

COVID-19 related information sources and prevention practices in Nigeria: A cross-sectional study

Sorochi ILOANUSI¹, Osaro MGBERE^{1,2}, Nchebe-Jah R ILOANUSI³,
Ismaeel YUNUSA⁴, Ekere J ESSIEN^{1,2}

Affiliations:

¹Department of Pharmaceutical Health Outcomes and Policy, University of Houston College of Pharmacy, Houston, Texas, USA. ORCID:<https://orcid.org/0000-0003-3571-0996> (Sorochi Iloanusi); <https://orcid.org/0000-0001-8157-8290> (Ekere J Essien)

²Institute of Community Health, University of Houston College of Pharmacy, Houston, Texas, USA. ORCID:<https://orcid.org/0000-0002-2863-6284> (Osaro Mgbere)

³General Hospital, Onitsha, Anambra State, Nigeria.

⁴Department of Clinical Pharmacy and Outcomes Sciences, University of South Carolina College of Pharmacy, Columbia, South Carolina, USA. ORCID:<https://orcid.org/0000-0002-9107-8561>

Corresponding author:

Ismaeel Yunusa, Department of Clinical Pharmacy and Outcomes Sciences, University of South Carolina College of Pharmacy, Columbia, South Carolina, USA. E-mail: iyunusa@mailbox.sc.edu

Abstract

Introduction: COVID-19 is known to have a higher transmission rate in densely populated areas, which has serious implications for populous cities, especially in resource-poor settings. This study aimed to identify the common COVID-19 related information sources used in Onitsha, a populous commercial city in Anambra State, Nigeria, and their associations with demographic characteristics and implementation of COVID-19 preventive practices.

Methods: Data from a cross-sectional survey of 140 adult residents of Onitsha in March 2020 was analyzed. Descriptive and inferential statistics were used to describe the study population and determine the associations.

Results: Internet/social media (63.5%), radio (61.5%) and television (58.5%) were identified as the topmost COVID-19 information sources. Educational level was significantly associated with the use of TV ($P < 0.01$), WhatsApp/text messages ($P < 0.0001$), and internet/social media ($P < 0.001$). The use of internet/social media, WhatsApp/text messages, and religious places of worship were significantly ($P \leq 0.05$) associated with implementing all identified recommended prevention practices.

Conclusion: Public health authorities can improve the mass adoption of COVID-19 preventive measures by utilizing the identified effective information sources to design targeted education and awareness campaigns.

KEY WORDS: Coronavirus; COVID-19; information sources; Nigeria; prevention practices; Onitsha; SARS-CoV-2.

INTRODUCTION

Coronavirus disease 2019 (COVID-19) has spread to 224 countries and territories since it was first discovered in December 2019 in Wuhan [1]. As of November 28, 2021, there were over 261 million confirmed cases of COVID-19 and 5.2 million confirmed deaths from the pandemic worldwide [2]. The spread of the disease, catalyzed by high population densities and increased interactions among individuals [3–7], is on the rise in African countries with more than 8 million cases in 54 countries resulting in devastating public health and economic consequences [8–11]. Nigeria has 213,982 confirmed cases and 2,975 deaths, ranking her the eighth highest in the number of confirmed COVID-19 cases in Africa [8, 12]. In Anambra state, there were 2,405 confirmed cases of COVID-19 compared to Lagos state and the Federal Capital Territory, Abuja (FCT), which had 78,136 and 23,491 cases, respectively [12]. Despite the current reported low number of COVID-19 cases in Anambra state, Onitsha city, which is a major economic hub for

commerce, industry, and education, is still at the highest risk of becoming the epicenter of the COVID-19 outbreak in the Southeastern region because of its high population density and continuous interactions with neighboring states and regions through heavy trade related traffic. Onitsha is the second most populous city in the nation, second only to Lagos [13, 14]. This has a lot of implications for the spread of COVID-19, which like most infectious diseases [15, 16] has a higher rate of transmission in densely populated areas [3–7]. Since COVID-19 spreads through proximity between individuals, interactions through trading activities coupled with the dense residential settings in Onitsha city make community spread of the virus in Onitsha city eminent, and thus, immediate attention is required in order to avert the spread of the pandemic.

