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Ibadan Urban Dwellers' Perception on the Use of Non-Pharmaceutical Interventions for COVID-19

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ABSTRACT

SARS coronavirus cases have been reported all across the world in the previous two years. The rate of transmission has been steadily increasing over time. This study examines residents' knowledge, attitudes, and preventive activities for SARS-CoV-2 prevention in five local government areas in Ibadan's urban zone (total population: 1,886,800 inhabitants, census 2016).During the months of November and December, 2021, a cross-sectional survey based on the health belief model was conducted with a simple random sample of 355 respondents from densely populated regions of urban Ibadan. SARS-CoV-2 was known by a total of 262 people. Only 33.5% of the total respondents were concerned about SARS coronavirus. A small percentage (4.5%) had previously been diagnosed with SARS coronavirus, 66.7% considered a SARS-CoV-2 infection to be serious, yet only 33.5% were concerned about SARS coronavirus. The results are inconsistent in reporting preventive practices, either community-level interventions (e.g., quarantining/self-isolating after returning from travel, 23.9%; actively maintaining a certain distance between myself and people outside, 31.8%) or personal preventive behaviours (e.g., use of alcohol-based hand sanitizers, 53.2%). Participants who reported willingness to accept a SARS-CoV-2 vaccine were more likely to perceive the risk of contracting it as higher (aOR = 1.02, 95% confidence interval [CI] = 1.01–1.04), as well as knowing if a friend had previously been diagnosed with SARS coronavirus (aOR = 2.92, 95% confidence interval [CI] = 1.62–5.55), according to a multivariate analysis using stepwise binary logistic regression which had a 77.27% predictive accuracy, using a test-train, confusion matrix split. In conclusion, the findings of this study suggest that future interventions promoting SARS-CoV-2 prevention among inhabitants of urban Ibadan should focus on individuals' views of SARS coronavirus vulnerability, highlighting the benefits of personal protective behaviors.

Keywords: SARS-CoV-2; Ibadan; Risk perception; SARS coronavirus; COVID-19; Binary Logistic Regression.

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INTRODUCTION

The havoc wrecked by SARS-CoV-2 is only rivalled by the Influnza pandemic of the 20th century which claimed 50 to 100 million lives [1]. The Pandemic Influenza is a case in which a new and highly pathogenic viral subtype obtains a foothold in the human population, one to which no one (or few) in the human population has immunological tolerance and is easily transmissible between humans, at which point it rapidly spreads worldwide. In the past, influenza pandemics have occurred every 28 years on average, with extreme values of 6 and 53 years [2]. There were three significant pandemics in the twentieth century [3,7]. The influenza virus spreads through two mechanisms: Antigenic Drift and Antigenic Shift. Because drift is gradual, an influenza vaccination based on last year's strain will likely provide adequate protection if just drift has occurred. Antigenic shifts, which are abrupt alterations that result in universal sensitivity to the disease, are blamed for pandemics.

The swift intervention of the World Health Organization in rallying global and local health authorities played a major role in avoiding disaster of the magnitude of 20th century Influenza Pandemic [5]. However, the SARS-CoV-2 has demonstrated the ability to mutate into strains of concern over time, making the development of an effective vaccine challenging. As a result, preventive actions are the most cost-effective and fair option [6,7] Nigerians have met the use of NPIs with reluctance. The use of facemasks and social distancing have received the highest forms of non-compliance [8] and even public figures were often seen to go against the recommended use of non-pharmaceutical interventions (NPIs) and speak actively against preventive vaccination [9,10]. But, following the discovery of new variants of SARS-CoV-2 and a huge number of Nigerians getting infected with SARS-CoV-2 and dying from COVID-19, most residents perception about the pathogen and attitude towards preventive practices changed swiftly [10].

Thus, this study aimed to determine how Ibadan urban residents perceive SARS-CoV-2 (total population: 1,886,800 inhabitants, census estimate 2016), their knowledge of his pathogen and their attitudes towards preventive measures to stop its spread, by sampling the densely populated areas. General Knowledge Scores and Risk Perception Scores using Psychometric Methods was computed from data gathered from respondents and further univariate and multivariate analysis was carried out.

