Original Article

Mpox Vaccination Willingness and its Socio-demographic and Psychological Determinants Among Doctors in Nigeria

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ABSTRACT

Socio-demographic and psychological variables are critical factors in the determination of willingness to vaccinate against infectious diseases. Behaviour towards previous vaccination exercise can also be an important predictor. This study was embarked upon to determine the impact of these variables in predicting willingness to vaccinate against Mpox among Nigerian doctors. A cross-sectional online study with multi-item scale questionnaires were used to assess doctors working in both urban and rural communities in Cross River State Nigeria. Data were collected on doctors' socio-demographic and psychological characteristics such as Mpox fear indicators, risk perceptions, history of uptake of COVID-19 vaccination, and others. Participants' willingness was tested using logistic regression model. A total of 164 participants were recruited, 127 (77.4%) were younger than 43 years, 97 (59.1%) were males, and the highest sub-specialty group was physicians (47.3%, n=70). Overall, 58.4%(n = 94)participants showed willingness to vaccinate against Mpox. Significant associations existed between willingness to vaccinate and general practitioner sub-specialty (OR: 3.82, 95%CI: 1.00-14.52, p =0.049);disagreeing that one could contract Mpox (OR: 0.290, 95%CI: 0.09-0.095, p = 0.041); disagreeing to the fact that Mpox can add new burden to the healthcare system of the affected countries(OR: 0.103, 95%CI: 0.015-0.068, p =0.018); and disagreeing that Mpox will be a likely occurrence during daily activities (OR: 0.118, 95%CI: 0.026-0.52, p = 0.005). No significant association existed between past history of vaccination and willingness to vaccinate against Mpox. The study revealed moderate rate of willingness among the participants to vaccinate against Mpox and that psychological variables of fear and risk perceptions play critical role in influencing willingness to vaccinate, hence proper risk communication and doctors' engagement is recommended to optimise Mpox control.

Keywords: Doctors, Monkeypox, Mpox, Smallpox, Willingness to vaccinate, Vaccination, Vaccine

INTRODUCTION

Mpox (Monkeypox) is a zoonotic disease caused by an *Orthopox* DNA virus related to the virus that causes smallpox-like disease.[1,2]The World Health Organisation (WHO) External Situation Report 31, from data received from national authorities by 30th November, 2023 reports that from 1st January 2022 to 30th November 2023, a total of 92, 783 laboratory-confirmed cases of Mpox including 171 deaths have occurred, from 116 countries in all six WHO Regions.[3] A total of 90, 460 cases and 149 deaths had occurred from January

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2022 to September 2023 in locations that have not historically reported Mpox.[4] The risk for the general population residing in countries with historical Mpox transmission and their neighbouring countries has been considered to be moderate.[3]There is still no specific treatment for Mpox.[5,6] Contact with wildlife reservoirs has been attributed to be the cause of many sporadic outbreaks of infection in African countries.[7] The ongoing Mpox outbreak in humans point to changes in biologic aspects of the virus, human behavioural changes, or both, being driven by waning smallpox immunity, relaxation of COVID-19 prevention measures, and sexual interactions associated with large gatherings.[4]Suggestion from phylogenetic analyses posits that Mpox virus has circulated undetected for some time outside of countries where it has been endemic possibly as other sexually transmitted infections.[8]

WHO declared Mpox to be a "a public health emergency of international concern" on 23rd June 2022.[9] The occurrence of new outbreaks has raised concern that Mpox may constitute another serious health threat to the general public similar to COVID-19.[2,10] The case fatality rate (CFR) of Mpox varies between 3 and 6%, which gives Mpox a not-too-deadly outlook when compared to other diseases, however, some cases have developed and ended fatally owing to different risk factors.[11,12]This observation has become a concern to the global health authorities as number of cases keep on rising, and has led to the production of effective vaccines and implementation of other measures to curtail the spread.[13,14] Vaccination against Mpox is regarded as the most important means of preventing Mpox.[15,16] Because of the similarity in structure of the Mpox virus to the Smallpox virus, the Smallpox vaccines offer up to 85% protection against Mpox.[17] Currently, two of such vaccines – JYNNEOS and ACAM2000 made from vaccinia virus are already in use in some countries.[18]In both Canada and Europe, a third generation vaccine modified vaccinia Ankara-Bavarian Nordic (MVA-BN) has been licensed for general public use.[19,20]