To facilitate the adoption of these preventive measures, individuals need accurate information that is reliable, accessible, and fast. For example, an online administered survey in Nigeria reported that most respondents used

TAKE-HOME MESSAGE

Sourcing information from social media platforms and religious places of worship influences the adoption of recommended COVID-19 prevention practices.

Competing interests - none declared.

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TV/Radio as their source of COVID-19 information [17]. In contrast, social media/internet was the most used source of COVID-19 information in other countries such as Egypt, Taiwan, and China [18–20]. The use of these various information sources often differs across different cultures, age groups, occupations, and educational levels [21–23]. In addition, information sources differ in accessibility and sometimes in the reliability of the information provided about the pandemic, and thus, could have potentially different outcomes with respect to the adoption of the recommended preventive measures. For instance, social media and the internet have been linked to COVID-19 misinformation creating an ‘infodemic’ that threatens the adoption of correct preventive measures against COVID-19 spread [24–26]. Furthermore, a study conducted in Canada found that misperceptions about COVID-19 were strongly associated with exposure to social media [27]. In contrast, studies have shown that individuals have a higher trust for information received from traditional information sources such as radio, TV and are more likely to adopt preventive measures from these sources [20, 28].

While a previous study in Nigeria has assessed the COVID-19 information sources most used in the country [17], it is not reflective of certain cities in Nigeria due to the inherent cultural and regional differences across the country. To facilitate the broad and efficient dissemination of COVID-19 information among residents of Onitsha, it is essential to assess the channels of information that the masses use to seek COVID-19 related information and the impact of the various channels on the implementation of the preventive measures. The overall goal of our study was to assess the relationship between information sources and the actual adoption of preventive measures in Onitsha city. We, therefore, aimed to: (1) describe the COVID-19 related information sources used by residents (2) assess the association between COVID-19 related information sources and demographic characteristics, and (3) estimate

the association between information sources and reported prevention practices of residents of Onitsha. We believe that our study will provide evidence to inform the most efficient and effective sources for dissemination of COVID-19 information and for targeted COVID-19 awareness campaign efforts in Onitsha city in Anambra state and other cities in Nigeria.

METHODS

Study design

This was a retrospective analysis of a cross-sectional survey data obtained from in-person interviews conducted in Onitsha, Anambra state, Nigeria during the month of March 2020 period of the COVID-19 pandemic [29]. Data collection occurred shortly before the government-mandated lockdown was implemented on March 29, 2020 [29]. A convenience sampling technique was used to recruit 18 years and older adults who live and/or work in Onitsha city and consented to participate in the survey [29]. A total of 140 participants were included in the final analytical dataset used for the current study. The detailed description of the survey instrument used, the data collection process, and study location have been described elsewhere [29].

Study variables

The analytical measures used were classified into three categories as demographic, information sources and the COVID-19 prevention practices. The demographic characteristics considered in this study include sex (female, male), age group (18-24, 25-34, 35-44, 45-54, and 55+ years), educational status (primary education or less, secondary education, diploma/associate degree and bachelors/postgraduate degree), occupation (civil servant, trader/self-employed, health care worker, student and other), and number of individuals living in household (1, 2-4, 5-7 and >8). The information sources assessed include radio, television (TV), newspaper, WhatsApp/text messages, Internet/social media, relatives/friend/community, and religious

places of worship such as church or mosque. Participants were required to indicate a 'yes' or 'no' for each of the sources that they used to obtain information on COVID-19. Prevention practices were based on universally recommended guidelines for COVID-19 [30] and included the following: regular washing of hands with soap and water for at least 20 seconds, use of hand sanitizers, avoid touching face, use of face mask, use of hand gloves, travel restrictions, avoidance of physical contact with others (social distancing) and regularly cleaning high contact surface with disinfectants. Participants were required to indicate a 'yes' or 'no' for each of the COVID-19 prevention practices that they currently adopt to avoid getting infected with the disease.

