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ORIGINAL ARTICLE | COVID-19 Misconceptions

COVID-19 Related Misconceptions and Prevention Practices Among Residents of a Populous Commercial City in Nigeria

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ABSTRACT

Introduction: The COVID-19 pandemic brought several misconceptions that could hinder individuals from taking necessary measures to prevent infection, thus, undermining the public health containment efforts. We aimed to assess the prevalence of COVID-19 related misconceptions and their associations with demographic characteristics and prevention practices in Onitsha city in Anambra state, Nigeria.

Methods: We analyzed data from a cross-sectional survey of 140 adult residents of Onitsha city in Anambra state, Nigeria, conducted in March 2020. Descriptive and inferential statistics were used to describe the study population and determine the associations between COVID-19 misconceptions, demographic characteristics, and implementation of COVID-19 prevention practices. Data management and statistical analyses were conducted using SAS JMP Statistical Discovery™ Software version 14.3 (SAS Institute, Cary, North Carolina, USA).

Results: The participants' average age was 34.5 (SD: ±10.9) years, and most were males (54.3%). Misconceptions about COVID-19 among the study population resulted in markedly reduced compliance with nearly all prevention practices. Some participants believed that COVID-19 would not spread in Nigeria (34.4%, $p < 0.0001$), was not fatal (10.8%, $p < 0.0001$), can be prevented and cured through spiritual means (48.2%, $P < 0.0001$), use of herbs (13.6%, $P < 0.0001$), use of antibiotics (11.4%, $p < 0.0001$) and that COVID-19 vaccine was available (25.4%, $p < 0.01$). Misconception about the possibility of COVID-19 spread was significantly associated with non-compliance to all prevention practices ($P < 0.05$) except travel restrictions.

Conclusions and Implications for Translation: Our study suggests the need for the government to tailor interventions targeting the common misconceptions in Onitsha in order to improve the public's trust and compliance with recommended COVID-19 prevention practices. Misconception has become a significant public health challenge, primarily as its prioritization over scientific evidence and guidelines directly affects the pandemic preparedness and control efforts and may cause more people to be at risk of contracting COVID-19.

Keywords: • COVID-19 • SARS-CoV-2 • Coronavirus • Misconception • Prevention Practices • Onitsha • Southeast Nigeria • Nigeria.

I. Introduction

On 31st December 2019, the novel Coronavirus Disease 2019 (COVID-19) was first reported as a pneumonia-like disease in Wuhan, China. As at February 2021, COVID-19 has spread to 235 countries and territories, infecting nearly 43 million people worldwide and causing over 1.2 million deaths.¹ In Africa, about 2 million persons have been infected with the disease, resulting in over 46,000 deaths.² Since COVID-19 was first reported in Nigeria on February 27th, 2020, the disease has spread to 36 states and the Federal Capital Territory (FCT).³ The spread of coronavirus is often exacerbated by factors such as high population density and increased interaction among individuals.^{4,5} According to Demographia World Urban Areas, Onitsha metropolitan city in Anambra state has an estimated population of nearly 6.3 million residents and a density of 3,227 per square kilometer, making it the second most populous city in Nigeria, after Lagos.⁶ In addition to being densely populated, Onitsha in southeast region and Lagos in southwest region, are the commercial hubs of their respective regions, resulting in high interactions among residents.^{6,7} While Lagos state accounted for 35% of the total number of confirmed cases of COVID-19 in Nigeria with 57,448 cases and 428 deaths, Anambra state reported 1,909 cases and 19 deaths as of March 2021.³ Although there is a relatively lower number of COVID-19 cases in Anambra state, the city of Onitsha faces the risk of a major outbreak due to its high population density and immense commercial activities often leading to increased interactions among individuals, unavoidable proximity due to the markets settings and influx of buyers and sellers from different cities within and outside Nigeria – these factors may catalyze the spread of COVID-19.^{4,5}