The Advisory Committee on Immunization Practices (ACIP) has recommended Mpox vaccination for some high-risk groups of population including healthcare workers (HCWs) taking care of Mpox patients such as doctors, laboratory workers, research laboratory workers, and public health professionals responding to outbreaks.[21,22] The ACIP recommendation, owing to its efficacy and safety profiles favoured the use of JYNNEOS vaccine over ACAM2000.[23,24]

Different theories of health behaviour including theory of planned behaviour, health belief model, and the theory of protective motivation, etc, have helped to identify and explain some of the factors affecting vaccination acceptance or hesitancy.[25-27]Sociodemographic factors, psychological factors, cultural beliefs, previous vaccination experiences were reported as factors influencing vaccination acceptance.[28,29] These studies reported some of the factors associated with willingness to vaccinate during previous pandemics such as in COVID-19, and H1N1.[30-32]A recent study has reported that a particular age group (30-40 years) of HCWs independently predicted Mpox vaccination as crucial to prevent Mpox, as well as showed willingness to pay for the Mpox vaccine.[33] History of being vaccinated with COVID-19 vaccine, knowledge about Mpox, and Mpox risk perception were independent predictors of willingness to accept Mpox vaccination.[34-36]

The willingness of the population, especially healthcare workers to accept vaccination against Mpox is crucial to the prevention and control agenda. HCWs are expected to adhere strictly to prevention and control measures against Mpox. Also, the acceptance of Mpox vaccination by the frontline healthcare workers will have a direct ripple effect on their close relatives, friends, acquaintances, and indirectly on the general public, as they can easily influence people around them on medical issues. Previous findings have shown that misinformation about dangers of emerging infectious diseases can increase fear, anxiety, and conspiratorial thinking.[37,38] Healthcare workers, especially, doctors' willingness, and the determinants of this willingness to vaccinate against Mpox are very important in the design and implementation of an effective infection control intervention programme. To date, there are few

studies globally, and Nigeria in particular, conducted to determine the predictors of the willingness of medical doctors to vaccinate against Mpox. This is important because of the important role they play in responding to epidemics such as Mpox. This study therefore aimed to assess the socio-demographic and psychological predictors of doctors' willingness to vaccinate against Mpox disease in south-south region of Nigeria. Nigeria is one of the countries in west Africa endemic for Mpox. According to the latest report by the Nigeria Centre for Disease Control and Prevention (NCDC)as at 5th January, 2024, there have been a total of 3208 suspected cases from 36 states and Federal Capital Territory (FCT), Abuja, with 1059 laboratory-confirmed cases, and 17 deaths.[39]

MATERIALS AND METHODS

Study setting

The setting of the study was in Cross River State Nigeria. Cross River is one of the six states that make up the south-south geopolitical zone of Nigeria. The capital city of the state is Calabar, where the majority of the participants (medical doctors) reside and work. Other big cities in Cross River state that hostother participants of this study include Akpabuyo, Obanliku, Obudu, Ogoja, Ugep, Ikon, Odupkani, and Akamkpa. Cross River State occupies an expansive landmass measuring 23, 074 km^2 and is bounded on its south pole by Akwa-Ibom State and the Atlantic Ocean, on its north pole by Benue State, east pole by the Republic of Cameroon, and on its west pole by Enugu and Abia States.[40]

Study design and Population

The study was an anonymous cross-sectional online survey, conducted from August 22, 2022 to September 23, 2022. The convenience sampling method was employed to select the study participants who were Medical and Dental Council of Nigeria (MDCN) certified doctors working in both urban and rural areas of Cross River State and belonging to Nigeria Medical Association (NMA). The participants were categorised into (1) General practitioners which included family medicine specialists, and non-specialist general practitioners; (2) Physicians – included specialists from internal medicine, paediatrics, laboratory medicine, and community medicine; (3) Surgeons – specialists from general surgery, orthopaedic, intensive care unit, urology, ear-nose-throat, and obstetrics and gynaecology.