Data analysis

Descriptive statistics such as frequency runs, and means were used to evaluate the demographic characteristics of the sample population. Initial inferential statistics included univariate analysis of the information sources used by participants using the chi-square test of independence. Information sources found to be statistically significant ($P \leq 0.05$) were used in subsequent bivariate analyses. The information sources that met this criterion include radio, TV, newspaper, internet/social media, and religious places of worship. Although WhatsApp/text message was not statistically significant, it was included in the bivariate analyses because it is a common and frequently used means of exchanging information in Nigeria [31]. Using the information sources as dependent variables, we conducted a series of bivariate analyses (chi-square test) to determine the independent associations between selected demographic characteristics (gender, age group, and educational status) and the selected COVID-19 information sources. Furthermore, using the information sources and prevention practices as independent and response measures, we determined the associations between them in a 2-way contingency table analyses using the Chi-Square test. These dichotomous measures allowed

for the computation of the marginal odds ratios and the 95% confidence intervals of the participants' likelihood of adopting a given COVID-19 preventative practice by each information source. Those who did not adopt a specified information source served as a referent in the analyses. All statistical tests performed were 2 tailed, with a probability value of 0.05 used as the threshold for declaring statistical significance. Data management and statistical analyses were conducted using SAS JMP Statistical Discovery™ Software version 14.3 (SAS Institute, Cary, North Carolina, USA).

Ethical aspects

All relevant ethical guidelines, including the Institutional Review Board approval process, were followed in the primary data collection [29]. The principal investigator granted permission to use the data from the primary survey for the current study. This study protocol was reviewed and approved [IRB#:00002363] by the Institutional Review Board of the University of Houston, Houston, Texas, USA.

RESULTS

Participants' characteristics

The demographic characteristics of the study participants are depicted in Figure 1 and have been described in detail in a previous study [29]. In summary, most of the participants were males (54.3%), of age group 25-34 years (40.0%) with an overall mean age of 34.5 (Standard deviation (SD): ± 10.9) years and held associate degrees or higher (53.7%). Most were traders or self-employed individuals (44.3%) with an average number of persons per household of 5.6 (SD: ± 2.58).

COVID-19 related information sources

The common information sources used by residents of Onitsha commercial city are presented in Table 1. The topmost sources for COVID-19 information identified were internet/social media (63.6%), radio (61.4%), and television (58.6%), while the least used