To contain the spread of the disease, the Nigerian Centre for Disease Control (NCDC) recommended prevention practices such as social distancing, regular handwashing with soap and water, regularly cleaning and disinfecting frequently used surfaces, travel restrictions, and wearing a face mask in public.³ However, misconceptions about COVID-19 poses a hindrance to the containment effort as it lowers individuals' disease risk perception and leads

to low adherence to the recommended prevention practices.⁸ Low compliance with preventive measures undermines public health containment efforts, exposing individuals, especially the vulnerable, to an increased threat of the disease. Furthermore, during a pandemic, misconceptions about a disease often give rise to panic⁹ and increased stigma^{10,11} which undermines public health efforts to mitigate the disease spread and worsen health inequalities and outcomes.¹²

An online administered survey conducted several weeks after the NCDC's COVID-19 public health advisory identified several misconceptions regarding the cause, transmission, and prevention of COVID-19 among individuals in Nigeria.¹³ The misconceptions identified include that COVID-19 was a Chinese designed biological weapon, a result of sinning against God, and can be prevented by the African hot weather and drinking herb products.¹³ Another study in northern Nigeria reported some misconceptions, including that COVID-19 was false, a western invention and does not affect black persons.¹⁴ Neither of these studies examined the implication of these misconceptions on the implementation of prevention practices among individuals. Furthermore, the sample size of participants from the Igbo ethnic group is grossly under-represented (8.47%) in one of the above studies,¹³ while the other study was conducted in northern cities.¹⁴ As a result, the findings from the above studies may not be easily generalizable to the city of Onitsha, a predominantly Igbo-Judeo-Christian southeastern city. This is because Nigeria is a multi-ethnic nation with strong ethno-religious identities which vary across the different geopolitical regions and impacts health behavior and outcomes.^{15,16} Previous studies of other diseases and health behavior have strongly recommended region-specific studies and interventions.^{17,18} To the best of our knowledge, no prior study has examined COVID-19 misconceptions and their impact on knowledge and prevention practices in any southeastern Nigerian city. Therefore, we aimed to assess the association between COVID-19 related misconceptions and prevention practices among residents of Onitsha city in Anambra State. Specifically, our study aims were to: (1) determine the prevalence of COVID-19 related

misconceptions present in Onitsha; (2) examine the association between demographic characteristics and misconceptions; and (3) assess the impact of misconceptions on the self-reported implementation of COVID-19 prevention practices.

2. Methods

We conducted a secondary analysis of a cross-sectional data obtained from a Knowledge, Attitude and Practices (KAP) survey in Onitsha, Anambra state, Nigeria from March 25th to March 27th 2020, just before the government mandated lockdown on March 29, 2020.¹⁹ Convenience sampling method was used to recruit 140 study participants from different locations in the city of Onitsha, including the commercial markets and housing units.¹⁹ The survey was conducted through face-to-face interviews of consenting adults aged 18 years and above living or working in Onitsha. The details of the survey instrument used, and data collection process have been described in detail elsewhere.¹⁹ Briefly, the survey contained questions on demographic information, COVID-19 knowledge, attitude, practice, misconceptions, information gaps and needs.

2.1. Analytical Measures

The analytical measures used were classified into three groups: (1) demographics, (2) misconceptions, and (3) COVID-19 prevention practices. The demographic variables include sex (female, male), age according to age groups (18-24, 25-34, 35-44, 45-54 and 55+ years), educational level (primary education or less, secondary education, diploma/associate degree, and bachelors/postgraduate degree), occupation (civil servant, trader/business owner/self-employed, health care worker, student and other), and number of individual living in household (1, 2-4, 5-7 and >8). The COVID-19 misconceptions assessed were the participants' beliefs regarding the following: imminent spread of COVID-19 in Nigeria, possibility of death from COVID-19, COVID-19 prevention, and cure with use of local herbs, prevention and cure through spiritual means, availability of a COVID-19 vaccine. Participants were required to indicate a "Yes", "No" or "Don't Know" response to each of the COVID-19 related misconceptions. Those who

answered "No" to questions on whether it was possible to die from COVID-19, or if COVID-19 could spread in Nigeria, were considered to hold misconceptions on those measures. Those who answered "Yes" to questions on whether COVID-19 could be prevented or cured with the use of herbs or spiritual means, and if COVID-19 vaccines were already available (as of March 2020) were considered to hold misconceptions. Prevention practices were based on the national guidelines for COVID-19 prevention as recommended by the NCDC.³ They include regular hand washing with soap and water, use of hand sanitizers, avoidance of touching of face, use of face mask, use of hand gloves, travel restrictions (i.e., cancelled travel plans to countries that have coronavirus spread), avoidance of physical contact with others (social distancing) and regularly cleaning high contact surface with disinfectants. Participants were asked to indicate with a 'yes' or 'no' for each of the COVID-19 prevention practice that they were currently implementing.