METHODOLOGY

Study Design

This study adopted a descriptive, questionnaire-based, cross-sectional design, which aimed to obtain demographic biodata from respondents and as well as answers to carefully selected questions developed from the Health Belief Model [11]. Spanning Urban Ibadan, this study covered 5 local governments areas in total [12], and largely dense metropolitan areas in each of these local government areas were selected [13]., with sample size appropriately determined statistically [14].

Sample Size Calculation

This was done using Cochran's formula and a total number of 355 respondents were surveyed.

Study Variables: Individual Characteristics

Age, Sex, Educational Level, Location in Ibadan, whether they had knowledge of the term SARS-CoV-2 and any Occupational Background in Healthcare Settings or experience with working with animals was asked in this section.

General Knowledge Score and Risk Perception Score

To gather data to compute the General Knowledge Score, the questions asked using the health belief model were:

1. How do you think most people get infected with SARS-CoV-2? (Answer, Contact with infected people)
2. What age group do you think is most likely going to get seriously ill after infected with SARS-CoV-2? (Answer, Elderly (> 50 years))
3. Do you think people with SARS-CoV spread viral infection? (Answer, Yes)
4. Do you think most people with SARS-CoV are asymptomatic? (Answer, Yes)
5. Do you know if a vaccine against SARS-CoV-2 is commercially available? (Answer, No)
6. Which behaviours do you think are best to avoid getting SARS-CoV-2? (Answers: "Using a surgical/N95 facemask", "Having open air meetings", "Using hand sanitizers frequently", "Taking preventive vaccination", "Avoid going to congested areas such as markets")

Also, respondents were asked to rate through three fully-labeled five-point Likert scales housing carefully selected questions:

1. "SARS coronavirus causes a serious disease?" (From strongly disagree to strongly agree),

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2. "How worried are you that you will get sick with SARS coronavirus?" (From not worried to worried), and
3. "How often do you protect yourself from SARS coronavirus?" (From never to very often).

These questions helped in computing the Risk Perception Score for each respondent after converting their answers to numerical values.

Statistical Analysis

A question with dichotomous response "Are you willing to accept a SARS coronavirus vaccine" was asked and had a binary response. A binary logistic regression model was then built using this outcome and checking its variability with other questions asked in the survey. The individual characteristics of the respondents was cross tabulated against the knowledge of SARS-CoV-2 (the pathogen which causes COVID-19) and a test for independence using the Chi-Squared test was performed. The continuous variables created (Risk Perception Score and General Knowledge score were reported with their average ± standard deviations and tested for normality using the D'Agostino-Pearson's omnibus test. Correlation between these variables was also examined through the Spearman's rank correlation test. IBM SPSS Statistics 22 and R Studio (4.1.0) were used to analyse the data obtained. All statistical tests were done at 5% level of significance.

RESULTS

Questionnaire Consistency

The reliability of the questionnaire was checked using Cronbach's Alpha and has a value of 0.798 which suggests acceptability of the questionnaire.

Descriptive Statistics

Of all respondents, 262 persons (73.8%) reportedly had any understanding of the term "SARS-CoV-2". As shown in Table 2, this status was more frequently reported among males (57.6%) than in females (42.4%, p = 0.038); in subjects aged 20 to 24 years (38.9%) and 25 to 29 years (21.8%) compared to other age groups (all of them <50%, p = 0.143). Participants having an educational achievement of bachelors' degree level of educational achievement or higher stood at 21.4% compared to subjects with lower academic qualifications (78.6%). Furthermore, the knowledge of the term SARS-CoV-2 was more frequently reported among subjects residing in Ibadan North East (24.8%) and Ibadan North (23.7%), while it was more frequently overlooked by respondents reportedly living in Ibadan North West (14.5%) or Ibadan South East (17.2%, p = 0.051). Focusing on the occupational factors, the awareness was higher among participants working in healthcare settings (91.1%, p = 0.005), and working with animals and cattle (85.0%). All of the respondents were, therefore, inquired about their previous encounters with the pathogen (COVID19 was used for people who did not know what SARS-CoV-2 meant), their understanding of the severity of the disease, and the potential acceptance of a hypothetical immunization against SARS-CoV-2.

