KNOWLEDGE, INFORMATION SOURCES AND ATTITUDES TOWARD THE COVID-19 PANDEMIC AMONG AFRICAN IMMIGRANTS IN THE UNITED STATES

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Abstract: In the United States of America, there is disproportionality in the COVID-19 related morbidity and mortality with Black people and other minority groups being the most affected. This study explored the COVID-19 related knowledge, information sources, attitudes, and precautionary behaviors among a convenient sample of African immigrants, a subgroup of the Black population. Data from 226 respondents who completed an online survey were analyzed. Most respondents were female (69.9%) and had a bachelor's degrees or higher education or training (74.8%). A higher number of respondents reported utilizing online avenues (social media and websites), government communication, and television as vital sources of pandemic related information compared to traditional media (radio and newspapers). Respondents demonstrated a satisfactory level of knowledge, with no respondent scoring below five (5) on the nine knowledge questions. Most respondents (88.5%) expressed some degree of worry regarding the COVID-19 pandemic, and all respondents except two had taken at least one precautionary practice since the pandemic. The least practiced precautionary behaviors among respondents included wearing a face mask in public. Only 37.2% of respondents were certain that they would accept a COVID-19 vaccine if it became available. The rest indicated they were either unsure or would refuse such a vaccine. Findings revealed that while knowledge among respondents was relatively high and accurate, there is a prevailing need for public health education focused on dispelling myths, teaching, and reinforcing risk reduction behaviors.

Keywords: *COVID-19, Information Sources, Knowledge, African Immigrants, Vaccine*

1.1 Introduction

Coronavirus disease 2019 (COVID-19) is a highly infectious respiratory disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). An outbreak of this disease was first detected in Wuhan, China, in December 2019. Its major symptoms include fever, cough, and shortness of breath, with some patients developing pneumonia in both lungs, multi-organ failure, and death during the severe stage of the disease (Chen, et al., 2020). Since its detection, COVID-19 has spread rapidly and was declared a pandemic by the World Health Organization (WHO) in 2020. As of August 4th, 2021, the WHO reported over 35 million confirmed cases of COVID-19 and 609,022 deaths in the United States alone (WHO, 2021). Further, native, and foreign-born racial and ethnic minorities disproportionately make up the "essential" and frontline workers in the healthcare sector, increasingly their vulnerability to contracting and dying from COVID-19 (Obinna, 2021).

COVID-19 as an emerging infectious disease that has been characterized by a great deal of uncertainty. At the time of its detection and rapid spread, there was little known about its causes, risk factors for transmission, its pathophysiology, and treatment mode or prevention. Some progress has been made in the past year to address many of these areas, however, myths, misinformation, and gaps in knowledge regarding disease persist among some sub-sets of the population. Scientific knowledge about the COVID-19 virus, the disease progression and the new vaccines that have now become available is still evolving. Subsequently, contradictory information has spread in the media, causing public health sources to update their recommended COVID-19 management protocols frequently. The general populace, especially the most marginalized and vulnerable need to stay abreast of the constantly evolving knowledge and recommended risk reduction practices and behaviors. Any misinformation, myths, misunderstandings, and lack of awareness can result in non-compliance with the recommended guidelines and potentially complicate attempts to control the spread of the virus or the pandemic's effective management, as evident from previous infectious disease outbreaks (Hung, 2003). It has become essential for public health practitioners to periodically gather information about the levels of COVID-19 related knowledge among the general population to help identify existing knowledge gaps. The findings of such assessments may provide useful information that can serve as the foundation for the development of targeted and appropriate campaign and intervention efforts.

At the onset of the pandemic, studies among the general public in the US and the United Kingdom (UK) revealed that respondents in both countries generally had good knowledge of the mode of transmission and symptoms of COVID-19, with 79.8% of those in the US and 84.6% in the UK correctly identifying cough, fever, and shortness of breath as symptoms of the disease (Geldsetzer, 2020). These findings notwithstanding, the survey also highlighted some misconceptions about COVID-19. For instance, 43.5% (US) and 36% (UK) of respondents had some misconceptions regarding ways of preventing the disease, and 25.5% (US) and 18.7% (UK) of respondents reported that at least one of the following – "nosebleeds, rash, constipation and frequent urination" - as a primary symptom of COVID-19 (Geldsetzer, 2020).