2.2. Data Analysis

Descriptive [frequency and percentages (categorical variables), means and standard deviation (numerical variables) and Inferential statistics (univariate and bivariate analyses)] were used to analyze the data. Descriptive statistics were used to outline the demographic characteristics of the study sample. Univariable analyses of the prevalence of various misconceptions among participants were carried out using the Chi-square tests. We used the misconceptions that were determined to be statistically significant ($p \leq 0.05$) in subsequent bivariate analyses. Using the misconceptions as dependent variables, we performed bivariate Chi-square tests to determine the independent associations between selected demographic characteristics (gender, age group and educational status) and the misconceptions. Furthermore, using the misconceptions as independent variables and the prevention practices as outcome variables, we assessed their associations in a 2-way contingency table using Chi-Square tests. We calculated and reported the odds ratios (OR) along with the 95% confidence intervals (CI) of the participants' adoption of a given COVID-19 prevention practice

based on each misconception. Participants who did not hold misconceptions (i.e., those who held the correct belief) served as the reference group. All statistical tests performed were 2-tailed, with a probability value of 0.05 used as the threshold for statistical significance. Data management and statistical analyses were conducted using SAS JMP Statistical Discovery™ Software version 14.3 (SAS Institute, Cary, North Carolina, USA).

2.3. Human Subject Protection

All relevant ethical guidelines including Institutional Review Board approval process were followed in the conduct of the primary data collection.¹⁹ The permission to use the data from the primary survey for the current study was granted by the principal investigator. This study protocol was reviewed and approved [IRB#: 00002368] by the Institutional Review Board of the University of Houston, Houston, Texas, USA.

3. Results

3.1. Sociodemographic Characteristics

Table 1 shows the demographic characteristics of the study sample. The mean age of participants was 34.6 (Standard Deviation (SD): ± 11.1) years. Greater than half of the respondents were males (54.3%, $n=76$) and 38.2% ($n=52$) held a bachelor's degree or higher. The majority were traders/business owners/self-employed (44.3%, $n=62$) and lived in households of 5-7 persons (47.5%, $n=66$).

3.2. Prevalence of COVID-19 Related Misconceptions

Table 2 shows the misconceptions held by study participants. The most widely held misconceptions were that spiritual healing is a prevention or cure for COVID-19 (48.2 %, $p<0.0001$), COVID-19 could not spread in Nigeria (34.4%, $p<0.0001$), and that COVID-19 vaccine was available (25.4%, $p<0.01$). The misconception that it was not possible to die from COVID-19 (10.8%, $p<0.0001$) was not held by many participants in our study. However, a sizable number indicated not knowing the correct response, ranging from 5.0% (Risk of death from COVID-19) to 30.7% (Use of antibiotics to treat COVID-19) (Table 2).

Table 1: Demographic characteristics of study sample

Characteristic	Number	Percentage (%) ^a
Sex		
Male	76	54.29
Female	64	45.71
Age Group (years)		
18-24	21	15.00
25-34	56	40.00
35-44	40	28.57
45-54	13	9.29
>55	10	7.14
Mean \pm SD (years)		34.6 \pm 11.1
Educational Status		
Primary education or less	14	10.29
Secondary Education	49	36.03
Diploma/Associate degree	21	15.44
Bachelor's degree/ Postgraduate degree	52	38.24
Occupation		
Civil servant	26	18.56
Trader/Business Owner/ Self-Employed	62	44.29
Student/Trainee	22	15.71
Healthcare Worker	16	11.43
Other	14	10.00
Number Living in Household [Person(s)]		
1	6	4.32
2-4	38	27.34
5-7	66	47.48
>8	29	20.86

^aWithin a given characteristic, the percentages may not add up to exactly 100 due to rounding.

3.3. Association Between Demographic Characteristics and Misconceptions

There were no statistically significant associations observed between the demographic characteristics of the study participants and COVID-19 misconceptions (Table 3).