Risk Perception Score

The large majority of respondents did characterize SARS-CoV-2 infection as a disease of significant severity. In fact, 66.7% of them acknowledged SARS-CoV-2 infection severity as significant/highly significant. Only 55.5% self-styled could protect themselves from SARS-CoV-2, and almost half of them (44.8%) reported that they are not really worried of a SARS-CoV-2 infection. A correspondent RPS equals 58.3% ± 21 (D'Agostino-Pearson p value = 0.08685; Figure 1), was eventually calculated, stressing the relative lax attitude towards SARS-CoV-2 among the sampled residents of the urban Ibadan region.

General Knowledge Score

After percent normalization, the mean GKS was slightly above average (58.0% ± 23; median 60.0%), and its distribution extensively skewed (D'Agostino-Pearson normality test, p = 0.00012) with a number of respondents reporting scores ≥ 75% (Figure 2). The majority of respondents (61.3%) were aware that the urban Ibadan Region was characterized by incident cases of SARS-CoV-2 infection, acknowledging SARS-CoV-2 infection is transmitted by contact with infected people (77.5%), and is vaccine-preventable (68.7%). On the contrary, respondents were affected by uncertainties about the clinical characteristics, including the possible other wrong transmission of the pathogen, that was correctly believed by only 22.5% of respondents. The age group most likely to get seriously ill with SARS-CoV-2 infection according to most respondents is the elderly (>50 years old) at 57.2%, and features of the infection—more precisely, only 41.7% clearly stated that most of the affected people are substantially asymptomatic.

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Table 1: General characteristics of 355 Respondents from the Urban Region of Ibadan Participating in the Survey (2021), Broken Down by their Understanding of the Term SARS-CoV-2.

Characteristics	Total (355, %)	Knowledge of the Term "SARS-CoV-2"	
		Yes (262, %)	*p* value *
Sex			0.038
Male	193, 54.4%	151, 57.6%	
Female	162, 45.6%	111, 42.4%	
Age (in years)			0.143
15 – 19	13, 3.7%	11, 4.2%	
20 – 24	140, 39.4%	102, 38.9%	
25 – 29	82, 23.1%	57, 21.8%	
30 – 34	35, 9.9%	29, 11.1%	
35 – 39	31, 8.7%	27, 10.3%	
40 – 44	8, 2.3%	6, 2.3%	
45 – 49	20, 5.6%	10, 3.8%	
50 – 54	13, 3.7%	9, 3.4%	
55 – 59	9, 2.5%	7, 2.7%	
60 – 64	4, 1.1%	4, 1.5%	
Education Level			<0.0001
No formal education	166, 46.8%	128, 48.9%	
Primary School Certificate	7, 2.0%	7, 2.7%	
SSCE/O'Level	36, 10.1%	34, 13.0%	
NCE/Diploma	43, 12.1%	37, 14.1%	
Bachelors'/Higher Diploma	22, 6.2%	6, 2.3%	
Masters' Degree	5, 1.4%	5, 1.9%	
Doctorate degree or higher	76, 21.4%	45, 17.2%	
Location in Ibadan			0.051
Ibadan, North	81, 22.8%	62, 23.7%	
Ibadan, North East	88, 24.8%	65, 24.8%	
Ibadan, North West	41, 11.5%	38, 14.5%	
Ibadan, South West	75, 21.1%	52, 19.8%	
Ibadan, South East	70, 19.7%	45, 17.2%	
Working in healthcare			0.005
Yes	45, 12.7%	41, 15.6%	
No	310, 87.3%	221, 84.4%	
Working with animals/cattle			0.087
Yes	40, 11.3%	34, 13.0%	
No	315, 88.7%	228, 87.0%	

