assigning a code to every response. The data were analyzed with the use of the SPSS package, and the data were organized and presented in the form of tables and figures. This enabled the researcher to summarize the data collected. Basic descriptive statistics are presented in the results as well as

statistical calculations utilizing a correlation analysis to check the statistical difference within the responses of the respondents.

Results

The demography of respondents as presented in **Table 3** shows that not less than 90% of the respondents have direct interface with patients to deliver health care services (area of practice in the health care domain) and not less than 60% respondents have been practicing in the health care domain for ≥ 8 years. Given the respondents' frontline status in patients' care and their intimate knowledge of the country's

health system and population, the data collected is the most recent.

Not less than 90% of the respondents returned with responses showing that the short messaging to Nigerians has a geographical reach (coverage) of moderate (50% to 79%) to high (≥ 80), only about 9% of the respondents believe that it has low geographical coverage ($< 50\%$) in the country – **Table 4**.

Because of the appropriateness and usefulness of the contents of the short messaging on COVID-19 outbreak response as presented in **Table 6**, 65.9% of the respondents were supportive of the future use of SMS messaging for distributing disease outbreak advisory, 8.3% were negative about the usefulness and appropriateness of the SMS, and 25.8% were undecided about it. In terms of the channel to reach the public members with the COVID-19 disease advisory to all population groups (rural and urban, rich and poor, accessible and inaccessible, etc.), Government's efforts through NCDC SMS Campaign on COVID-19 ranked highest (32.6%), followed by the other traditional channels of information dissemination and reception on the radio (22%), social media (14.8%), health workers (12.5%), traditional and religious institutions (8.9%), television (8.3%) and newspaper (0.9%).

The study further probed into the usefulness of the SMS content to the public members as perceived by the health workers and/or professionals – **Table 5**. The majority of the respondents were very positive about the usefulness of the contents of the short advisory messages on COVID-19 to be extremely useful (19.3%) and very useful (52.3%), 25% find the contents somewhat useful, and 3.4% find it not so useful in the providing messages to adhere to COVID-19 advisory. Additionally, the majority of the respondents found the short messaging to be useful in dispelling misinformation and providing up-to-date and accurate information on COVID-19; 18.5% and 50.5% of the respondents found the SMS extremely useful and very useful, respectively, while 25.5% found the SMS somewhat useful 4.9% found it

not so useful and a small fraction of the respondents (0.5%) still believe it is not at all useful.

The study also revealed the clarity of the content of the short messages as perceived by the respondents, majority of the respondents (74.0%) believed that the SMS has helped the households to deal with disinformation and that it did not bring confusion and panic in any way, 17.2% are not sure or did not take notice of the clarity of the SMS while 8.9% of the respondents believed that the SMS brought confusion and panic to the households. One of the positive behavioral changes that the content of the short messages produced was to help members of the public to develop, moderate to great positive behavioral changes towards abiding by the COVID-19 advisory. The observed positive changes range from moderate to great behavioral changes; from the 384 respondents used for the study, 101 (26.3%) testified of great behavioral changes, 250 (65.1%) testified of moderate behavioral changes, while 33 (8.6%) for no behavioral changes.

H01: There is no significant difference in the perceived usefulness of the NCDC SMS campaign in dispelling rumours, myths, and misinformation among the members of the public base on respondents' area of practice in the health care domain.

These results presented in **Table 2** indicate that the perception of respondents on the usefulness of the NCDC SMS in dispelling rumours among members of the public varies across the healthcare domain line. Therefore, the perception of the respondents with respect to their healthcare domain is not different. The Spearman's rho correlation test statistic is -0.026 . This indicates a negative correlation. The result shows there is no significant difference in the perceived usefulness of the NCDC SMS campaign in dispelling rumours, myths, and misinformation among the members of the public base on respondents' area of practice in health care with a p-value of 0.616 at a 0.05 level of significance.

Table 2. Testing of Hypothesis on the Usefulness of COVID-19 SMS Versus Health Care Domain

Correlations			
		Which of these best describe your area of practice in the health care domain	How useful did you perceive the NCDC SMS campaign in dispelling rumours among the members of the public in your state?
Which of these best describe your area of practice in the health care domain	Pearson Correlation	1	-.026
	Sig. (2-tailed)		.616
	N	384	384
How useful did you perceive the NCDC SMS campaign in dispelling rumours among the members of the public in your state?	Pearson Correlation	-.026	1
	Sig. (2-tailed)	.616	
	N	384	384

Source: Project Survey Data, 2020.