Another study examining the awareness, attitudes, and practices related to COVID-19 among higher-risk older adults in the US found that while COVID-19 knowledge was generally high, respondents who identified as Black and those who were unemployed showed more inadequate knowledge than the general population (Wolf, et al., 2020). Black respondents were also more

likely to report that they were "not worried at all" and were significantly more likely to report that it was "not at all likely" for them to contract COVID-19. Regarding practicing risk reduction behaviors, men, black respondents, those living below the poverty level, and those who were unemployed or retired reported that they were less likely to make behavioral changes due to the coronavirus outbreak (Wolf, et al., 2020).

1.2 Rationale and Study Objective

In the US, in addition to being elderly and having a pre-existing health problem, there seems to be another factor - race - associated with COVID-19 infection and the severity of its outcome. Black people and individuals of other minority backgrounds are severely affected due to a myriad of preexisting conditions and factors associated with historic "systemic health and social inequalities" (Centers for Disease Control and Prevention [CDC], 2020). This disproportionality in COVID-19 related morbidity and mortality makes research focusing on ethnic minorities a priority. Unfortunately, there is a paucity of such studies, including those focused on understanding the COVID-19 related knowledge gaps, attitudes, and overall pandemic experience among the Black population. Additionally, The Black population in the US is diverse, with possible within-group differences that often go unnoticed and unreported. Indeed, literature indicates that an examination of the heterogeneity among the different groups that make up the American Blacks can offer insight into how social contexts influence the health and disease outcomes among Black people (Arthur & Katkin, 2006; Griffith, 2011). Foreign-born African immigrants are one of the subgroups that are included among the overall Black population in the US. The dearth of knowledge about this subgroup's pandemic experience illustrates how they are an underserved and under-researched community (Derr, 2016). Our study bridges the gap in knowledge regarding the pandemic experiences of this subgroup of the Black community in the United States.

African immigrants have varied characteristics, life circumstances, and face challenges germane to the migration experience. Many are employed in occupations such as health and social care (Tesfai & Thomas, 2020) that are considered "essential" but also present a higher risk of exposure to infectious diseases such as SARS-CoV-2. There is no systematic study (to the best of the authors' knowledge) that has focused or reported information on African immigrants' level of knowledge, attitudinal and behavioral responses to the COVID-19 pandemic to date. For this reason, the present study explored the level of COVID-19 related knowledge, information sources, precautionary behaviors and attitudes among African immigrants in the United States during the initial stages of the pandemic. This study's findings have implications for health education programming and the direction of future research among this subgroup of the Black population.

1.3 Methods

Study Design and Population

We conducted a cross-sectional online survey between April 15 and May 24, 2020, utilizing Qualtrics (https://www.qualtrics.com). We used an online data collection method to reduce face to face interaction between researchers and respondents during a period when social distancing and sheltering-in-place orders were being implemented across the US. We recruited participants using a snowball sampling strategy. The survey was disseminated via social media platforms (WhatsApp, Facebook, and Twitter) to African immigrant groups. Recipients of the link who met the inclusion criteria were requested to participate in the survey and share the link with other African individuals

in their networks. The inclusion criterion was individuals aged 18 years and older who are foreign-born and migrated from an Africa country and were currently residing in the US. Other demographic groups, including members of other subgroups of Black Americans, the Caribbean, and Africans living elsewhere, were excluded. Participation was voluntary and anonymous. The Institutional Review Board at a university in the East Coast region of the US granted ethical approval for the study.

Sampling

There were no similar studies related to COVID-19 among African immigrants at the planning stage of this research study. As such, we based the sample size calculation on the assumption that the estimated accuracy rate concerning COVID-19 knowledge among this population would be similar to that reported for a general sample of adults living in the US, which according to a recent study, was 80 percent (Clements, 2020). Thus, with an assumed confidence interval of 95%, a limit of 5% precision, and a design effect of 1.0, we estimated a sample size of 246 respondents. Estimation of the sample size was done using the OpenEpi software (Dean, 2013).