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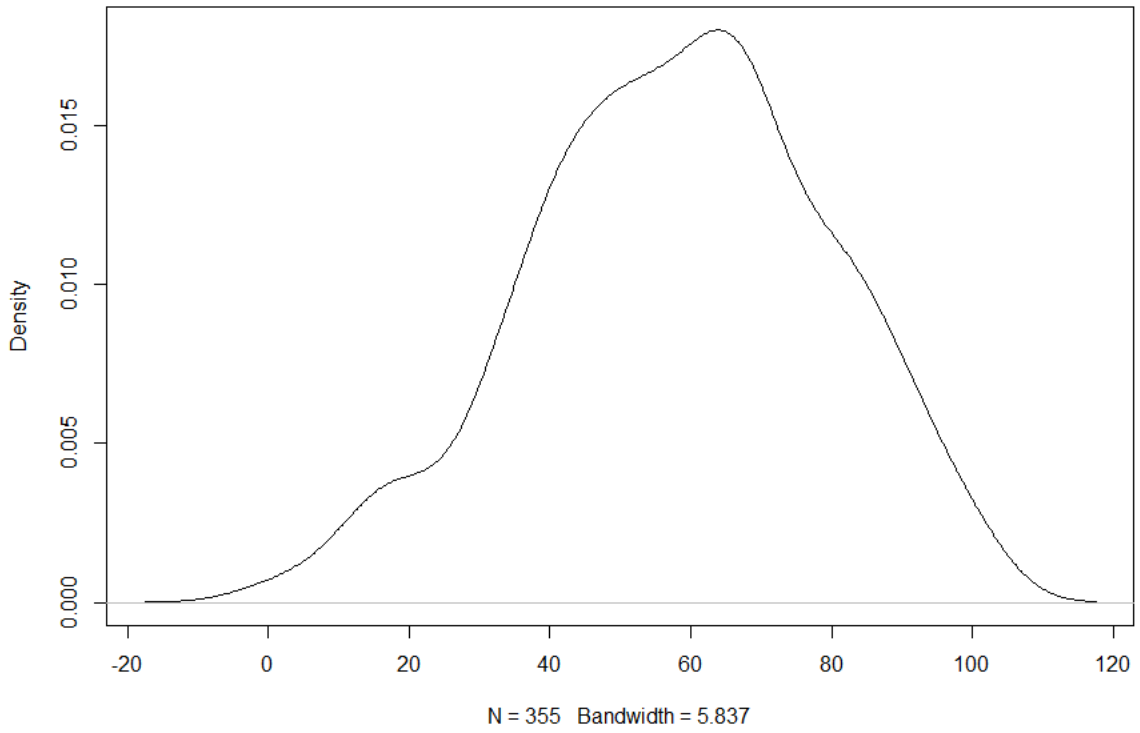

Figure 1: Density plot of Risk Perception Score, showing the skewness of cumulative scores (p value of D'Agostino-Pearson's test = 0.08685)