Sample size

The sample size was determined with an online sample size calculator using a 5% margin of error, a confidence level of 95%, a population proportion of 39% based on a previous similar study, and a population of 443 (number of NMA membered doctors on the Association's WhatsApp group at the time of the study).[41,42]

Ethical considerations

The study involved human participants, therefore, ethical principles of Helsinki Declaration in medical research were followed.[43] Confidentiality and anonymity were ensured by using only online, self-administered questionnaires without names, emails, or Ip addresses of the participants. Only the principal investigator had access to the online survey account. Every participant signed the e-consent section before proceeding with the study. The participants that refused to sign the e-consent section were not able to proceed with the study after introduction.Since this study was based on online filling of form with no direct link to the participants, no inclusion of clinical data of the participants, and no plausibility to cause harm or stigma to the participants, a preliminary evaluation by an Ethical Committee was not applied for.

Survey tool and Administration

The questionnaire, adapted from a previous study by Ricco *et al*[16] was created with Google forms (Google LLC; Menlo Park, CA, USA) and consisted of 58 questions structured into (1) introductory and e-consent – containing information about the study and its objectives followed by the e-consent, (2) biodata – containing information on socio-demographic characteristics of the participants including age, gender, marital status, and medical sub-specialties, (3) the main-body – containing questions that tend to elicit participants' knowledge, attitudes, and perception about Mpox and its vaccination.

Mpox Fear Scale (MFS). The MFS measures the indicators of Mpox fear. The calculation of MFS was adapted from Caycho-Rodriguez et al.[44]Five 5-point Likert items with response range 1= strongly disagree to 5 = strongly agree, and two 5-Likert items with response range 1= not significant to 5 = very significant, giving a total of seven 5-points Likert scales (see Questionnaire - **Appendix 1**). In the present study, the internal consistency of these 7 items, calculated using Cronbach's Alpha Scale was 0.61. Cronbach's alpha (α) is a measurement that calculates the internal consistency of an assessment instrument. In this study, the value of Cronbach's alpha greater than 0.6 was deemed acceptable.[45]

Risk perception score (RPS). According to Yates, risk perception is defined as a function of the perceived probability of an event and its expected consequences.[46] Risk Perception Score (RPS) was therefore computed as the product of two items, with a potential range of 1-25.By multiplying perceived severity, derived from a 5-point Likert scale questionnaire as captured in the questionnaire (**Appendix 1**). Both questionnaire items have the same scale range "1 = not significant to 5 = very significant". In this study, the Cronbach's alpha coefficient for the Risk Perception Score (RPS) was 0.85, while Mpox Fear Scale (MFS) score was 0.61.Further details on the survey tool and administration have been published elsewhere.[18,31]

Data analysis

Analysis was done with IBM SPSS statistical package for Windows (version 19.0 SPSS Inc. Chicago, IL. USA). Categorical and continuous variables were summarised and reported as percentage and mean ± SD values respectively. The cumulative scores for Knowledge score (KS), Risk perception score (RPS), and Mpox fear scale (MFS) scores were initially obtained, then normalised as percentage values before they were dichotomised into good/poor KS, low/high RPS, and low/high MFS respectively, using a cut-off of ≥ 70%. Univariate analysis was conducted based on Chi-Suare test to evaluate the associations between outcome and explanatory variables, while binary logistic regression model was used to predict the determinants of the study outcome - willingness to vaccinate against Mpox disease, utilising odds ratio (OR), 95% confidence interval (95%CI), and *p*-value. Statistical significance was considered at $p<0.05$.

RESULTS

Participants' characteristics and demographics

A sample size of at least 202 would have been preferred for good statistical power, however, only 164 participants responded and submitted their survey form.

As shown in **Table 1**, of the 164 participating medical doctors that were enrolled into the study, 59.1% (97) of them were males, 77.4% (127) of them were less than 43 years of age (Mean age = 38.28 ± 6.28). About two-third of the participants (74.4%) were married. Almost half of the participants (47.3%) were physicians. **Figure 1** shows the response of the participants when asked "How would you rate the health threat represented by Monkeypox on a scale of 1 = minimum threat to 10 = maximum threat?" Approximately twenty percent (19.9%) of the participants settled for 5, which is intermediate rating.

