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Knowledge and preventive practices related to Monkey pox among medical doctors in Sokoto metropolis of Sokoto State, Nigeria

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Abstract

Background: For effective control of Monkey pox (Mpox), clinicians need to have adequate knowledge of the disease and adopt appropriate practices to contain it. This study sought to assess the knowledge and practices of medical doctors regarding Monkey pox.
Methodology: A descriptive cross-sectional design was utilized for the study and using a two stage sampling method, 210 medical doctors working in Sokoto metropolis were recruited into the study. A set of structured, pretested and self-administered questionnaire was used to obtain relevant information from the study participants. Data obtained was analyzed using SPSS computer software version 23 with level of statistical significance set at $p<0.05$
Results: All the respondents were aware of Mpox with more than half (52.3%) having the internet as their commonest source of information. The majority, ((72%) of the clinicians had good knowledge and only years of working experience was significantly associated with knowledge of the disease. Preventive practices were well exhibited by all the respondents with the majority (73%) having appropriate preventive practices.
Conclusion and recommendation: This study has demonstrated good knowledge towards Mpox by clinicians in Sokoto metropolis, with a greater majority exhibiting appropriate preventive practices. Sustained awareness and retraining of health care workers in general is necessary to maintain the tempo of high index of suspicion for outbreaks of Mpox and other potential epidemics and also regular use of personal protective equipment

Keywords: Knowledge, appropriate practice, Monkey pox, clinicians, Sokoto

Introduction

Monkey pox (Mpox) is a zoonotic infectious disease caused by the monkeypox virus (MPXV) of the genus Orthopoxvirus, which is a predominantly endemic disease in Western and Central Africa.[1] It was not recognized as a distinct viral infection in humans until 1970, when MPXV was isolated from a patient with suspected smallpox infection in the Democratic Republic of the Congo (DRC).[2] In recent years, specific regions of Africa have witnessed an increase in the frequency and geographic distribution of human Mpox culminating in it being recognized as a disease of increasing public health threat, especially in West Africa due to the close interaction between wild animal reservoirs and humans, particularly in areas where evidence has shown an increasing attack rate of the infection.[3] The Mpox transmission route is through droplets and by contact with skin lesions or contaminated body

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fluids and materials, with an incubation period ranging from 5 to 21 days.[4,5] Moreover, MPXV can be transmitted through the vertical route (i.e mother to fetus).[6,7] Also, preparing or eating meat from an infected animal or the use of its products can spread the disease.[3]

Although the disease's clinical presentation resembles that of smallpox, it is however less severe, characterized by fever, chills, fatigue, headache, lymphadenopathy, back discomfort, myalgia, and skin rash. The extremities are frequently affected by skin lesions, which progresses from maculopapular to vesicles, pustules, and crusts.[8]

The 2022 Mpox outbreak was confirmed in May, 2022 when the first case was detected in the United Kingdom in an individual who was found to have a travel history to Nigeria following which the United Kingdom showed the initial clustering of cases.[4] The outbreak marked the first time the disease had a wide spread outside West and Central Africa. The World Health Organization (WHO) declared Mpox as a Public Health Emergency of International concern on July 23, 2022 and as of 12th April, 2023, a total of 86,956 confirmed cases from over 100 countries were reported, of which 85,502 and 1,454 cases were from locations that have historically not reported Mpox and those who have reported it, respectively.[3] In Nigeria, a total of 829 confirmed cases with 9 deaths have been reported from 26 states since the beginning of 2022.[3] Historically, the largest outbreak of Mpox was reported in Nigeria in 2017 with 197 confirmed cases from 18 states.[9,10]

According to CDC, the risk of Mpox for most front-line healthcare workers is currently low, however, employers should implement protocols to safely care for potentially infected health care workers and those with confirmed infections of monkey pox virus.[11] The increased number of cases reported in the current outbreak underscores the need for clinicians to update their knowledge of this zoonotic infection, including its prevention, clinical management, prophylaxis, and basics of infection control, so as to be able to understand the broader implications of the current outbreak.[12] To the best of our knowledge no study has been carried out in the state amongst medical doctors about Mpox infection. It is in realization of the role of frontline healthcare workers in the control and prevention of MPXV infections that we set out to carry out this study aimed at assessing the knowledge and preventive practices of Medical doctors with regards to Mpox infection in Sokoto metropolis of Sokoto state, Nigeria. It is hoped that findings from this study will facilitate the development of policy briefs that will design programs aimed at equipping the medical doctors with relevant information about MPXV infection and other Orthopox viruses.