Measures

We developed the study questionnaire by reviewing the extant literature on COVID-19 by the Centers for Disease Control and Prevention (CDC), the World Health Organization (WHO), and other peer-reviewed publications (CDC, 2020; Jang, et al., 2020; WHO, 2020; WHO Regional Office for Europe, 2020; Zhong, et al., 2020). The variables of interest included demographic characteristics, knowledge, information sources, attitudes, and precautionary behaviors towards COVID-19. Following is a brief description of the various variables:

Demographics

Items in this section included respondents' age, gender, level of education, COVID-19 related job loss (specifically whether a respondent lost his or her job due to the pandemic), and employment in a health/social care field (including positions such as a medical doctor, nurse, pharmacists, laboratory technician and certified nurse assistant). Age was re-coded into four levels (1=18–29, 2= 30-39, 3=40-49, and 4= 50 years and older).

Knowledge

Respondents' perceived level of COVID-19 related knowledge was assessed with a Likert type item (i.e., "How would you rate your current level of knowledge about the COVID-19 epidemic?") with a 5-point response option (ranging from 1- very poor to 5- very good). This was followed by nine (9) items that assessed respondents' actual knowledge of COVID-19 symptoms, mode of transmission, treatments, and preventive measures. Sample questions include: "COVID-19 can be transmitted through droplets like coughing, sneezing or intimate contact," "Persons with COVID-19 can be contagious (transmit the virus to others) before showing symptoms" (See Table 2 for all knowledge items). All items were answered on a true/false basis and coded as *1=Correct* and *0=Wrong*. A cumulative knowledge score was determined by the summing of all the responses with a higher score representing a better level of COVID-19 related knowledge.

COVID-19 Information Sources

This was assessed with the question: "What is/are your most important sources of information to know about the coronavirus disease (COVID-19) outbreak? (check all that apply)". The response

options included choices such as conversation with family, friends, and neighbors, communication from the workplace, church / religious leaders, Federal and/or State Government announcements and websites, Official websites of WHO and CDC, Social media posts, Television, Radio as well as Newspapers and posters.

Attitudes toward COVID-19

Respondents' attitudes towards COVID-19 were assessed with four Likert type items. The first item was the level of worry which was assessed using the question "Overall, how worried are you about the COVID-19 outbreak?" Response options for this item were: "not worried at all", "worried" and "very worried". The second item was cognitive risk perception which was assessed using the question "do you think the COVID-19 pandemic will settle down in the next few days or spread further?" The corresponding options were: "it will settle down" and "will spread further". The third item measured respondents' intent to vaccinate by asking "if there was a vaccine against COVID-19, would you consider getting vaccinated?" The response options were "yes", 'maybe" and "no". The fourth item assessed disclosure preference by asking "if I or somebody in my family gets COVID-19, I would want that to remain private or secret?" The response option for this item ranged from 1 = strongly agree to 7 = strongly disagree.

Precautionary Behaviors

We assessed precautionary behavior with a list of ten (10) items. Respondents were asked to indicate all of the precautionary measures they had adopted within the previous three weeks in relation to COVID-19. Precautionary behaviors included: "covering of mouth when coughing or sneezing", "washing hands with soap and water for at least 20 seconds after coughing or sneezing or rubbing your nose or after touching contaminated objects" and "maintaining a distance (6 feet) between oneself and other people in the community". Each selection was assigned a numerical value of 1 and the total number of precautionary measures selected represented respondents' behavioral scores.

Data Analysis

We used IBM SPSS (version 27) for all data analyses. First, data were cleaned by listwise deletion of empty cases, respondents who resided outside of the US, or those who did not consent to participation. Afterward, we ran descriptive statistics to determine the sample characteristics with results expressed as frequencies and percentages for categorical data. Lastly, we conducted chi-squares to analyze the relationship between COVID-19 knowledge level and other study variables.

1.4 Results

Preliminary Analysis

A total of 286 respondents completed the informed consent to participate in the study. We excluded data from 58 respondents who did not respond to at least 53% (over half) of the survey items, thus had missing values for more than two entire variables. We also excluded data from two respondents who indicated that they resided in the UK since the targeted group lived in the US. After the listwise deletion, our total sample size was 226 respondents.

Demographic Characteristics

All respondents identified as African immigrants, and over two-thirds (69.9%, n=158) were

female. The respondents' average age was 41.9 years old (SD = 9.3, range = 19 to 80). Three quarters had a bachelor's degree or higher (74.8%, n=169), and nearly half (46%, n= 104) of the respondents worked in the health and social care field. Approximately 9.3% (n=21) of respondents had lost their jobs due to the COVID-19 pandemic. Table 1 presents the participants' characteristics.