Willingness to receive an Mpox Vaccination

Figure 2 shows how willing the participants were to be vaccinated against Mpox disease. Of the 161 participants that responded to this question, only 23 (14.3%) were strongly willing, 71 (44.1%) were willing, and 8 (5%) were strongly not willing to vaccinate against Mpox. Thus, the proportion of participants willing (strongly willing and willing) to be vaccinated against Mpox disease was 58.4% (94/161).

Relationships between baseline socio-demographic characteristics and psychological factors and willingness towards Mpox Vaccination.

Table 2 further breaks down the participants responses with respect to their willingness to vaccinate. Sixty-point-five percent (n = 75) of the participants younger than 43 years versus 51.4% (n = 19) of those greater than 43 years were willing to accept Mpox vaccination. Fifty-point-seven percent (34/67) of the female participants as against 63.8%

(60/94) male participants showed willingness to participate. Coincidentally, of the number that were willing to accept vaccination, 63.8% (60/94) were males. Greater proportion of the unmarried participants (68.3%, n = 28) showed willingness to vaccinate when compared to 55% (n = 66)of married participants. Considering the three major medical specialties, General practitioners (66.7%, n = 28) displayed the highest willingness to vaccinate, followed by the Physicians (58.6%, n = 41). Greater proportion (61.3%, n = 124) of those that have had COVID-19 vaccination in the past showed willingness than those that have not had COVID-19 vaccination (48.6%, n = 37).

Among the participants with high-risk perception score (RPS), 62.5% (n =24) of them were willing to receive Mpox vaccination compared to 57.7% (n = 137) of the participants that had low RPS. For the Mpox fear indicator scale (MFS), greater proportion of those with high MFS were willing to vaccinate against Mpox than obtainable from those with low MFS (68.7%, n = 67 vs 49.3%, n = 75), (p = 0.02). Analysing the participants' response to the question "Do you think you can contract Mpox?" The participants that answered yes to it were more willing to accept vaccination than those that felt they could not contract Mpox (68.2%, n = 85 vs 47.4%, n = 76), (p =0.007).

Logistic regression model analyses of the predictors of Mpox Vaccination Willingness

From **Table 3,** results showed that General practitioners are more willing to receive Mpox vaccination compared to the surgeons (OR: 3.82, 95%CI: 1.00-14.52, p =0.049). The results also showed that those that disagreed that they could contract Mpox were less likely going to be willing to vaccinate than those that agreed that they could contract Mpox (OR: 0.290, 95%CI: 0.09-0.095, p = 0.041). A participant disagreeing to the fact that Mpox can add new burden to the healthcare system of the affected countries would less likely be willing to vaccinate against Mpox compared to the participant that agreed (OR: 0.103, 95%CI: 0.015-0.068, p =0.018). Also, a participant that disagreed that "Mpox will be a likely occurrence during daily activities" would less likely vaccinate against Mpox than his counterpart that agreed (OR: 0.118, 95%CI: 0.026-0.52, p = 0.005). Other sociodemographic and psychological factors lacked the capacity to predict willingness to vaccinate against Mpox disease.

Table 1: Characteristics of the participants

	N (%)	(%)	Mean (± SD)
Age in years			38.28 ± (6.28)
Age groups			
< 43 years	127	77.4%	
43 years and above	37	22.6%	
Gender			
Female	67	40.9%	
Male	97	59.1%	
Marital status			
Single	42	25.6%	
Married	122	74.4%	
Medical sub-specialty			
Physicians	70	47.3%	
General Practitioners	42	28.4%	
Surgeons	36	24.3%	
Have you received COVID-19 Vaccine?			
Yes	125	77.2	
No	37	22.8	