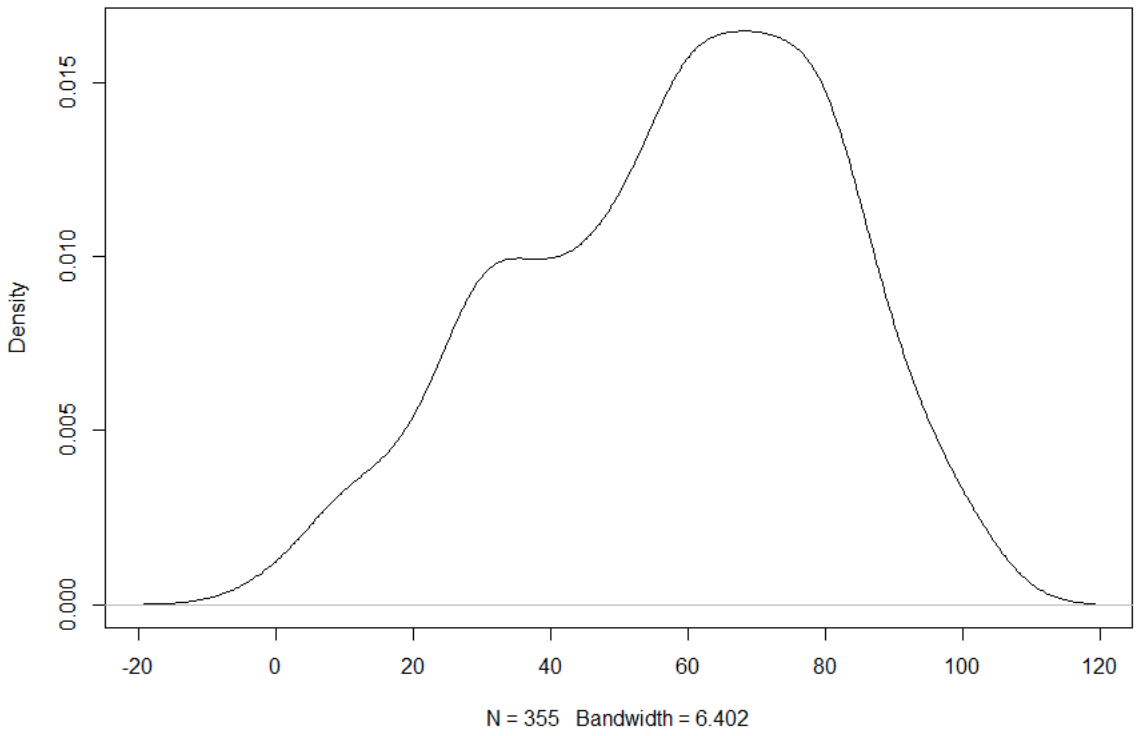

Figure 2: Density plot of General Knowledge Score, showing the skewness of cumulative scores (p value of D'Agostino-Pearson's test = 0.00012)

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Correlation between General Knowledge Score and Risk Perception Score

The Risk Perception Score and General Knowledge Score were slightly correlated (Spearman's rank correlation test p = 0.0021; Figure 3): In other words, a better knowledge status (i.e., fewer misconceptions and/or less personal attitudes guiding the individual behaviour) is associated with a greater risk perception for SARS-CoV-2 infection.