Table 1: *Participant Characteristics*

	N	%
Demographic Characteristics		
Age Group		
19-29	12	5.3
30-39	56	24.8
40-49	79	35.0
50+	25	11.1
Missing	54	23.9
Gender		
Male	60	26.5
Female	158	69.9
Prefer not to answer	1	0.4
Education Level		
< Bachelor's Degree	56	24.8
Bachelor's Degree and Above	169	74.8
Is the respondent a Healthcare worker		
Yes	104	46.0
No	121	53.5
Missing	1	0.4
COVID 19 Specific Characteristics		
Cumulative Level of COVID Knowledge		
Low	27	11.9
High	71	31.4
Very High	128	56.6
Worried about COVID		
Yes	200	88.5
No	25	11.1
Missing	1	0.4
Intend to Vaccinate against COVID		
Yes	84	37.2
No	141	62.4
Missing	1	0.4
Will keep COVID Diagnosis Private		
Agree	70	31.0
Neither Agree/Disagree	49	21.7
Disagree	106	46.9
Missing	1	0.4
Number of COVID Precautionary Behaviors Practiced		
0 to 7	26	11.5
8 to 9	65	28.8
10	135	59.7
	N	%
Job Loss Due to COVID-19		
Yes	21	9.3
No	204	90.3
Missing	1	0.4

Source: Survey Data, 2020

Respondents' Knowledge about COVID-19
Regarding the perceived level of COVID-19 knowledge, when respondents were asked to rate their level of COVID knowledge on a scale of 1—very poor to 5—very good, over three quarters of the

respondents rated their level of COVID knowledge as either good (45.6%, n=103) or very good (35.4%, n=80). Conversely, 18% (n= 41) and 0.9% (n=2) stated that they had average and poor knowledge respectively. respondents were then asked to provide a wrong or right response to various specific knowledge items, e.g., COVID-19 can be transmitted through droplets like coughing, sneezing or intimate contact. Most respondents answered each of the knowledge items correctly, with the correct response rate per item ranging from 81.9% to 99.6%. The two items about the myths identified by WHO received the highest incorrect responses, with 17.7% of respondents reporting that COVID-19 cannot be transmitted in hot and humid climates and 15.9% stating that spraying alcohol, chlorine, or Dettol all over one's body can kill the COVID-19 virus (See Table 2). A sum score of the nine knowledge items was created, with scores ranging from 5 to 9. The average COVID knowledge score was 8.44 (SD= 0.94,) and Median 9.00 (Range=5-9). More than half of the respondents (57.1.8%, n=129) had a perfect score (9) and 31.9% (n=72) had a near perfect score (8). Only 11.1% (n=25) had a score of 7 or below.

Table 2: *Knowledge about COVID-19 among Respondents*

Knowledge Item	Correct n (%)	Wrong n (%)
Symptoms & Mode of Transmission		
1. COVID-19 can be transmitted through droplets like coughing, sneezing or intimate contact	99.6 (225)	0.4 (1)
2. You can get COVID-19 by touching a surface or object that has the virus on it and then touching your mouth, nose, or eyes	99.6 (225)	0.4 (1)
3. The symptoms of COVID-19 include fever, cough, shortness of breath, and lack of smell	97.3 (220)	2.2 (5)
4. Persons with COVID-19 can be contagious (transmit the virus to others) before showing symptoms	99.6 (225)	0.4 (1)
Treatment & Vaccination		
5. If you think you have been exposed to COVID-19 and develop symptoms, you should first call your doctor or healthcare provider before going to the Emergency Room (ER)	88.5 (200)	11.1(25)
6. There is currently no drug treatment or vaccine for COVID-19	95.6 (216)	4.4 (10)
7. People who have contact with someone infected with COVID-19 virus should be immediately isolated and observed for at least 14 days	99.1 (224)	0.9 (2)
Myths		
8. COVID-19 cannot be transmitted in hot and humid weather	81.9 (185)	17.7 (40)
9. Spraying alcohol, chlorine or Dettol all over your body can kill the COVID-19 virus	83.6 (189)	15.9 (36)