3.4. Association Between Misconceptions and Self-Reported Implementation of COVID-19 Prevention Practices

Table 4 presents the association between misconceptions and self-reported implementation of

Table 2: Common COVID-19 misconceptions among residents of Onitsha in Anambra State, Nigeria, March 2020

Misconception ^a	Response			Test Statistics	
	Yes n (%)	No n (%)	Don't Know n (%)	χ^2	P-Value
Imminent spread of COVID-19 in Nigeria	72 (51.4)	48 (34.4)	20 (14.3)	31.26	<0.0001****
Risk of death from COVID-19	117 (84.2)	15 (10.8)	7 (5.0)	162.36	<0.0001****
Prevention and cure with use of local herbs	19 (13.6)	88 (62.9)	33 (23.6)	57.01	<0.0001****
Prevention and cure through spiritual means	67 (48.2)	47 (33.8)	25 (18.0)	19.05	<0.0001****
Availability of Vaccine for COVID-19	35 (25.4)	63 (45.7)	40 (29.0)	9.70	0.0078**
Use of Antibiotics to treat COVID-19	16 (11.4)	81 (57.9)	43 (30.7)	45.70	<0.0001****

^aNot mutually exclusive or independent; Significance Level: **= $p < 0.01$, ****= $p < 0.0001$.

COVID-19 prevention practices. The misconception that COVID-19 could not spread in Nigeria was significantly associated with non-compliance with all prevention practices except travel restrictions ($p < 0.05$). Participants who held the misconception that COVID-19 could not spread in Nigeria were 75% (OR: 0.25, 95% CI: 0.10–0.60; $p < 0.001$) less likely to wash their hands regularly with soap and water, 76% (OR=0.24, 95% CI: 0.10–50.8, $p < 0.001$) less likely to wear a face mask, and 64% (OR=0.36, 95% CI: 0.17–0.77, $p < 0.01$) less likely to socially distance from others compared to those who do not have those misconceptions.

The misconception that it was not possible to die from COVID-19 was significantly associated with non-implementation of 4 out of the 8 identified prevention practices ($p < 0.05$). Those who believed it was not possible to die from COVID-19 were 74%–90% less likely to avoid touching their face with unwashed hands (OR=0.26 95% CI: 0.07–0.98,

$p < 0.05$), wash hands regularly with soap and water (OR=0.25, 95% CI: 0.082–0.77, $p < 0.01$), use hand sanitizers (OR=0.15, 95% CI: 0.05–0.48, $p < 0.001$) and socially distance (OR = 0.10, 95% CI: 0.02–0.45, $p < 0.001$), compared to other participants who did not hold these misconceptions.

Significant associations were observed between not using hand sanitizers and holding the misconceptions that there is vaccine available for COVID-19 (OR = 4.67, 95% CI: 1.90–11.42, $p < 0.001$) and that herbs can prevent or cure COVID-19 (OR=3.47, 95% CI: 1.25–9.63, $p < 0.01$). Those who believed that COVID-19 can be prevented and cured through spiritual means were 67% less likely (OR=0.33, 95% CI: 0.13–0.86, $p < 0.05$) to use hand gloves compared to their counterparts who did not share the same belief.

4. Discussion

Misconceptions are harmful because they often lead to reduced compliance with prevention practices,^{13,20} therefore, interventions to dispel misconceptions are public health necessities and should be an integral part of any public health crises management plan. Our study findings revealed that the general misconceptions about COVID-19 among residents of Onitsha city during the early phase of the COVID-19 outbreak were that it could not spread in Nigeria, it was not fatal, a vaccine was available for it and that it can be prevented or cured through spiritual means, the use of herbs, and the use of antibiotics. The most prevalent misconception was that COVID-19 can be cured or prevented through spiritual healing. This does not come as a surprise because Onitsha residents, like most Igbos, are generally very religious people with deeply engrained belief in the power of spiritual healing for any disease.²¹ This belief has been noted in other studies of infectious diseases in southeastern Nigeria.²²⁻²⁴ While some may argue in favor of spiritual healing for diseases, there is no documented evidence for the efficacy of spiritual healing in preventing or curing a viral pandemic such as COVID-19. As of the time the data for this research was collected in March 2020, there was no cure nor vaccine for COVID-19 and strict