Table 3. Demographic Data of Respondents

Variable	Count	Percentage (%)
Gender		
Female	135	35.2
Male	249	64.8
Age		
18 – 24	6	1.6
25 - 34	129	33.6
35 - 44	118	30.7
45 - 54	98	25.5
55 - 64	31	8.1
65+	2	0.5
Zone		
NCZ	114	29.7
NEZ	73	19.0
NWZ	71	18.5
SEZ	25	6.5
SSZ	46	12.0
SWZ	55	14.3
Area of practice in the health care domain		
Health care	352	91.7
Health Care Academia	11	2.9
Health Care Support	21	5.5
years of work experience		
Less than 2	24	6.3
2 - 4	57	14.8
5 - 7	61	15.9

8 -10	48	12.5
11+	194	50.5
Total	384	100

Source: Project Survey Data, 2020.

Discussion

The study is aimed at assessing the appropriateness and effectiveness of SMS technology as part of the COVID-19 national outbreak response targeted at meeting the information needs of the general public in Nigeria. From the result of the study, the majority believed that the short messages directed to the public on the COVID-19 outbreak response are useful for the purpose of dispelling disinformation and providing accurate and up-to-date information among the members of the public across the country. The study also revealed that the majority of the public would subscribe to SMS notification in case of any future disease outbreak; out of 1112 patients, 1007 signed up for SMS services, and

only 5 declines [24]. As a result of the SMS campaign, the behavioral attitude of many have changed positively towards abiding by the COVID-19 advisory for prevention and control using non-pharmaceutical interventions. Many also find the content of the SMS very useful and appropriate and therefore are willing to receive cognate information in the future. The government's efforts through the sending of short messages ranked highest among all the information dissemination and reception channels because the SMS reached all the diverse population groups in Nigeria. Hence, short messages using the SMS technology can be used as an additional layer for quick and immediate information dissemination and reception for health and aid interventions.

Table 4. The Geographic Coverage of the NCDC SMS Campaign on COVID-19 for Risk Communication to Rural and Urban and/or Rich and Poor Households in your State?

How would you score the geographic coverage of the NCDC SMS campaign on COVID-19 for risk communication to rural and urban and/or rich and poor households in your state?		
Level	Frequency	Percent
High Coverage ($\geq 80\%$)	143	37.2
Moderate Coverage (between 50% - 79%)	205	53.4
Low Coverage ($< 50\%$)	36	9.4
Total	384	100.0

Source: Project Survey Data, 2020.

Table 5. Clarity of the SMS Campaign

Would you rather say the NCDC SMS campaign on COVID-19 brought more confusion and panic to members of the public in your state?		
Level	Frequency	Percent
Yes, it brought confusion and panic to households	34	8.8
No, it did not bring confusion and panic; it helped to calm the households	284	74.0
Not sure	66	17.2
Total	384	100.0

Source: Project Survey Data, 2020.

Table 6. Willingness of the Public to Receive Disease Outbreak Advisory via SMS in the Future

Based on your perception and testimonies from the members of the public in your state, would the public members want to receive disease outbreak advisory via SMS in the future?		
Level	Frequency	Percent
Maybe	99	25.8
Yes	253	65.9
No	32	8.3
Total	384	100.0

Source: Project Survey Data, 2020.

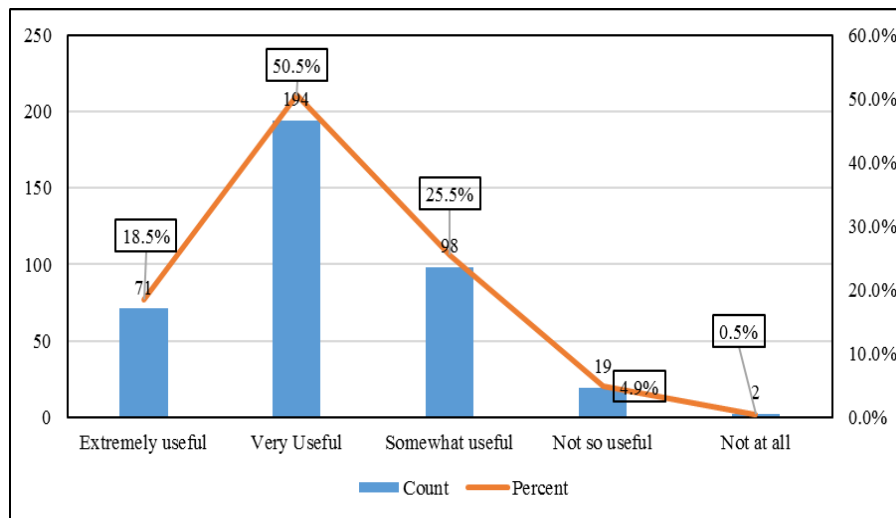


Figure 1. Usefulness of the NCDC SMS Campaign in Dispelling Rumors, Myths and Misinformation among the Members of the Public in your State?