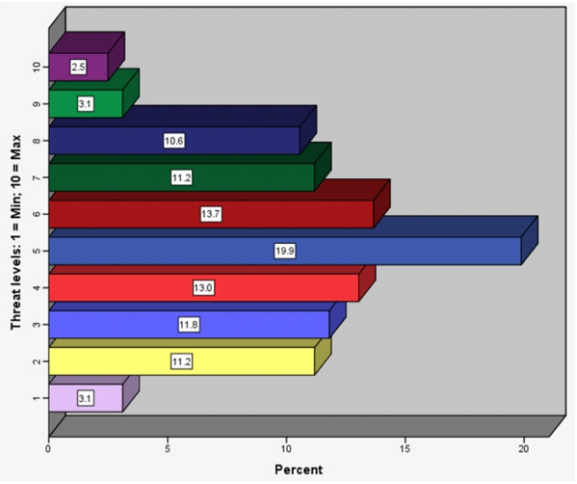

Figure 1. Threat level posed by Mpox as judged by the participants

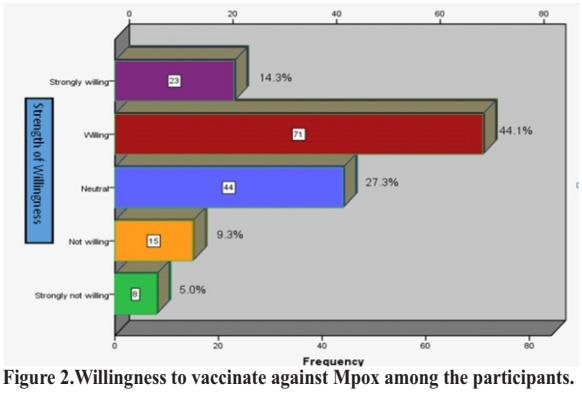

Figure 2.Willingness to vaccinate against Mpox among the participants.

Table 2. Bivariate associations between socio-demographic and other predictor variables and readiness to get vaccinated

Variable	Willingness to get Mpox vaccine		*P*-value
	No (%)	Yes (%)	
Age group (years)			0.323
<43	49 (39.5)	75 (60.5)	
43 and above	18 (48.6)	19 (51.4)	
Gender			0.097
Female	33 (49.3)	34 (50.7)	
Male	34 (36.2)	60 (63.8)	
Marital status			0.136
Single	13 (31.7)	28 (68.3)	
Married	54 (45.0)	66 (55.0)	
Medical specialty			0.137
Physicians	29 (41.4)	41 (58.6)	
General Practitioners	14 (33.3)	28 (66.7)	
Surgeons	19 (55.9)	15 (44.1)	
Have you received COVID -19 vaccine?			0.171
No	19 (51.4)	18 (48.6)	
Yes	48 (38.7)	76 (61.3)	
Risk perception score (RPS)			0.658
Low RPS			
High RPS	58 (42.3)	79 (57.7)	
	9 (37.5)	15 (62.5)	
Mpox Fear Scale (MFS)			0.02
Low MFS	38 (50.7)	37 (49.3)	
High MFS	21 (31.3)	46 (68.7)	
Do you think you can contract Monkeypox?			0.007
No	40 (52.6)	36 (47.4)	
Yes	27 (31.8)	58 (68.2)	

Table 3: Logistic regression models predicting participants' willingness to get vaccinated against Mpox

Variable	B	Logistic Regression	
		OR (95% CI)	*P*-value
Age group			
< 43 years	-.769	0.463 (0.08 -2.693)	0.392
43 + years *			
Gender			
Female	-.274	0.761 (0.28 -2.055)	0.589
Male *			
Marital status			
Single	-.304	1.63 (0.23 -2.40)	0.614
Married *			
Sub -specialty			
Physicians	0.914	2.50 (0.76 -8.15)	0.130
General Practitioner	1.342	3.828 (1.00 -14.52)	0.049
Surgeons *			
Do you think you can contract Mpox?			
Disagree			
Neutral	-.786	0.456 (0.13 -1.66)	0.233
Agree*	-1.24	0.290 (.09 -0.95)	0.041
I think that Mpox can add new burden on healthcare system of the affected countries!			
Disagree			
Agree*	-2.277	0.103 (0.015 -0.68)	0.018
Mpox will be a likely occurrence during daily activities.			
Disagree			
Agree*	-2.140	0.118 (0.026 -0.52)	0.005
Conspiracy beliefs about Mpox			
Disagree	0.210	1.234 (0.307 -4.96)	0.767
Agree*			
Mpox Fear Score (MFS)			
Low MFS			
High MFS*	-.400	0.671 (0.072 -6.22)	0.725
Knowledge Score (KS)			
Low KS			
High KS*	-1.786	0.168 (0.026 -1.09)	0.061
Risk Perception Score (RPS)			
Low RPS			
High RPS*	-1.432	0.239 (0.28 -2.07)	0.194

* = Reference variable, B = Logistic regression coefficient.