Table 3: Associations of COVID-19 misconceptions by demographic characteristics among residents of Onitsha City in Anambra State, Nigeria

Characteristic	COVID-19 Misconception ^a					
	Imminent spread of COVID-19 in Nigeria (n=48)	Risk of Death from COVID-19 (n=15)	Prevention and cure with use of local herbs (n=19)	Prevention and cure through Spiritual means (n=67)	Availability of Vaccine for COVID-19 (n=35)	Use of Antibiotics to treat COVID-19 (n=16)
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%) ^b
Gender						
Male	24 (50.0)	6 (40.0)	13 (68.4)	35 (52.2)	19 (54.3)	9 (56.3)
Female	24 (50.0)	9 (60.0)	6 (31.6)	32 (47.8)	16 (45.7)	7 (43.8)
Test Statistics: X ² (P-value)	1.841 (0.1748)	1.772 (0.1831)	2.679 (0.1017)	0.105 (0.7455)	0.613 (0.4335)	0.002 (0.9682)
Age group (years)						
<25	9 (18.8)	2 (13.3)	2 (10.5)	12 (17.9)	5 (14.3)	2 (12.5)
25-34	16 (33.3)	5 (33.3)	5 (26.3)	26 (38.8)	10 (28.6)	7 (43.8)
35-45	11 (22.9)	6 (40.0)	9 (47.4)	20 (29.9)	13 (37.1)	6 (37.5)
45-55	8 (16.7)	2 (13.3)	1 (5.3)	5 (4.4)	3 (8.6)	1 (6.3)
>55	4 (8.3)	----	2 (10.5)	4 (6.0)	4 (11.4)	----
Test Statistics: X ² (P-value)	5.886 (0.2078)	2.246 (0.6906)	3.925 (0.4162)	1.671 (0.7959)	4.919 (0.2957)	2.706 (0.6082)
Educational Level						
Primary	6 (13.0)	2 (14.3)	2 (11.1)	6 (9.4)	5 (14.7)	1 (6.3)
Secondary	19 (41.3)	4 (28.6)	7 (38.9)	21 (32.8)	16 (47.1)	6 (37.5)
Diploma/ Associate Degree	9 (19.6)	4 (28.6)	3 (16.7)	12 (18.6)	6 (17.7)	3 (18.8)
Bachelor/ Post Graduate Degree	12 (26.1)	4 (28.6)	6 (33.3)	25 (39.1)	7 (20.6)	6 (37.5)
Test Statistics: X ² (P-value)	5.589 (0.1334)	3.892 (0.2734)	0.292 (0.9622)	0.657 (0.8833)	3.366 (0.3386)	1.976 (0.5774)

^aBased on proportion of participants who had misconceptions about COVID-19 in Onitsha as of March 2020. ^bWithin a given characteristic, the percentages may not add up to exactly 100 due to rounding.

adherence to recommended prevention practices was the only effective way of preventing the spread of the disease.

About 10.8% of the participants surveyed believed that it was not possible to die from COVID-19. In contrast, Olapegba et al., reported a 3% prevalence of the same misconception in 180 Nigerian cities.¹³ The lower prevalence of the misconception noted in the study¹³ compared to ours may be attributed to the fact that their study was conducted during the lockdown, while the data for our study was collected before the lockdown.

Therefore, it is understandable that people were becoming increasingly aware and informed about COVID-19 with every passing day following the mandated lockdown. A similar misconception was reported among 6.9% of residents in northern Nigeria who believed that black people cannot die of COVID-19.¹⁴ However, since COVID-19 was first reported in Nigeria in February 2020, 19 persons have died in Anambra state, 1,125 persons have died in the country³ and over 1,000,000 persons have died globally.¹ The continued burden of the pandemic in the city may lead to altering of people's

Table 4: COVID-19 Misconceptions and self-reported implementation of prevention practices by residents of Onitsha city in Anambra State, Nigeria