Source: Survey data, 2020

Sources of Information on COVID-19
The primary sources of information about COVID-19 were online means (websites and social media), government communication, and television. Specifically, 75.2% of respondents selected WHO and/or CDC websites as important sources of information about COVID-19, followed by Federal / State Government announcements and websites (73.9%), television (66.8%), and Social media (48.2%). Religious leaders, radio, and newspapers were among the least reported sources of information about COVID-19 (see Figure 1 below).
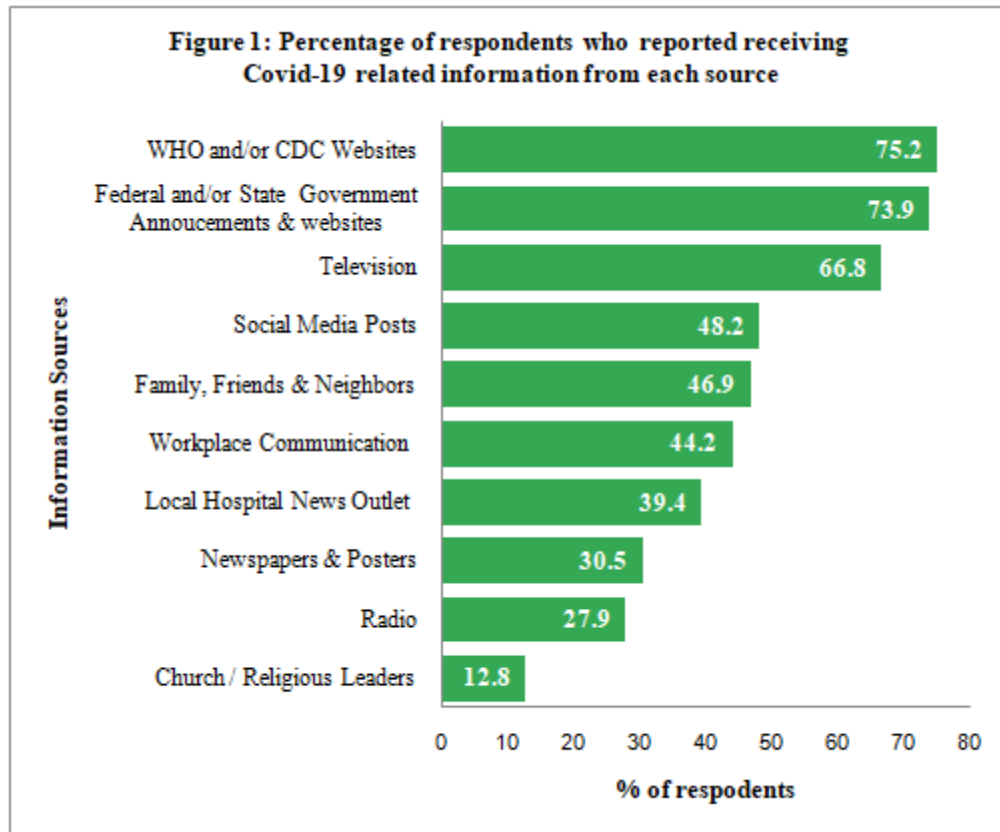
Figure 1: Percentage of respondents who reported receiving Covid-19 related information from each source

Information Sources	% of respondents
WHO and/or CDC Websites	75.2
Federal and/or State Government Annoucements & websites	73.9
Television	66.8
Social Media Posts	48.2
Family, Friends & Neighbors	46.9
Workplace Communication	44.2
Local Hospital News Outlet	39.4
Newspapers & Posters	30.5
Radio	27.9
Church / Religious Leaders	12.8

Figure 1. *Information Sources for COVID-19*
Source: Field survey, 2020

Worrying, Intent to Vaccinate, and Disclosure Preference

Over three-quarters of the respondents (88.5%) reported some degree of worry about the pandemic. Expressly, nearly half of the respondents (48.7%, n=110) indicated that they were "worried," and 39.8% (n=90) noted that they were "very much worried" about the COVID-19 outbreak. Only 11.1% (n =25) of the respondents indicated they were "not worried at all." One hundred and fifty respondents (66.4%) expected the outbreak to spread further, with only 72 respondents (31.9%) indicating that it will end soon.

Concerning the intention to be vaccinated, 84 respondents (37.2%) stated that they would get vaccination should one become available while 94 (41.6%) selected "maybe" and 47 (20.8%) indicated that they would not get the vaccination. When asked about their disclosure preference, 70 respondents (31%) reported that should they or a close relative become infected with COVID-19, they will prefer to keep it private or secret, 48 (21.7%) were not sure of their preference, and 106 (46.9%) were open to disclosing their status.