Study area

This study was conducted within Sokoto metropolis in Sokoto State, one of the 36 states in Nigeria. The metropolis has one tertiary health institution, Usmanu Danfodiyo University Teaching Hospital (UDUTH) that provides highly specialized medical care, six secondary health facilities and 48 primary health centers. Other hospitals in the metropolis include those operated by the Nigerian Army and the Police and over 38 private health facilities.

Study population

The study population comprised medical doctors working in the health facilities within the metropolis and must have worked for at least six months prior to the commencement of the study (inclusion criteria) while medical doctors who are administrators were excluded from the study.

Study design

A descriptive Cross-sectional design was utilized for the study

Sample size determination

The sample size was calculated using the Cochrane formula for estimating sample size in descriptive studies.[13]

$N=z^2pq/d^2$

Where

n = Minimum sample size in a population of more than 10,000 people.

z = Standard normal deviation at alpha probability (95% confidence interval) =1.96

p = Prevalence of good knowledge of Mpox infection from a previous study[14] = 36.5%.

q = Complementary factor = 1-0.37

d=Accuracy = 5% (0.05)

Using the above formula, a sample size of 358 was obtained.

Adjustment for non-response was done by using anticipated response rate of 90% as follows: ns = n/0.9 =358/0.9 = 398
For a population <10,000:
nf=n/(1+n/N)
nf= 398/1.9
nf= 210
Therefore 210 respondents were recruited into the study.

Sampling technique
To generate the sampling frame, every healthcare facility in the four metropolitan LGAs was identified and listed. The respondents were selected using a two stage sampling technique as follows:
Stage 1: The healthcare facilities were stratified into tertiary (1), secondary (6), and primary healthcare facilities (48). By using simple random sampling, one secondary and tertiary health facility each and 12 PHCs in the metropolis were selected. Thereafter, a proportionate allocation of questionnaires was made to each selected health facility.
Stage 2: Based on the population of the cadre of medical doctors, a proportionate allocation of the questionnaires was made for each of the selected health facilities. After determining the sampling interval, the respondents were then selected using systematic sampling technique.

Instrument and method of data collection
A set of structured, pretested and self-administered questionnaire was used to obtain relevant information from the study participants. The questionnaire has three sections as follows:
Section A: Socio-demographic characteristics of respondents
Section B: Knowledge of respondents regarding Mpox
Section C: Preventive practices of respondents regarding Mpox
Data was collected by Questionnaire survey from the respondents in their various departments and units

Personnel
Six Resident Doctors of the Department of Community Medicine of Usmanu Danfodiyo University Teaching Hospital, Sokoto, were used as research assistants for the data collection. They were trained by the principal researcher for two days; each training session lasted for two hours. The training covered the following: epidemiology of Mpox, general principles of research, objectives of the study, conduct of research, interpersonal communication skills and administration of research instruments.

Pretest
The questionnaire was pretested in other health facilities outside the metropolis. Necessary amendments were made thereafter.
Instruments and method of data analysis
Data collected were manually checked for completeness and then entered into the computer for analysis using IBM SPSS version 25. Continuous variables were summarized as mean and standard deviation, while categorical variables were summarized as frequencies and percentages. Inferential statistical analysis was done where necessary, and the level of statistical significance was set at 5% ($p< 0.05$).
For the knowledge and practice variables; one point was awarded for each correct answer on knowledge and practice, while zero point was awarded for incorrect or negative responses. The scores were converted to percentages and graded. For the knowledge variables, scores < 50 were graded as poor knowledge, 50-69 as fair and scores ≥70 were graded as good knowledge, while scores <60 and ≥ 60 were adjudged as inappropriate and appropriate practices of prevention
Ethical consideration
Ethical approval was sought from the Research Ethics Committee of the Sokoto State Ministry of Health while approval was also obtained from the heads of the various health facilities. Informed verbal consent was obtained from each participant before the commencement of data collection after assurance that all information sought shall be handled with utmost confidentiality.

Results
More than half, (58.0%) of the respondents were within the age group of 25-34 years with a mean age of 35.23±7.308 years. About two third of the respondents were males (68.4%), and registrars constituted the highest number (57.7%) amongst the

cadre of the doctors. Majority, (83.8%) of the respondents worked at the tertiary health facility, and nearly half of the respondents (44.3%), had 1 – 5 years of practice (Table 1). Figure 1 shows that all the respondents (100%) were aware of Monkey pox. The majority (52.3%) of the respondents obtained information concerning the Mpox through the electronic media (Radio and TV), followed by radio and television (42.6%), (Fig. 2).