Misconception	Prevention Practice											
	Regular washing of hands with soap and water			Use of Hand sanitizers			Avoid touching face			Wear face mask ^b		
	n (%) ^a	OR (95% CI)	P-value	n (%) ^e	OR (95% CI)	P-value	n (%) ^e	OR (95% CI)	P-value	n (%) ^e	OR (95% CI)	P-value
Imminent spread of COVID-19 in Nigeria	19 (15.8)	0.25 (0.10-0.60)	0.0013**	20 (16.7)	0.40 (0.18 - 0.89)	0.0228*	31 (25.8)	4.60 (0.22 - 0.98)	0.0437*	40 (33.3)	0.24 (0.10-0.58)	0.0010***
Risk of death from COVID-19	7 (5.3)	0.25 (0.082-0.77)	0.0104*	10 (7.58)	0.15 (0.05-0.48)	0.0004***	12 (9.1)	0.26 (0.07-0.98)	0.0355*	10 (7.6)	1.04 (0.33 - 3.25)	0.9470
Prevention and cure with use of local herbs	5 (4.7)	1.00 (0.33 - 3.11)	0.9871	11 (10.3)	3.47 (1.25 - 9.63)	0.0136*	14 (13.0)	1.94 (0.64 - 5.86)	0.2354	13 (12.2)	0.72 (0.25 - 2.13)	0.5541
Prevention and cure through spiritual means	17 (14.9)	1.10 (0.47-2.66)	0.8100	22 (19.3)	1.28 (0.56 - 2.70)	0.5553	35 (30.7)	0.74 (0.35 - 1.58)	0.4381	44 (38.6)	0.66 (0.29 - 1.50)	0.3162
Availability of Vaccine for COVID-19	7 (7.1)	0.58 (0.22 - 1.55)	0.2751	20 (20.4)	4.67 (1.90-11.42)	0.0005***	23 (23.5)	1.18 (0.50 - 2.80)	0.7078	28 (28.6)	1.36 (0.50 - 3.72)	0.5458
Use of Antibiotics to treat COVID-19	5 (5.2)	1.39 (0.43 - 4.47)	0.5836	5 (5.2)	0.96 (0.30 - 3.05)	0.9470	20 (10.31)	1.09 (0.36-3.23)	0.8806	13 (13.4)	1.72 (0.45 - 6.60)	0.4261

Misconception	Prevention Practice											
	Use of hand gloves ^a			Travel restrictions			Avoid physical contact with others			Regularly clean high-contact surfaces with disinfectants		
	n (%) ^b	OR (95% CI)	P-value	n (%) ^b	OR (95% CI)	P-value	n (%) ^b	OR (95% CI)	P-value	n (%) ^b	OR (95% CI)	P-value
Imminent spread of COVID-19 in Nigeria	41 (34.2)	0.30 (0.12 - 0.77)	0.0097**	33 (27.5)	0.51 (0.24 - 1.09)	0.081	30 (25.0)	0.36 (0.17 - 0.77)	0.0072**	35 (29.2)	0.35 (0.16 - 0.77)	0.0082**
Risk of death from COVID-19	12 (9.1)	0.64 (0.17 - 2.40)	0.5017	11 (8.3)	0.49 (0.15 - 1.62)	0.2334	13 (9.9)	0.10 (0.02 - 0.45)	0.0004***	11 (8.33)	0.42 (0.13 - 1.41)	0.1522
Prevention and cure with use of local herbs	13 (12.2)	0.48 (0.16 - 1.46)	0.1901	16 (15.0)	3.2 (0.87 - 11.82)	0.0693	13 (12.2)	2.60 (0.91 - 7.46)	0.0694	14 (13.1)	2.03 (0.67 - 6.14)	0.2029
Prevention and cure through spiritual means	44 (38.6)	0.33 (0.13 - 0.86)	0.0204*	42 (36.8)	0.87 (0.40 - 1.89)	0.7202	38 (33.3)	2.11 (0.99 - 4.52)	0.0528*	39 (34.2)	0.86 (0.40 - 1.85)	0.7082
Availability of Vaccine for COVID-19	30 (30.6)	1.71 (0.56 - 5.24)	0.3410	26 (26.5)	1.16 (0.45 - 2.94)	0.7616	17 (17.4)	0.91 (0.40 - 2.09)	0.8330	19 (19.4)	0.55 (0.24 - 1.29)	0.1693
Use of Antibiotics to treat COVID-19	13 (13.4)	1.33 (0.34 - 4.16)	0.6812	13 (13.4)	2.83 (0.75 - 10.72)	0.1141	6 (6.2)	0.62 (0.20 - 1.85)	0.3844	9 (9.28)	0.84 (0.28 - 2.48)	0.7517