Engagement in Precautionary Behaviors

Nearly all respondents (99.1%, n=224) have taken at least one precaution concerning COVID-19. Only two respondents (0.9%) reported no precautionary action taken. Table 3 shows the precautionary measures and the percentage of respondents who have engaged in each. Avoidance of handshakes and hi-fives (96%), maintaining a distance (6 feet) between oneself and others when in the community (95.6%), and handwashing with soap and water for at least 20 seconds (95.1%) were the three most practiced behaviors. The least practiced behaviors were wearing face masks when in public (85%), avoiding the use of public transportation or ride-sharing (85%), as well as cleaning and disinfecting frequently touched surfaces daily (87.2%). About 11.9% of respondents reported not wearing face masks when in public.

Table 3: *Percentage of Respondents Engaging in each Precautionary Behavior*

Precautionary Behavior	Proportion Selecting Behavior n (%)
Covering of mouth when coughing or sneezing	213 (94.2)
Washing your hands with soap and water for at least 20 seconds after coughing or sneezing or rubbing your nose or after touching contaminated objects	215 (95.1)
Using hand sanitizer that contains at least 60% alcohol to clean your hands when water is not available	207 (91.6)
Cleaning and disinfecting frequently touched surfaces daily	197 (87.2)
Avoid touching your eyes, nose, mouth with unwashed hands	206 (91.2)
Maintaining a distance (6 feet) between you and other people when in the community	216 (95.6)
Staying home except to get medical care or essential items such as food	199 (88.1)
Avoid using public transportation, rider-sharing such as Uber, or Taxis	192 (85.0)
Wearing a face mask when in public	199 (88.1)
Avoiding handshakes and Hi-fives	217 (96.0)

Source: Survey data, 2020

Bivariate Analysis

A chi-square test of the association between the level of COVID knowledge and various COVID related variables (See Table 4). Generally, there were no statistically significant differences between the COVID-19 knowledge level and any of the other COVID variables at p<0.05. However, 2 variables i.e., Loss of employment due to COVID-19 (X^2 (2, $N = 127$) = 5.48, $p = .065$) and number of precautionary behaviors practiced (X^2 (4, $N = 127$) = 7.81, $p = .068$) approached significance at p<0.1.

Table 4: *Relationship between Cumulative COVID-19 Knowledge and various COVID Variables*

	Cumulative COVID-19 Knowledge			Pearson Chi-Square		
	Low N (%)	High N (%)	Very High N (%)	Value	*df*	*p* (2 sided)
Lost job due to COVID-19						
Yes	3(11.1)	11(15.5)	7(5.5)	5.48	2	0.065
No	22(88.9)	61(84.5)	121(94.5)			
Total	25	72	127			
Worried about COVID-19						
Yes	20(83.3)	62(87.3)	117(91.4)	2.73	2	0.255
No	4(16.2)	9(12.7)	11			
Total	26	71	128			
Intend to Vaccinate						
Yes	9(33.3)	22(31.0)	53(41.7)	2.46	2	0.293
No	18(66.7)	49(69.0)	74(58.3)			
Total	27	71	127			
Will disclose COVID diagnosis						
Agree	7(25.9)	16(22.5)	47(37.0)	6.35	4	0.174
Neither Agree/Disagree	8(29.6)	19(26.8)	22(17.3)			
Disagree	12(44.4)	36(50.7)	58(45.7)			
Total	27	71	127			
Number of Precautionary Behaviors						
0 to 7	4(14.8)	10(14.1)	12(9.4)	7.81	4	0.068
8 to 9	9(33.3)	12(16.9)	44(34.4)			
10	14(51.9)	49(69.0)	72(56.3)			
Total	27	71	128			

Note. All Total add to 100% thus percentages are not provided in the table
Source: Survey data, 2020