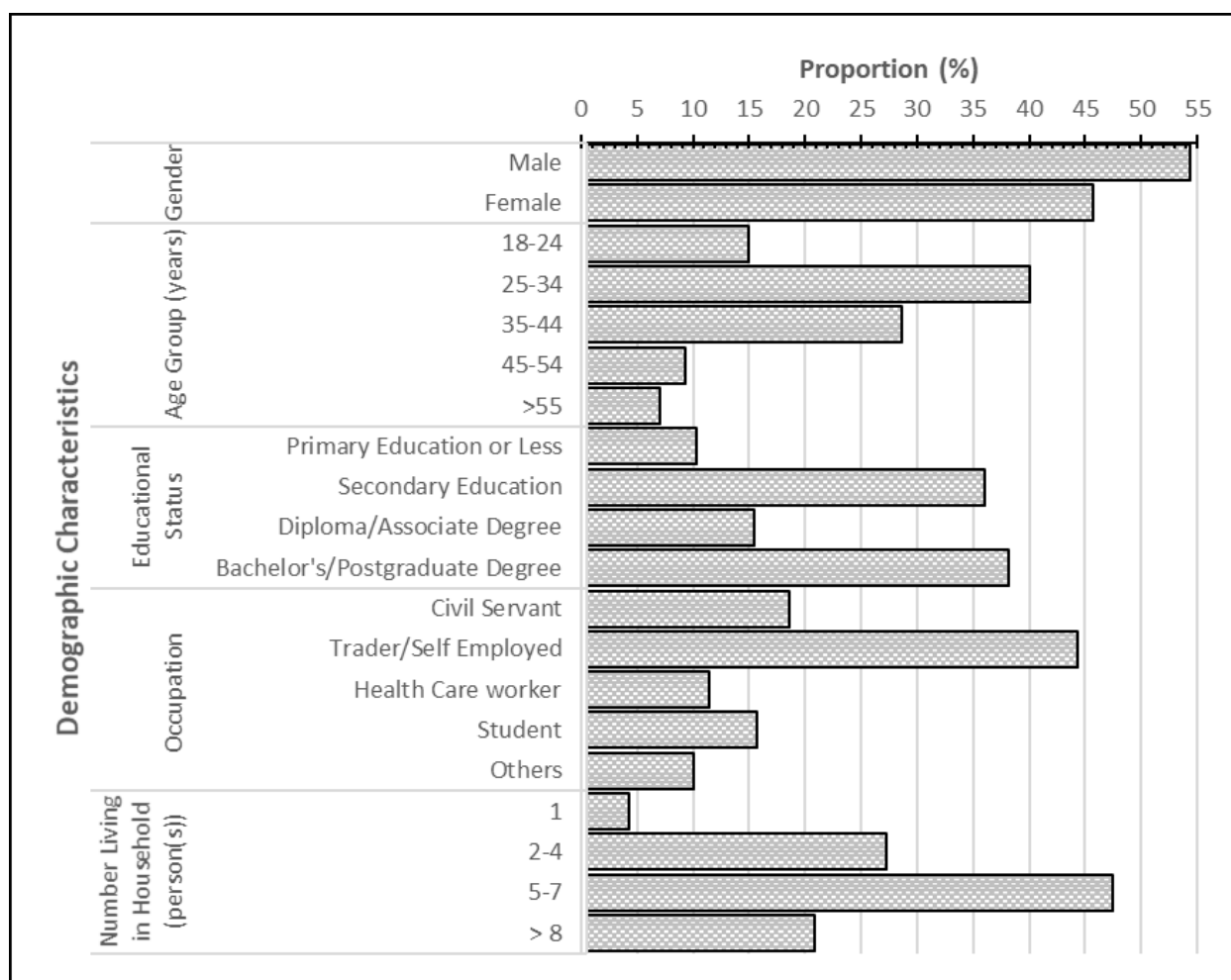


Figure 1. Demographic characteristics of sample population (n = 140).

Table 1. Information sources commonly used to learn about COVID-19 by residents of Onitsha Commercial City in Anambra State, Nigeria[†].

Information Source	Use Status		Test Statistics	
	Yes N (%)	No N (%)	χ^2	P-value
Radio	86 (61.4)	54 (38.6)	7.31	0.0068**
Television	82 (58.6)	58 (41.4)	4.11	0.0425*
Newspaper	47 (33.6)	93(66.4)	15.1	<0.0001****
WhatsApp messages/ Text messages	69 (49.3)	71 (50.7)	0.03	0.8658 ^{ns}
Internet/social media (e.g., Facebook, Twitter, Instagram, blog, etc.)	89 (63.6)	51 (36.4)	10.31	0.0013***
Relatives/Friends/community	67 (47.9)	73(52.1)	0.26	0.6121 ^{ns}
Religious Places of worship such as Church, Mosque, etc.	55 (39.3)	85 (60.7)	6.43	0.0112**

[†]The choice of COVID-19 information source by participants are not mutually exclusive or independent
 Significant Level: *P<0.05, **P=0.01, ***P<0.001, ****P<0.0001, ns=Not significant P>0.05).

sources were newspapers (33.6%) and religious places of worship (39.3%).

Association between COVID-19 related information sources and demographic characteristics

Table 2 details the associations between COVID-19 related information sources and selected demographic characteristics. We recorded a significant association ($P < 0.05$)

between the age group of participants and the use of WhatsApp/text messages as the means for obtaining information on COVID-19. The educational status of participants played a significant role in the choice of TV ($P < 0.01$), WhatsApp/SMS ($P < .0001$), and internet/social media ($P < 0.001$), with the majority of participants holding bachelor's degrees or higher. In general, to some extent, gender and age group played no significant roles in

Table 2. Associations between information sources for COVID-19 and selected demographic characteristics of residents of Onitsha Commercial City in Anambra State, Nigeria.