^aRepresents only the number and proportions (%) of participants with misconceptions about COVID-19 who are not implementing selected recommended prevention practices
^bPrevention practices not yet recommended during the data collection period (in March 2020) but was recommended weeks after.
 Significance Level: *= $p < 0.05$, **= $p < 0.01$, ***= $p < 0.001$, ****= $p < 0.0001$.

perception about the disease and may impact their attitude and prevention practices. Therefore, it is necessary to carry out studies to determine if people's misconceptions have evolved, to inform more targeted education and awareness campaigns.

We noted strong associations between key misconceptions and non-implementation of all prevention practices except for travel restrictions as reported by participants. The belief that COVID-19 could not spread in Nigeria threatens compliance with the recommended prevention practices such as washing hands regularly with soap and water, wearing face mask in public, social distancing, use of hand sanitizers, avoidance of face touching, and regularly cleaning frequently used surfaces. This finding is consistent with other studies which have shown that misconceptions regarding the risk of infectious diseases reduce compliance with recommended prevention practices.^{13,14,20} This misconception may have been influenced by the myth that the SARS-COV-2 virus cannot survive in hot temperature zones.²⁵ Currently, COVID-19 has spread to all the 36 states in Nigeria including Anambra state and the FCT,³ hence, it is likely that most persons will no longer be in denial about the risk of disease spread in the country.

The belief that it was not possible to die from COVID-19 was significantly associated with not washing hands regularly with soap and water, lack of social distancing, non-use of hand sanitizers and non-avoidance of face touching with unwashed hands. As of March 2021, 2,036 persons in Nigeria have died of COVID-19³ including prominent political figures, hence it is likely that this belief is less prevalent now. However, studies to estimate current prevalence of this misconception and its effect on practicing the recommended prevention practices are necessary to inform ongoing COVID-19 awareness campaigns.

The misconception that COVID-19 can be prevented and cured using herbs was associated with non-use of hand sanitizers. The literature and guideline recommendations on the use of complementary and alternative medicine (CAM) in the treatment of COVID-19 is scarce and conflicting.²⁶ Currently, there is no scientific evidence on the use of CAM for the prevention or treatment of COVID-19 in Africa.

Often, individuals in Africa who resort to CAM use, do so because it is more affordable and easily accessible compared to seeking health care at the hospital.²⁷ Although three African countries (Madagascar, Togo, and Burkina Faso) have implemented the initiative to use CAM in the treatment of COVID 19,²⁸ public health officials in Nigeria have not recommended its use. While China recommends CAM use in the treatment of COVID-19,²⁶ the United States Food and Drug Administration (FDA) and the National Center for Complementary and Integrative Health (NCCIH) have strongly warned against it, stating that there is no scientific evidence to justify CAM use for COVID-19 cure or prevention.^{29,30} China is the only country outside of Africa whose health authorities have recommended the use of CAM in the treatment of COVID-19, and the recommendation is based solely on experts' consensus.^{26,31} Although most of the literature on CAM use for COVID-19 are case reports, clinical trials are ongoing in China to support the decision on the use of Traditional Chinese Medicine (TCM) in addition to conventional medicine in treating COVID-19.²⁶ Since there is no evidence about the use of herbs in the prevention and treatment of COVID-19 and it is not recommended by public health experts in Nigeria, awareness campaigns must incorporate this information to prevent individuals from falling victim to peddlers of fake herbal remedies for COVID-19.