DISCUSSION

Overall, this current study revealed that 58.4% of the participants were willing to vaccinate against the Mpox, and that medical sub-specialties were important predictors of willingness to be vaccinated against Mpox among doctors. This study was conducted during the heat of the current ongoing Mpox epidemic in 2022, and the objectives were to assess doctors' willingness to vaccinate against Mpox disease and to determine the socio-demographic and psychological factors that influence this willingness. In Nigeria, it is quite uncertain if there is willingness to vaccinate against Mpox, and what socio-demographic and psychological variables would predict this willingness among doctors. Willingness to vaccinate against infectious disease entails a complex multifactorial process. Several studies have showed the importance of psychological factors in decision-making process that either culminates in acceptance, hesitancy or outright refusal.[47-49] Socio-demographic factors such as age, gender, occupation, and socioeconomic status have also been considered important predictors of willingness to vaccination.[50,51] Another important variable tested in this study was the influence of past vaccination disposition, as this has been found to affect peoples' willingness to vaccinate in the future.[52,53]

The rate of willingness in this study is slightly lower than 60% reported by Caycho-Rodriguez *et al* among general population in Peru, but also higher than 46% by Winters *et al* among US general public, and 56% reported by Ulloque-Badaracco *et al* in a systematic review study.[29,34,54]A previous study in Nigeria based on the 5C model for assessment of the psychological antecedents of vaccination reported that only 31% of the participating HCWs showed confidence in the Mpox vaccination.[42]Bates *et al* reported only 40% willingness to get vaccinated against Mpox among clinicians in Ohio, US.[13] Other similar studies that specifically targeted HCWs but however, reported far higher proportions of willingness to be vaccinated than this current study were Harapan *et al*, 94%, and Hong *et al*, 90%.[33,55]

In this study, the trend gotten from the bivariate analysis showed that the younger, unmarried male doctors who were general practitioners, and had received COVID-19 vaccine previously, with high perception risk (RPS) and high emotional fear for Mpox (MFS), and believing that they can contract Mpox were more willing to be vaccinated than any other subgroup, though only MFS and fear of contracting Mpox were statistically significant. Previous studies have also reported similar findings about importance of the role of male gender in determining willingness to be vaccinated.[56,57] A contrary finding has also been reported where females demonstrated more willingness to be vaccinated.[55,58]Greater proportion of younger participating doctors tended to be more accepting of the vaccination than the older participants. A possible explanation for this observation is that the younger population seem to trust modern medical interventions more than older ones.[59]There was no readily data from the present study to explain this variation in gender willingness to be vaccinated, however a previous study has shown that women perceive higher risks than benefits of vaccines, as such they would refrain from getting vaccinated.[60]

The predictive analysis (via logistic regression model) did not find a significant relationship between vaccine willingness and most of the socio-demographic variables – age, gender, marital status. Similar Saudi and Chinese studies have also reported lack of association between willingness to vaccinate and socio-demographic variables such as gender, residence, education level, and occupation.[61,62]However, the study demonstrated that medical sub-specialty (the only socio-demographic variable), and the following psychological variables - perception that one can contract Mpox, perception that Mpox will add a new burden on healthcare system of Nigeria, and the perception that Mpox will be a likely occurrence during daily activities were all predictor variables for willingness to be vaccinated against Mpox. Regarding medical sub-specialty, a general practitioner was more willing to be vaccinated than a Surgeon. The reason for this could be due to the fact that the General practitioners are the foremost frontliner in receiving and managing people infected with Mpox. This is what was

obtainable at the time of study at the centre where this study was conducted. Suspected cases of Mpox were thereafter referred to Clinical microbiologists/infectious diseases unit for expert care. So, the perception that they could be infected with Mpox perhaps was driving this willingness to get protected against Mpox. This finding is in agreement with some previous studies where the perception of fear was reported to be associated with willingness to vaccinate.[63-65] The other two significant predictors of willingness to vaccinate against Mpox border on risk of Mpox. Medical doctors who did not agree that Mpox would add a new burden on healthcare system of Nigeria, or that Mpox would be a likely occurrence during daily activities in Nigeria were less willing to be vaccinated against Mpox.