Characteristic	Information Sources			
	Radio (n=86)	Television (n=82)	Newspaper (n=47)	
Gender	N (%)	N (%)	N (%)	N (%)
Male	43 (50.0)	41 (50.0)	26 (55.3)	39 (56.5)
Female	43 (50.0)	41 (50.0)	21 (44.7)	30 (43.5)
<i>Test Statistics: X² (P-value)</i>	<i>1.650 (0.199)</i> ^{ns}	<i>1.465 (0.226)</i> ^{ns}	<i>0.30 (0.861)</i> ^{ns}	<i>0.274 (0.600)</i> ^{ns}
Age Group (years)	N (%)	N (%)	N (%)	N (%)
<25	12 (14.0)	9 (11.0)	6 (12.8)	9 (13.0)
25-34	33 (38.4)	31 (37.8)	19 (40.4)	34 (49.3)
35-45	28 (32.6)	27 (32.9)	16 (34.0)	20 (27.0)
45-55	6 (7.0)	9 (11.0)	4 (8.5)	5 (7.3)
>55	7 (8.1)	6 (7.3)	2 (4.3)	1 (1.5)
<i>Test Statistics: X² (P-value)</i>	<i>3.141 (0.535)</i> ^{ns}	<i>4.307 (0.366)</i> ^{ns}	<i>1.852 (0.763)</i> ^{ns}	<i>10.066 (0.0393)</i> [*]
Educational Status	N (%)	N (%)	N (%)	N (%)
Primary	12 (14.1)	5 (6.1)	4 (8.7)	3 (4.4)
Secondary	26 (30.6)	24 (29.3)	12 (26.1)	15 (22.1)
Diploma/Associate Degree	11 (12.9)	13 (15.9)	8 (17.4)	12 (17.7)
Bachelor/Post Graduate Degree	36 (42.4)	40 (48.8)	22 (47.8)	38 (55.9)
<i>Test Statistics: X² (P-value)</i>	<i>7.004 (0.072)</i> ^{ns}	<i>12.182 (0.007)</i> ^{ns}	<i>3.923 (0.269)</i> ^{ns}	<i>23.444 (<0.0001)</i> ^{***}

*Number (n) and percentages (%) represent a proportion of the study participants that used a given source to access COVID-19 related information by demographic characteristics. Within a given characteristic, the percentages may not add up to exactly 100 due to rounding. Significance Level: *P<0.05, **P=0.01, ***P<0.0001, ns=Not significant (P>0.05).*

the choice of sources used for acquiring COVID-19 information among the residents of Onitsha commercial city.

Association between information sources and prevention practices

The marginal odds ratios between information sources and prevention practices are presented in Table 3. There were significant associations ($P \leq 0.05$) between residents' use of WhatsApp/text messages, internet/social media, and religious places of worship as sources of COVID-19 information. Participants who asserted using these media had 100% implementation of all identified prevention practices (Table 3). On the other hand, participants who learned about COVID-19 through the TV used 7 (87.5%) out of the 8 identified preventative practices, while those who accessed such information from reading newspapers only adopted 6 (75%) out of the 8 identified recommended guidelines. The use of radio as a COVID-19 information source was only associated with the regular washing of hands with soap and water for at least 20 seconds ($P < 0.05$) and the use of hand gloves ($P < 0.01$). Most of the participants in Onitsha commercial city all practiced regular washing of hands with soap and water for at least 20 seconds ($P \leq 0.05$) regardless of the COVID-19 information sources. The general level of adoption of the preventive practices among participants varied by the sources of COVID-19 information and ranged from 83.7% (Radio, $P < 0.05$) to 93.6% (Newspaper, $P < 0.001$) for regular washing of hands with soap and water for at least 20 seconds, from 78.1% (TV, $P < 0.01$) to 84.1% (WhatsApp/text messages, $P < 0.001$) for the use of hand sanitizers and from 62.9% (Internet/social media, $P < 0.01$) to 68.1% (Newspaper, $P < 0.01$) for the avoidance of physical contact with others (social distancing). Other less practiced COVID-19 prevention measures among residents of Onitsha city include avoiding touching face (range: 51.2% (TV, $P < 0.05$) to 58.2% (Religious places of worship, $P < 0.01$)), travel restrictions (from 47.6% (TV, $P < 0.05$) to 58.2% (Religious places of worship, $P < 0.001$) and

use of face mask, where only 40.2% (TV, $P < 0.01$) to 48.9% (Newspaper, $P < 0.01$) of the participants implemented this measure.

Despite being the least used information source (33.6%), participants who consider newspapers as their source of COVID-19 information were nearly 7 times (OR= 6.65, 95%CI 1.90 to 23.17, $P < 0.001$) more likely to wash their hands with soap and water for at least 20 seconds; 3 times more likely to wear a face mask (OR= 2.58, 95%CI 1.19 to 5.60, $P < 0.01$) and to socially distance themselves from others (OR= 2.99; 95%CI 1.48 to 6.01, $P < 0.01$), compared to those who did not use this source for obtaining COVID-19 related information. On the other hand, residents who get COVID-19 information from the internet/social media (63.6%) were 3 times (OR= 2.92, 95%CI 1.30 to 6.57; $P < 0.01$) more likely to wash their hands with soap and water for at least 20 seconds and to social distance (OR=2.86, 95% CI 1.40 to 5.83, $P < 0.01$), and had nearly 4 times (OR=3.82, 95%CI 1.61 to 9.08, $P < 0.01$) likelihood of wearing a face mask to prevent COVID-19 infection compared to those that used an alternative source (Table 3).