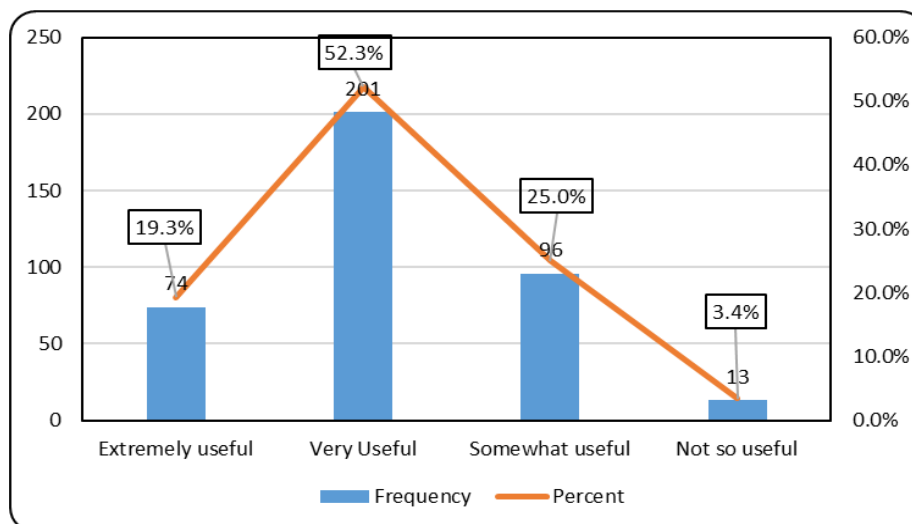


Figure 2. Usefulness of the Content of the NCDC SMS in Providing Risk Communication messages to Members of the Public to adhere to COVID-19 Advisory?

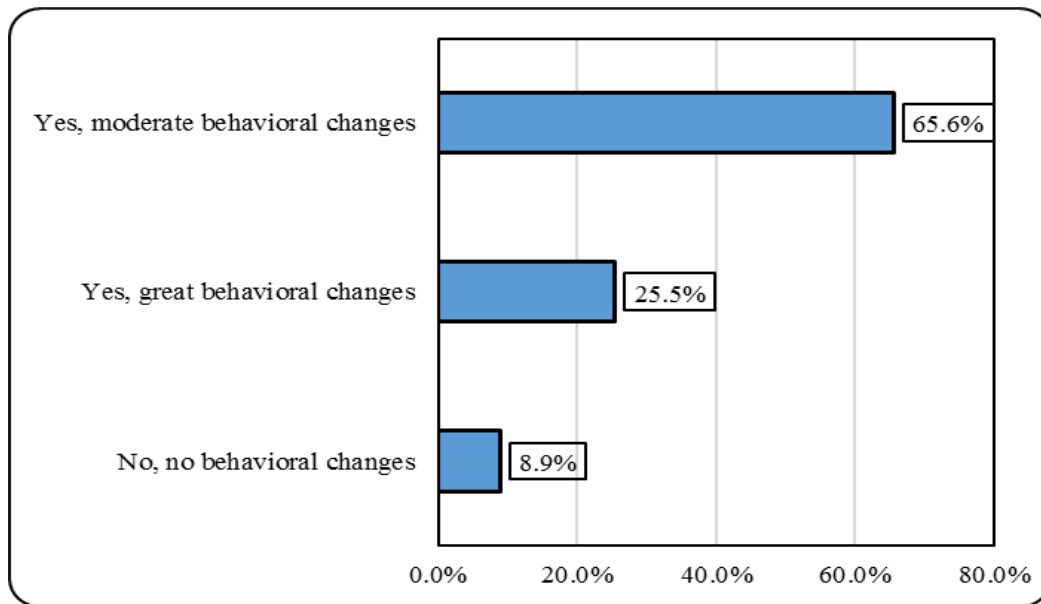


Figure 3. Effect of SMS campaign on the Behavioral Changes in the Members of the Public Towards the Control of Community Transmission of COVID-19

Conclusion

This study provides an all-inclusive assessment of the Perception of Health Care Workers/Professionals About the Appropriateness and Usefulness of COVID19 Short Message Service in Nigeria. The findings suggest that health professionals who participated in the survey positively perceive the usefulness, coverage, and impact of the NCDC COVID-19 SMS campaign. Their responses show that the short messages were sent to Nigerians from different backgrounds and locations. The study reveals the usefulness of the effort of the government to inform the populace about the outbreak of COVID-19, prevention, knowledge about early symptoms, how to reduce the spread of COVID-19 in case of infection, and what to do in case of emergency. While SMS ranked highest as the medium of information dissemination and

reception among different groups, institutions, and locals, local radio and television stations, social media, and community engagement were also noticed to be efficient means of information dissipation and reception on COVID-19.

Acknowledgement

We would like to acknowledge the efforts of all health workers and professionals who took out time from their busy schedules to participate in the survey and shared widely with others the links to the questionnaire survey – thank you for your frontline efforts and what you do in responding to the pandemic.

Conflict of Interest

This study is the work of the author and co-authors provided in the cover page of this article, except where we have acknowledged the use of the works of other people.

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