The misconception that COVID-19 vaccine was available in the early phase of the outbreak had a negative impact on the use of hand sanitizers. Although COVID-19 vaccine is currently available, as at the time of the data collection in March 2020, there was no cure nor vaccine for COVID-19. In addition, most experts strongly recommend continued compliance with COVID-19 prevention measures despite the availability of COVID-19 vaccine. Therefore, the presence and impact of the misconception on prevention practices is a public health challenge. Although several COVID-19 vaccines are currently available, the available doses are limited and costly.³² Cost related issues pose a challenge in the availability of sufficient quantity of COVID-19 vaccine for the population, especially in low-income countries.³² Furthermore, like many other

African countries, factors such as misconceptions, public distrust in the health care system and lack of convenience in accessing the vaccine are among additional barriers that might hinder COVID-19 vaccine uptake in cities in Nigeria even if it were made sufficiently available.³³ Studies to assess the willingness of Onitsha residents to obtain vaccination against COVID-19 is important to inform health care policies in Onitsha. As of early March 2021, Nigeria received about 3.94 million COVID-19 vaccines from the Vaccines Global Access Facility-COVAX, and is expecting 41 million more doses from the African Union.³⁴ There is a need for culturally sensitive research that takes the diversity of Nigerian cultures and geographical variation into consideration. To that end, we recommend that tailored research studies be conducted to investigate emerging misconceptions that could impact COVID-19 vaccine uptake in the city of Onitsha. It is important to note that as at the time of the data collection in the early phase of the pandemic, there was no case of COVID-19 in Onitsha and the use of face mask by the public was not yet recommended by public health officials. Regardless, residents of Onitsha were already using face masks weeks before the recommendation to use it. This is not surprising because of the commercial relationship between Onitsha and China³⁵ which may have facilitated the use of face masks, a prevalent COVID-19 prevention practice in China at the time.³⁶

Given the prevalence of misconceptions in Onitsha and its resulting negative impact on implementation of prevention practices as demonstrated by our study, it is important for public health officials to constantly identify emerging misconceptions and specifically address them in ongoing COVID-19 awareness campaigns. Although the NCDC has videos on its website addressing some misconceptions such as the use of antibiotics for prevention and cure of COVID-19, a dedicated myth buster page identifying and tackling misconceptions as they emerge may be necessary to improve the efficiency of COVID-19 campaign and facilitate mass adoption of prevention practices.

4.1. Study Limitations and Strengths

Our study findings should be interpreted cautiously, owing to some limitations. First, this is a secondary

analysis of a pre-existing cross-sectional survey data collected with a different research aim, hence, affecting the level of exhaustiveness of our assessment due to the absence of some variables that would have helped to enhance our further understanding of the subject matter. Second, being a cross-sectional study, it represents only a snapshot in time which cannot sufficiently address some inherent study biases, hence, the possibility of overestimation of the strength of measures may exist. In addition, the non-random sampling method used, and the small sample size of participants enrolled in the survey limits the generalizability of our study findings.

However, the strengths of our study outweigh its limitations. First, due to the paucity of COVID-19 related research specific to Onitsha city, our study is the first to document the existence of important misconceptions that may hinder compliance with prevention practices among residents of the city. Second, because the data for our study was collected before the first case of COVID-19 in Onitsha, our findings provide baseline data for assessing the efficiency of COVID-19 awareness campaign in reducing the prevalence of related misconceptions in the city. Third, data used for this study was collected face-to-face, thereby reaching individuals with no or limited internet access who might otherwise have been missed in an online survey. The evidence provided in our study supports the need to prioritize the designing of a tailored intervention targeting people who have COVID-19 misconceptions to improve public health outcomes. This is especially important for a teeming city like Onitsha, and a raging novel pandemic like COVID-19 with emerging new variants whose containment relies on implementation of the recommended prevention practices.

5. Conclusions and Implications for Translation

Our study identified the most prevalent misconception as the notion that spiritual healing is a prevention or cure for COVID-19. Misconceptions about COVID-19 among the study sample resulted in markedly reduced compliance with nearly all prevention practices. Our study highlights the need for tailored interventions targeting the common misconceptions

in Onitsha to improve the public compliance with recommended prevention practices. Further studies are needed to examine the current COVID-19 related misconceptions and their impact on COVID-19 vaccine uptake among the residents of Onitsha City.

Compliance with Ethical Standards

Conflict of Interests: The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Key Messages

- ▶ During the early stage of the COVID-19 pandemic, some residents of Onitsha city did not believe that COVID-19 could spread in Nigeria, nor that it could be fatal.
- ▶ Nearly half of the participants believed that COVID-19 could be prevented and cured through spiritual means.
- ▶ The misconceptions about COVID-19 among the study population resulted in markedly reduced compliance with nearly all prevention practices.

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