Table 3. Marginal odds ratios between information sources for COVID-19 and preventive practices adoption by residents of Onitsha Commercial Hub in Anambra State, Nigeria.

Information Sources	Prevention practices															
	Regular washing of hands with soap and water for at least 20 seconds				Use of Hand sanitizers				Avoid touching face				Wear face mask			
	n (%)	OR (95% CI)	P-value	n (%)	OR (95% CI)	P-value	n (%)	OR (95% CI)	P-value	n (%)	OR (95% CI)	P-value	n (%)	OR (95% CI)	P-value	
Radio	72 (83.7)	2.57 (1.15-5.75)	0.0193*	63 (73.3)	1.49 (0.71-3.10)	0.2887 ^{ns}	40 (46.5)	1.26 (0.64-2.52)	0.5034 ^{ns}	31 (36.1)	1.61 (0.76-3.41)	0.212 ^{ns}				
Television	72 (87.8)	4.4 (1.88-10.27)	0.0004****	64 (78.1)	2.51 (1.20-5.26)	0.0135**	42 (51.2)	2.00 (1.00-3.99)	0.0495*	33 (40.2)	2.58 (1.19 - 5.60)	0.0147**				
Newspaper	44 (93.6)	6.65 (1.90-23.17)	0.0006****	37 (78.7)	1.94 (0.86-4.40)	0.1093	27 (57.5)	2.23 (1.10-4.57)	0.0258*	23 (48.9)	3.09 (1.47-6.52)	0.0025**				
WhatsApp/Text Messages	61 (88.4)	3.89 (1.61-9.44)	0.0018**	58 (84.1)	4.09 (1.84-9.07)	0.0003****	40 (58.0)	3.07 (1.53-6.15)	0.0013****	30 (43.5)	2.87 (1.37-6.03)	0.0046**				
Internet/Social Media	75 (84.3)	2.92 (1.30-6.57)	0.0080**	72 (80.9)	4.07 (1.90-8.73)	0.0002****	50 (56.2)	4.17 (1.93-9.01)	0.0002****	37 (41.6)	3.82 (1.61-9.08)	0.0016**				
Religious Places of worship	51 (92.7)	6.26 (2.05-19.07)	0.004**	45 (81.8)	2.72 (1.20-6.13)	0.0141**	32 (58.2)	2.55 (1.27-5.12)	0.0078**	24 (43.6)	2.36 (1.14-4.88)	0.0192*				
Information Sources	Use of hand gloves				Travel restrictions				Avoid physical contact with others				Regularly clean high-contact surfaces with disinfectants			
Radio	30 (34.9)	3.08 (1.29-7.37)	0.0093**	39 (45.4)	1.80 (0.88-3.69)	0.103 ^{ns}	47 (54.7)	1.12 (0.56-2.21)	0.7465 ^{ns}	38 (44.1)	1.24 (0.62-2.49)	0.537 ^{ns}				
Television	29 (35.4)	2.98 (1.28-6.92)	0.0093**	39 (47.6)	2.19 (1.07-4.46)	0.0299*	53 (64.6)	2.99 (1.48-6.01)	0.0018**	39 (47.6)	1.72 (0.86-3.45)	0.1227 ^{ns}				
Newspaper	22 (46.8)	4.24 (1.93-9.30)	0.0002****	26 (55.3)	2.60 (1.26-5.35)	0.0085**	32 (68.1)	2.48 (1.19-5.18)	0.0144**	23 (48.9)	1.52 (0.75-3.08)	1.52 (0.75-3.08)				
WhatsApp/Text Messages	27 (39.1)	3.51 (1.57-7.84)	0.0017**	37 (53.6)	3.16 (1.56-6.42)	0.0012****	45 (65.2)	2.56 (1.29-5.08)	0.0065**	35 (50.7)	2.02 (1.02-3.98)	0.0426*				
Internet/Social Media	33 (37.1)	5.42 (1.96-15.01)	0.0005****	42 (47.2)	2.36 (1.12-4.96)	0.0218*	56 (62.9)	2.86 (1.40-5.83)	0.0034**	47 (52.8)	3.64 (1.69-7.85)	0.0007****				
Religious Places of worship	22 (40.0)	2.88 (1.34-6.18)	0.0059**	32 (58.2)	3.53 (1.73-7.22)	0.0004****	36 (65.5)	2.23 (1.11-4.50)	0.0233*	33 (60.0)	3.40 (1.67-6.92)	0.006**				