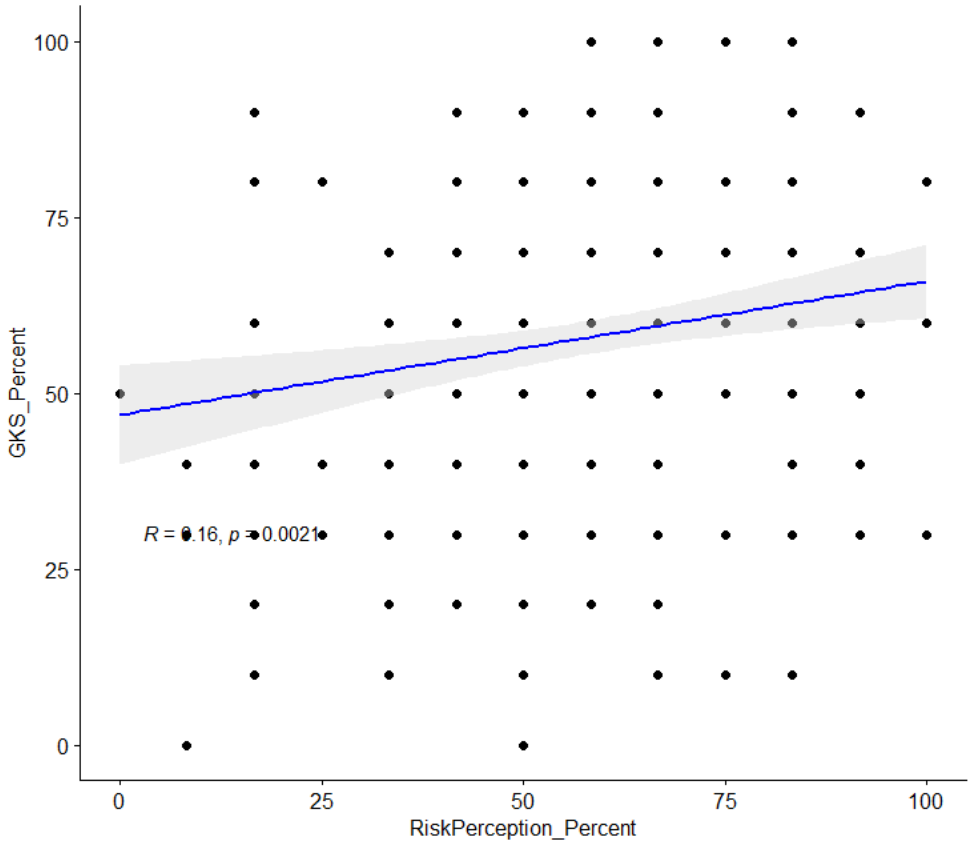

Figure 3: Scatter plot for General Knowledge Score vs. Risk Perception Score, showing significant correlation between the cumulative scores (Spearman's rank correlation test p = 0.0021).

Binary Logistic Regression Model

The outcome had 9 variables reported to best explain the willingness of the respondent to accept a SARS-CoV-2 vaccine.

A higher risk perception score (aOR 1.02; 95%CI 1.01 to 1.04), having a friend previously diagnosed with SARS coronavirus (aOR 2.92; 95%CI 1.60 to 5.55), knowing if people with COVID are asymptomatic (aOR 2.31; 95%CI 1.35 to 4.00), washing hands with soap and water/using hand sanitizers (aOR 1.32; 95%CI 1.01 to 1.73), sex (aOR 1.74; 95%CI 1.03 to 2.97), and religion (aOR 1.63; 95%CI 1.01 to 2.71) are positively associated with the willingness to take the vaccine.

In turn, acceptance of SARS-CoV-2 vaccine was negatively associated with educational level (aOR 0.86; 95%CI 0.78 to 0.96), location in Ibadan (aOR 0.80; 95%CI 0.67 to 0.94), and if the respondent is a healthcare worker (aOR 0.44; 95%CI 0.20 to 0.97).