Previous studies have shown that prior vaccination experience is a key factor in determining vaccination acceptance, however, this predictor variable lacked significant association with willingness to vaccinate against Mpox in this study.

Limitations

This study is not without limitations. Major limitations include (i) because of the cross-sectional design nature of this study no causal link could be established between the predicted and predictor variables, (ii) lack of representativeness of the sample of the participating doctors in Nigeria. Samples were drawn only from one State out of 36 states; hence the findings may not be generalised to other parts of the country, (iii) The considerably small sample size in this study may affect its statistical power, (iv) There was the possibility of cognitive and reporting bias based on a subjective approach arising from the questionnaire.

CONCLUSION

This study has shown that 58.4% of the participating doctors demonstrated willingness to get vaccinated against Mpox. Though this rate is above half the number of the participants, there is still room for improvement. All of the socio-demographic variables lacked predictive ability to determine participants' willingness to vaccinate against Mpox, except the medical sub-specialties. Being a general practitioner was associated with greater willingness to get vaccinated. Three psychological variables bordering on fear and risk of Mpox - perception that one can contract Mpox, perception that Mpox will add a new burden on healthcare system of Nigeria, and the perception that Mpox will be a likely occurrence during daily activities were found significant predictors for willingness to be vaccinated against Mpox.

Recommendations

Based on the findings from this study, it is obvious that more efforts need to be made in raising and training medical doctors with the right psyche towards public health strategies to prevent and control Mpox including vaccination. Tailored risk communication and engagement of different sub-medical specialties is therefore highly recommended at both urban and rural communities to ensure Mpox control.

Authors' Contributions

IAA and OGI conceptualized the study. IAA, OPA and EBE designed the study. IAA, EBE and OPA participated in fieldwork and data collection. IAA performed the data analysis and interpreted the data. IAA prepared the first draft of the manuscript, reviewed by OGI, EBE, OPA, and EDE. All authors contributed to the development of the final manuscript and approved its submission.

Disclosure of Conflict of Interest

The authors declare no conflict of interest exist.

Funding Source

None.

APPENDIX 1: QUESTIONNAIRE

Consent - Do you consent to participate in this questionnaire?

Biodata

1. Your age in years (only figures, please)
2. Gender - male or female
3. Education - Highest Education attended
4. Marital Status -Marital Status
5. Employment - Currently, I am employed as:
6. State of Residence - State of residence in Nigeria

7. Occupation – What is your medical specialty?

Knowledge (Yes or No Questions)

1. Mpox (MPX) is caused by a newly discovered virus
2. MPX virus circulates only among primates, including humans
3. In most cases, MPX evolves in an uncomplicated influenza-like illness
4. MPX infections are associated with typical skin lesions
5. Asymptomatic individuals are critical in circulating MPX
6. Until recently, Nigerian cases of MPX have been mostly travel-associated
7. Is there any effective vaccine against MPX available as yet?
8. Are there any effective drugs targeting MPX virus as yet available?
9. Are there any effective drugs targeting MPX virus as yet available?
10. MPX may be transmitted through the respiratory system
11. MPX may be transmitted through the respiratory droplets
12. MPX may be transmitted through body fluids
13. MPX may be transmitted through body contacts
14. The case-fatality ratio of MPX usually ranges between…(options given to choose from)
15. MPX infection is associated with a high rate of systemic complications
16. MPX causes a less severe illness in children (age < 14-year-old) than in adults
17. MPX infection is usually associated with a … lymphadenopathy.
18. The skin rash associated with MPX is typically asynchronous
19. Surface extension and profusion of MPX-associated skin lesions are of prognostic value
20. MPX-associated skin lesions may be differentially diagnosed as … according to their stage
21. Standard preventive measures are effective in preventing MPX infection
22. A clinical case characterized by: (1) atypical skin rash; (2) lymphadenopathy (cervical and/or inguinal); (3) history of travel to countries endemic for MPX
23. A clinical case characterized by: (1) generalized or localized skin rash, either maculopapular or vesiculopustular; (2) umbilicated skin lesions; (3) lymphadenopathy
24. The case-fatality ratio of smallpox usually ranged between… (options given to choose from)
25. MPX is able to survive for several days on contaminated surfaces
26. Where did you first hear of Monkeypox? (Options given to choose from)