Abbreviation: OR (95% CI) - Odds Ratio (95% Confident Interval); Refer to odds of occurrence of preventative practice by information sources used by participants for obtaining COVID-19 related information. n (%); Represents a proportion of the study participants that implemented a given preventive practice by the means through which they obtained COVID-19 related information. Significance Level: *P<0.05, **P=0.01, ***P<0.001, ****P<0.0001, ns=Not significant P>0.05).

DISCUSSION

In an emerging pandemic like COVID-19, the importance of providing individuals with fast and reliable information as knowledge of the disease evolves cannot be overemphasized. As important as the message is, however, the medium of disseminating it plays a vital role in adopting preventive behavior. Our study identified internet/social media as the top-most source of information used by residents of Onitsha city to learn about COVID-19 and was significantly associated with the implementation of all the eight preventive measures. This finding is not surprising because the near-ubiquitous nature of mobile phones drives the accessibility of health information on social media/internet [32]. In addition, social media is the fastest means of spreading public health information [33], making it possible to access information globally with one click of a link or hashtag. However, despite the advantages, the use of the internet/social media presents a challenge because it is often wrought with misinformation, leading to increased panic and reduced compliance to preventive measures [24, 26, 34]. It is, therefore, important for public health officials to maximize the use of social media/internet to prevent peddlers of misinformation from reaching the public first. The city of Onitsha can do this by having a verified account across social media platforms like Facebook, Instagram, and Twitter and utilizing them for fast and broad-based dissemination of reliable COVID-19 related information to the residents of the city.

Our study noted that religious places of worship were significantly associated with implementing all recommended COVID-19 prevention practices. This assertion highlights the colossal impact religious leaders can play as partners in transmitting accurate scientific information about the coronavirus. This is not surprising as religion is an integral part of the everyday life of Nigerians who often revere and trust religious leaders, deeming them as God sent and looking up to them for guidance on different aspects of life, including health. Previous studies of other in-

fectious diseases in Nigeria and other parts of Africa have revealed the importance of incorporating religious leaders in disease prevention efforts in the community [35–39]. In addition, some studies in Nigeria and other parts of the world have recently highlighted the need for incorporating religious leaders in the fight against COVID-19 [40–45]. Similarly, the WHO's COVID-19 interim guidance underscored the importance of leaders of faith-based organizations as one of the most trusted and accessible sources of COVID-19 information, especially among vulnerable members of religious communities [46]. Considering the critical influence of religious leaders and information sources on the implementation of COVID-19 preventive practices, public health authorities must incorporate them in COVID-19 awareness campaigns. To maximize the role of religious leaders as allies in the COVID-19 containment effort in Onitsha, public health authorities will need to train them and involve them directly in COVID-19 awareness campaigns and dissemination of COVID-19 related information.

The COVID-19 information sources varied significantly among the residents of Onitsha city by age group and educational status. Other studies have highlighted the association between educational level and information source preference [47, 48]. People with a higher level of education often have a higher health literacy that is strongly associated with better preventive behavior and health outcomes [49–54]. It might be necessary to conduct further studies to specifically explore sources of COVID-19 information most accessible to people of lower educational status to reduce health disparities often associated with low health literacy [50, 52].

Of note is the fact that as of the time of the data collection, there was no case of COVID-19 in Onitsha city, and the use of face masks by the public was not yet recommended. Despite this, individuals were already using face masks and hand gloves well before the government official recommendation to use them. Two reasons might explain this

phenomenon. First, Onitsha is the commercial hub of the Southeast with strong ties to China due to trade-related activities [55]; hence individuals may have been independently adopting some prevention practices already being carried out in China at the time, such as mass use of face masks. Second, the use of face masks was significantly associated with the use of all information sources except radio, pointing towards the adoption of visual cues [56, 57], as images of the pandemic are often portrayed with individuals in face masks through sources such as internet/social media, TV, and newspapers.