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> exp(cbind(OR = coef(bothways), confint(bothways)))
Waiting for profiling to be done...
                                                       OR      2.5 %    97.5 %
(Intercept)                                     0.1414159 0.02012977 0.9337615
RiskPerception_Percent                          1.0267405 1.01297994 1.0412969
HasanyfriendofyoursbeendiagnosedwithSARScoronavirus 2.9233150 1.59794795 5.5458587
EduLevel                                        0.8631472 0.77589261 0.9595872
LocIB                                           0.7950921 0.66808495 0.9438314
DoyouthinkmostpeoplewithSARSCoVareasymptomatic  2.3081433 1.35283355 3.9969985
Iwashmyhandswithsoapandwateroruseahandsanitizer 1.3207628 1.01182406 1.7306113
HealthCare                                      0.4385077 0.19921105 0.9698305
Sex1                                            1.7440735 1.02570153 2.9736561
Religion1                                       1.6346981 1.00804363 2.7069985
```

Figure 4: Output obtained by generating the adjusted odds ratio of the stepwise binary logistic regression model obtained in Figure 4.4

Model Reliability

The model had an overall precision power of 77.27% which was obtained from a test-train confusion matrix split using R studio. It also covered an ROC area of 81.81%, which suggests acceptable reliability of the model.

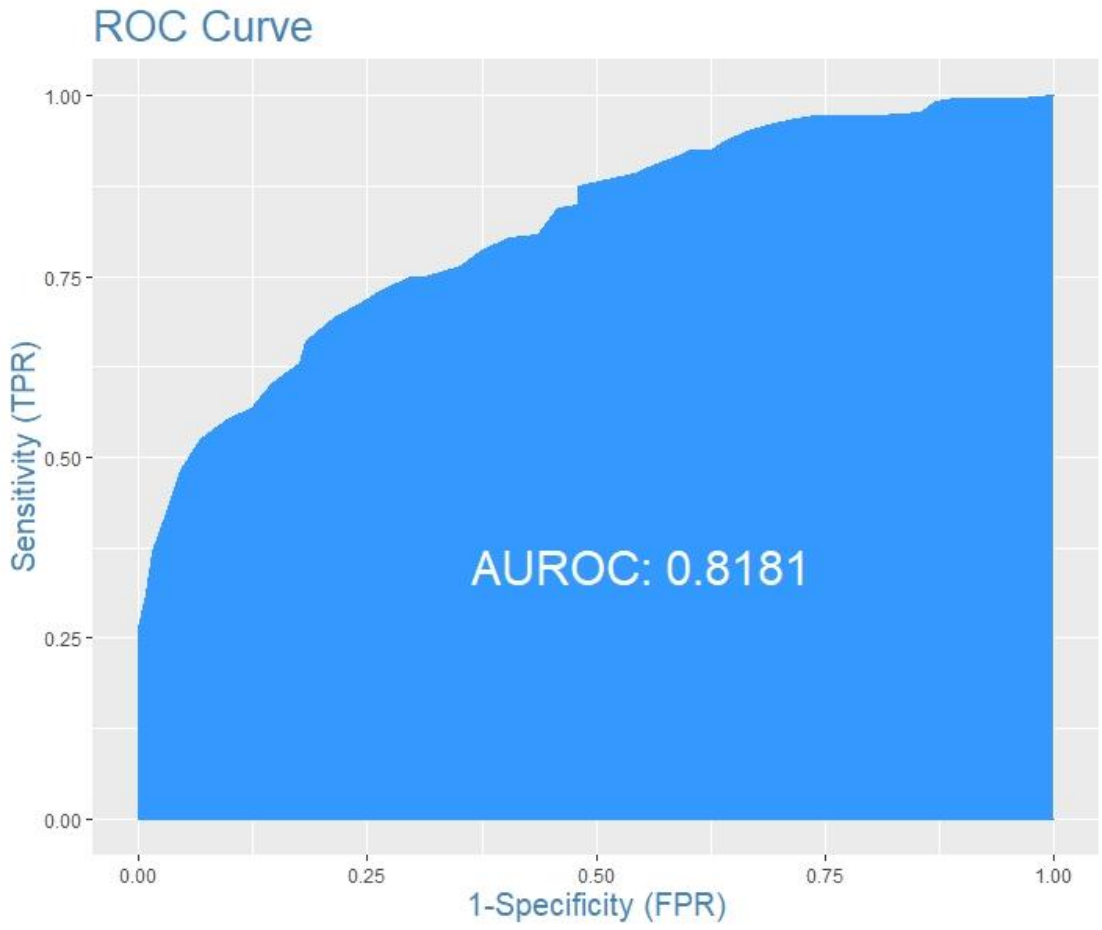

Figure 5: Receiver Operating Characteristic (ROC) curve, covering an area of 81.82%

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DISCUSSION

Although many people were aware of SARS-CoV-2 transmission, the number of people who thought SARS coronavirus infections were a severe problem was quite low. Furthermore, when it came to NPI adherence, a sizable proportion of respondents were hesitant to deal with acceptable personal protective behaviors or promote community-level preventative measures.

The acceptability of a human vaccine against SARSCoV-2 was specifically questioned about in this study, coupled with the respondents' concern about a SARS-CoV-2 infection. Three separate patterns were detected as a result, however certain commonalities should be highlighted.

First, despite the fact that both GKS and RPS were statistically correlated, the risk perception score only had a predictive value for concerns about the acceptance of a human vaccine against SARS-CoV-2, as well as acknowledging the potential severity of the resulting disease, when compared to the general knowledge score. In fact, this runs contrary to widespread consensus that a better understanding of the SARS coronavirus could increase vaccination adoption and encourage acceptable attitudes and practices [15]. While in some previous reports, the excess of confidence and lack of concern were partially explained through the diffuse reporting of collective and/or personal protective practices [16,17], the sample of respondents averagely satisfied the use of NPIs and PPB, and particularly those characterized by a minimal impact on individual attitudes and practices, such as avoiding the potential and unnecessary individual exposures to unsatisfactory practices.

Interestingly, people exhibiting some acceptance for community-level interventions, and more precisely self-isolating after travel, were more likely to be healthcare workers or involved in the managing of livestock and/or other animals, presumptively because a better understanding of the health risks associated with pests, including the vectors for SARS-CoV-2. Respondents using hand-sanitizers frequently was somewhat expected, because of its overall extent (53.2% of all participants).

However, it should be stressed that some previous reports have questioned the otherwise seemingly obvious restraints people as regard the use of non-pharmaceutical interventions and the willingness to take a vaccine [17]. Albeit, the aforementioned remarks were somewhat inconsistent with available studies, most of these findings were not unexpected.

According to the Health Belief Model, a person's belief in a health threat, as well as the belief in the effectiveness of the recommended health behavior or action, represent the main predictors for the likelihood that people will adopt the behavior [18]. SARScoronavirus usually cause a mild disorder, often described as "flu", that in turn is quite similar to other arboviral infections.