Attitudes (Five 5-point Likert items with response range 1= strongly disagree to 5 = strongly agree)

1. I am confident that the world's population can control the monkepox worldwide:
2. I am confident that Nigerian Federal Ministry of Health and local population can control the Monkeypox locally
3. I have bad feelings towards Monkeypox virus that it might become a worldwide pandemic:
4. I think that Monkepox can add new burden on healthcare system of the affected countries
5. I think that Monkepox is another health hoax
6. Monkeypox is shrouded by conspiracy like COVID-19
7. I think that mass media coverage about

Monkepox may have influence on its worldwide prevention:

8. We all should be interested in learning more about Monkeypox:
9. I think that it is dangerous to travel to the country's epidemic with Monkeypox:
10. Do you think you can contract Monkeypox?
11. Are you favourable to deliver Smallpox vaccine for preventing Monkeypox infection?
12. If made available, would you receive Smallpox vaccine for preventing Monkeypox infection?
13. Considering the present realities in the country, how much would you pay for receiving a vaccine against Monkeypox?

Perception

(1. 2, 9 & 10 questionnaire items are 5-Likert scale from "1 = not significant to 5 = very significant"; 3 -8 questionnaire are 10-Likert scale items assessing threat levels from grade 1 = minimum to grade 10 = maximum)

1. According to your current understanding, how you perceive MPX infection in Nigeria: Regarding frequency:
2. According to your current understanding, how you perceive MPX infection in Nigeria: Regarding severity:
3. How would you rate the health threat represented by Monkeypox
4. How would you rate the health threat represented by Sars-CoV-2
5. How would you rate the health threat represented by Tuberculosis
6. How would you rate the health threat represented by Seasonal influenza
7. How would you rate the health threat represented by HIV
8. How would you rate the health threat represented by Hepatitis B
9. From your point of view, in the following 12 months Monkeypox will be a likely occurrence during daily activities
10. From your point of view, in the following 12 months Monkeypox. Will significantly affect your daily activities
11. Are you confident to be able to recognize incident Monkeypox cases during your daily activities?

Extra

1. Have you received COVID-19 Vaccine?

2. Reason why you did not want to take COVID-Vaccine

3. Have you completed your COVID-19 Vaccine dose?

How RPS was calculated: By multiplying perceived severity, derived from a 5-point Likert scale questionnaire (*According to your current understanding, how do you perceive the severity of MPX infection in Nigeria*) by the perceived frequency, derived from another 5-point Likert scale item (*According to your current understanding, how you perceive the frequency of Monkeypox infection in Nigeria*). Both questionnaire items have the same scale range "not significant to very significant". According to Yates, risk perception is defined as a function of the perceived probability of an event and its expected consequences. Risk Perception Score (RPS) was therefore computed as the product of the two items, with a potential range of 1-25.

How Mpox Fear Scale was calculated (MFS; Caycho-Rodriguez et al): The MFS measures the indicators of Mpox fear. Five 5-point Likert items with response range 1= strongly disagree to 5 = strongly agree, and two 5-Likert items with response range 1= not significant to 5 = very significant, giving a total of 7 5-points Likert scales.

The 7 items are: (1) *From your point of view, in the following 12 months, Monkeypox will be a likely occurrence during daily activities*, (2) *From your point of view, in the following 12 months, Monkeypox will significantly affect your daily activities*, (3) *According to your current understanding, how do you perceive the severity of MPX infection in Nigeria*, (4) *According to your*

current understanding, how you perceive the frequency of Monkeypox infection in Nigeria, (5) *I have bad feelings towards Monkeypox virus that it might become a worldwide pandemic*, (6) *I think that Monkeypox can add new burden on healthcare system of the affected countries*, and (7) *I think that it is dangerous to travel to the countries epidemic with Monkeypox*. In the present study, the internal consistency of these 7 items, calculated using Cronbach's Alpha Scale was 0.61.

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