Discussion
In the US, the impact of COVID-19 has been disproportionately prevalent and severe among the Black community (CDC, 2020). Some of the factors attributed to the increased vulnerability to COVID-19 infection and mortality among the black population include (a) presence of various comorbid factors such as hypertension, diabetes, malignancies, heart failure, cerebrovascular

disease, and underlying pulmonary/ cardiovascular disease (Dyer, 2020; Myers, 2020). (b) mistrust and suspicion of the healthcare system due to historical experiences such as the Tuskegee syphilis scandal (Dyer, 2020), leading to possible hesitation in care seeking or adherence to public health recommendations; (c) lower socioeconomic status and employment in jobs that increase risk of exposure to the virus (CDC, 2020) and (d) systemic racism as a result of which black people receive inferior or sub-standard care (Dyer, 2020; Myers, 2020). However, it's noteworthy that the black population in the US is very diverse, and some of the presenting factors may differ among various subgroups, such as African immigrants. No study was found that had evaluated subgroups within the Black Community in the US and their COVID-19 related experiences. The current study assessed the level of awareness about COVID-19 among a convenient sample of African immigrants living in the US—a black community subgroup. The study also assessed respondents' practices, and attitudes toward the pandemic.

Current study findings indicate that COVID-19 related knowledge among respondents was generally high, with the overall accuracy rate being 93.7%. Further, over half of the study respondents obtained above-average knowledge scores, and none scored below 5 out of 9. A previous study conducted in the US by Clements (2020) reported overall accurate response rates of approximately 80%. The differences in the accuracy rates between Clements' research and our study could be attributed to the former being conducted in the early phase of the pandemic, while the latter was conducted relatively later. Clements' study involved the general population. In contrast, the present study involved a subset of the Black population, a majority of whom were relatively well educated with approximately three quarters indicating they had a bachelor's degree. It is noteworthy in Clements' study that black participants had lower COVID-19 knowledge compared to participants from other ethnic groups. While Clements (2020) did not provide detailed characteristics of various ethnic groups, the current study populations may have been different on multiple factors, including education level, which could account for differences in the level of COVID-19 knowledge. Indeed, Echeverria-Estrada and Batalova (2019) noted that, in general, the African immigrant population is among the most educated immigrant groups in the US.

Despite the high level of COVID-19 knowledge, there was noticeable misinformation among respondents about certain myths regarding the epidemic. About 17.7% and 15.9% considered as accurate the myths that "COVID-19 cannot be transmitted in hot and humid climate" and that "spraying alcohol, chlorine or Dettol all over your body can kill the COVID-19 viruses" respectively. Our findings are consistent with Geldsetzer (2020) study, who found some degree of misinformation among a sample of US and UK respondents despite satisfactory levels of COVID-19 related knowledge. This finding suggests possible knowledge gaps that public health education may have to target.

Nearly half of the respondents indicated that social media sites (such as- WhatsApp, Facebook, and twitter) were among the most critical and common sources of COVID-19 related information. While social media and other online resources allow for easy access to information, they may also allow for easy spread of misinformation, which can be harmful or dangerous and counter public health education efforts. The overabundance of factual and non-factual information during the COVID-19 epidemic has raised grave concerns and been labeled as an *infodemic* by the World Health Organization (WHO, 2020). Though beyond this study's scope, understanding the levels of media literacy among the population studied may become essential to provide insight into how

they consume the abundance of information from the social media sources mentioned and coordinate responses to counter any misinformation. Respondents need to be aware of this danger and the need for media literacy to ensure that they are getting the correct and updated information about COVID-19 and not consuming only myths purported as sound medical advice.

Approximately 66.4% of respondents had a pessimistic attitude towards the COVID-19 outbreak, reporting that the outbreak was likely to spread further rather than end soon. A vast majority of respondents (approximately 89%) also indicated they were worried to some extent about the COVID-19 pandemic. Further, approximately 52.7% of respondents in the current study were unwilling or uncertain about disclosing positive status should they or a relative get diagnosed with COVID-19. Past experiences are likely to influence attitudes towards a given situation. It is therefore essential to consider the potential influence of respondents' experiences during the Ebola epidemic that occurred on the African continent when interpreting their reported attitudes towards disclosure of positive COVID-19 results. Many African immigrants, to some extent, were directly or at least indirectly affected by the Ebola epidemic. Ebola, which is also an emerging infectious disease like COVID-19, started from a small location before spreading fast to other countries and lasted for what some may consider a relatively long period. African immigrants living outside the African continent lost relatives, experienced fear, worry, and stigmatization and/or discrimination because they were suspected as potential infection source (Lin, et al., 2015; University of Cincinnati, 2015). These factors may have influenced the current study respondents who reported pessimistic attitudes towards COVID-19, worrying and unwillingness or uncertainty about disclosing their status. Practitioners must consider this when planning programs for this population. This is because pessimistic attitudes during stressful situations such as the one instigated by the COVID-19 pandemic are known to be associated with maladaptive outcomes such as depression and anxiety (Arslan, et al., 2020). Focusing on mental health promotion as part of the overall COVID-19 management is essential considering the paradox created by the pandemic, such as the promotion of social-distancing which exacerbates social isolation (known to impact mental health negatively- Cacioppo & Hawkley, 2009) and limiting social interactions which could mitigate worrying and depression). The impact of the mandated social isolation/distancing can be enormous for African immigrants for whom community gatherings and attending religious services are the primary channels of connecting with their social networks (Agyekum & Newbold, 2016).