In other words, the actual severity of SARS-CoV-2 infections may be radically overlooked, and the trade-off between appropriate NPIs and the risk for SARS-CoV-2 infection may be perceived by the general population as disproportionately unbalanced. Even though North-Eastern Africa, as well as other European areas, have been historically plagued by other influenza pathogens since the end of World War II, most of these infections have been largely regarded as nothing more than a seasonal, annoying, and even irritant state of nature [19]. Consequently, the participants may be improperly optimist when pondering their chances to avoid SARS-CoV-2 infections, while some Personal Protective Behaviors, such as social distancing and choice of appropriate facemask, may be improperly applied because of improper information.

Finally, even though there have been some brands of vaccines available for the respondents to take, they have not been vaccinated and a small majority of them are actually willing to take the vaccine. An insignificant share of them is willing to invest their money in a SARS-CoV-2 vaccines, presumptively perceiving a benefit in protecting themselves from SARS coronavirus. In similar studies in other climes, such attitude was either associated with a better knowledge status [15,20] or with an occupational background in healthcare settings, while in our survey not only knowledge status, but also perceivingSARS-CoV-2 as a potential health threat, and acknowledging the potential risk to get the pathogen, were identified as significant effectors. In this regard, while [18] have previously hinted towards a mutually exclusive status between a more favorable attitude towards SARS-CoV-2 vaccine and acceptance of NPIs, in this survey, acceptance of a potential vaccine was associated with their location in Ibadan and if their friend/colleague has been previously diagnosed with SARS coronavirus. In other words, seeing is believing! Being exposed to a suburban location and having a few people that one knows that have been infected with SARS-CoV-2, increases the chances/willingness to get vaccinated.

CONCLUSION

This study suggests that residents of the urban Ibadan region of Oyo State, Nigeria, exhibit an above-average knowledge on SARS-CoV-2/COVID-19, with a satisfactory risk awareness. Moreover, adherence and acceptance of NPIs

were largely unsatisfying, as the results suggest that a significant share of sampled participants ignores, or only partially applies, official recommendations to avoid SARS-CoV-2/COVID-19.

Unfortunately, as knowledge status was equivocally associated with more appropriate risk perception, it was not identified as a significant predictor towards the willingness to accept a SARS-CoV-2 vaccine. Hence, it is plausible that filling such information gaps might improve the rate of proper NPIS and the acceptance of community-level interventions. In turn, the potential acceptance of forthcoming human vaccines may benefit from such intervention.

As SARS-CoV-2 infection may be effectively countered through effective behavioural practices, improving this way the prevention of all flu-like infections among the general population of high-risk areas, and increasing their health literacy could be, therefore, instrumental and cost-effective in reducing the potential spreading of SARS-CoV-2 infections.

STUDY LIMITATIONS

Whilst the questionnaire was designed in English language, the researcher had to code-switch to Pidgin-English and/or Yorùbá on the spot. This was a bit difficult especially when quizzing respondents on questions that were structured a bit technically, particularly the Personal Protective Behaviours and Community-Level Interventions section in the questionnaire.

Also, some of the respondents that were in the sample could have actually lived out of the targeted area under study, which would in turn not fulfil the initial selection criteria, and therefore compromising the actual representativity of the sample.

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