Despite initial restrictive measures, such as the lockdown, school closures, restrictions on gathering and traveling, the cases of COVID-19 have continued to climb drastically in Onitsha and so many other cities nationwide [12]. This may be a consequence of low COVID-19 related information diffusion due to delays in initiating COVID-19 awareness campaigns using accessible and efficient channels of information [58, 59]. As of the time of writing this article, measures have been taken to improve access to reliable COVID-19 information nationwide. For instance, the Nigerian Center for Disease Control (NCDC) operates a COVID-19 WhatsApp group to share reliable information about the disease among Nigerians. However, the extent of adoption of that information source by the residents of Onitsha city remains to be seen. Studies to evaluate the effectiveness of this measure are needed to inform improvement efforts and adherence to COVID-19 guidelines and recommended practices.

Closing the communication gaps in the COVID-19 awareness campaign is crucial for curbing the spread of the virus, which depends mainly on the preventive practices of the public. This is because individuals cannot adopt necessary COVID-19 prevention practices if they do not access the correct information. Therefore, public health promotion incorporating the critical information sources identified in the current study and the associated preventive practices may be the most efficient and effective means for broad-based

dissemination of COVID-19 information to the masses in Onitsha city and elsewhere in Nigeria. In addition, as governments and communities in Nigeria struggle to figure out the best way to deal with the novel coronavirus, they need to assess the impact of containment efforts such as lockdown on access to COVID-19 related information especially among poor and vulnerable populations. In such circumstances, intervention measures such as providing food, medicines, and other essential needs could help balance the 'risk to lives' versus the 'risk to livelihoods', and thus, help prevent or curtail the spread of coronavirus in the community.

Limitations and strengths of the study

Our study has some limitations that warrant careful interpretations of the findings. First, the current study was conducted using pre-existing dataset collected by a different researcher who had a set of objectives, and therefore, it may not answer all our specific questions of interest. Also, issues related to the sampling technique, sample size, data collection strategies, and the inherent limitations of the data cannot be addressed in our study beyond the use of statistical adjustments where necessary. Second, the small sample size and the cross-sectional and the snapshot-in-time nature of the data used for the current study may have caused some potential bias resulting in the overestimation of the magnitude of associations between the independent and dependent factors studied. Finally, while the dataset used may not represent the entire residents of the Onitsha commercial city, our findings provide the general outlook and understanding of the sources of information in use and the level of implementation of the COVID-19 guidelines preventative practices by the Onitsha city residents.

Despite these limitations, our study has some far-reaching strengths. The data for this study was obtained in March 2020 before the government lockdown and before the first case of COVID-19 was reported in the city of Onitsha; hence, it can serve as a baseline for evaluating the efficiency and effectiveness

of the different channels used for COVID-19 awareness campaign post-lockdown. Unlike previous studies [17, 60], the data for our study was collected via in-person interview [29], hence the selection of participants was not limited by technology savviness. Furthermore, our study provided evidence that the information source for COVID-19 is as crucial as the message due to its strong association with the implementation of necessary preventive practices. Our study findings advocate for a need to utilize the most accessible and effective COVID-19 sources of information to educate the different demographics to ensure broader and more efficient adoption of preventive practices.

CONCLUSION

Findings from our study reveal that social media/internet was the topmost source of COVID-19 information among Onitsha residents, while the newspaper was the le-

ast used information source. We also noted significant variations in the choice of COVID-19 related information sources across different educational levels and age groups. Among residents of Onitsha city, the source of COVID-19 information was significantly associated with the implementation of COVID-19 preventive practices.

Improving access to reliable COVID-19 information must be treated as a public health priority to facilitate the mass adoption of preventive practices. Our findings provide needed evidence for public health authorities to design and disseminate targeted COVID-19 education and awareness campaigns among Onitsha residents using the most accessible, effective, and efficient media identified in this study. Further studies are needed to estimate the prevalence of COVID-19 related misconceptions and misinformation and the resulting impact on adopting preventive practices in Onitsha city in Anambra state.

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