Given the elevated levels of worry regarding the risk of infection and the stigma of COVID-19 among African immigrants, practitioners need to pay close attention to the population's mental health needs during the pandemic. Generally, African immigrants in the US are at risk of social isolation. Being physically separated from significant others and travel restrictions during the lockdowns can compound feelings of worry, isolation and loneliness. Fortunately, facilitating access to social networking sites can reduce the negative psychological impact of the pandemic and promote community organizing towards empowering ventures. For instance, one popular online community on Facebook composed of Kenyan women in the US recently crowdfunded to purchase personal protective equipment for its members who are essential workers. There have been other similar organized activities among African immigrants on social media platforms to address unmet needs (Guerin, et al., 2006). Notwithstanding, there is a need for formal studies to look into the pandemic's long-term psychological impact on African immigrants.

Another observation from the current study that requires attention is the reluctance among participants to receive a COVID-19 vaccination should one become available. When asked about their willingness to be vaccinated, only 37.2% of respondents were confident that they would receive a vaccination. Approximately 62.4% stated they were uncertain or would outright refuse COVID-19 vaccination if it became available. Evidence of COVID-19 vaccine hesitancy has been observed among French (COCONEL Group, 2020; Courtemanche, 2020) and Nigerian samples (Reuben, 2020). Since the beginning of the pandemic, many resources have been dedicated to vaccine development, and it appears policy-makers and public health officials consider vaccine availability as a crucial step in the fight against COVID-19. While the availability of vaccines is essential, people's willingness to be vaccinated is vital. The results of the current study suggest that policy-makers and public health practitioners may need to anticipate and prepare for potential hesitation among African immigrants to get vaccinated. There may be a need for a public health campaign to promote vaccination among this population.

Limitations
The study has some limitations, including the potential for community bias inherent in the snowball sampling technique utilized. Owing to non-random sampling, respondents in the current study are more likely to be similar to each other on various characteristics than would be expected by chance. As a result, caution must be exercised in extrapolating the results to other groups of immigrants or people who may differ significantly in education, age, and gender distribution. Nonetheless, the group surveyed represents a critical subgroup, and the findings of this study present a snapshot of their awareness of COVID-19, level of worry, and attitudes that can inform public health campaigns and other interventions.

Another limitation might be using a non-standardized study questionnaire and the fact that the questionnaire was self-administered by the respondents. It is possible that respondents over-reported socially desirable answers and underreported undesirable ones, especially concerning the section of the survey regarding precautionary behaviors.

1.5 Implications and Directions for Future Research
The scientific understanding of COVID-19 has evolved, resulting in new policies, restrictions, and changes in the content of public health messages. Findings from this study can guide the design and conduct of future studies regarding how African migrants living in the US experience future phases of the COVID-19 pandemic.

African immigrants are a fast-growing segment of the US population (Anderson, 2015). Findings in this study highlight some points of significant misinformation among this diaspora population as well as concerns regarding vaccination, disclosure of positive COVID results, and attitudinal factors that need to be addressed. These can inform the content of public health education efforts targeted at the group.

Future studies need to assess the extent of the misinformation about COVID-19 preventive practices among this group. This is because the content of some of the myths or misinformation when accepted as facts and acted upon have the potential to cause other health problems or alter risk reduction behaviors. For example, the 15.9% of respondents who considered as accurate the myths that spraying alcohol, chlorine, or Dettol all over one's body can kill the virus that causes

COVID-19 may be at risk of skin irritation and corrosive injuries if they act upon this misinformation.

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