Concerning the knowledge of the respondents regarding Mpox, the variables that had the highest percent correct response by the respondents were; travel to infected area as a risk factor, the link of Mpox with fever and headache, and skin rash as one of the signs or symptoms of Mpox, with 97.1, 94.8 and 95.2% respectively. Only 42.2% knew that it takes less than 5 days for symptoms to appear after infection (Table 2). Overall, 152(71.7%)

Table 1: Sociodemographic variables of the respondents

Variable	Frequency	Percentage
Age (years)		
25-34	123	58.0
35-44	66	31.1
45-54	17	8.0
55-64	6	2.8
Mean age	35.23±7.308	
Sex		
Male	143	68.4
Female	66	31.6
Cadre/Rank		
House officer	33	15.7
Medical officer	17	8.1
Senior medical officer	15	7.1
Principle medical officer	1	0.5
Registrar	69	32.9
Senior registrar	52	24.8
Consultant	23	110
Place of work		
PHC	2	1.0
Secondary health facility	29	13.8
Tertiary health facility	176	83.8
Years of Practice(years)		
1-5	94	44.3
6-10	66	31.1
>10	52	24.5
Mean years of practice	7.59±6.368	

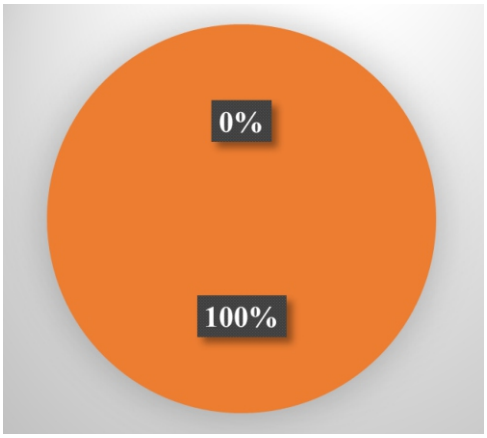

Figure 1: Awareness of Monkeypox among respondents

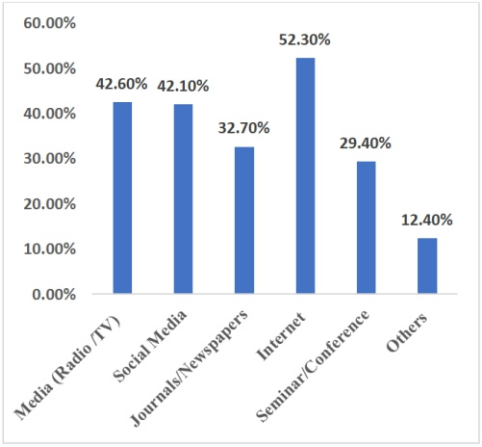

Figure 2: Source of information on Monkeypox

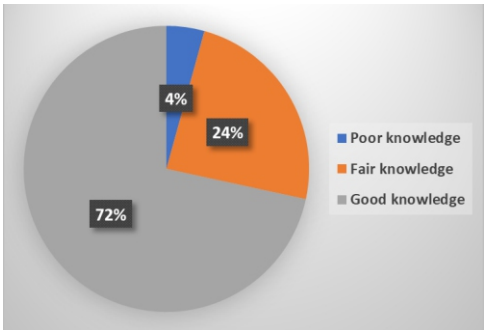

Figure 3: Overall graded knowledge of respondents regarding Monkeypox

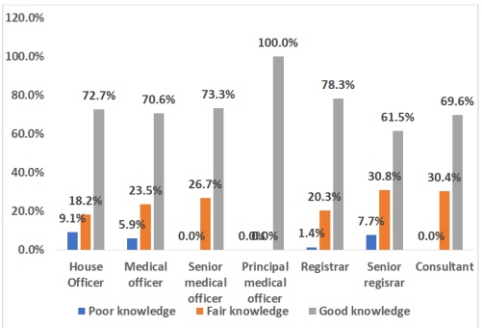

Figure: 4 Knowledge of Monkeypox by respondents' cadre

Table 2: Knowledge of respondents regarding Monkeypox

Variable	Frequency	Percentage
Monkeypox is endemic in Nigeria		
Yes	74	35.2
No	127	60.5
I don't know	9	4.3
Monkeypox is prevalent in Western and Central Africa		
Yes	149	72.3
No	40	19.4
I don't know	17	8.3
Monkeypox is easily transmitted human-to-human		
Yes	169	80.9
No	24	11.5
I don't know	16	7.7
Shaking or touching hands of infected persons can transmit the disease		
Yes	144	68.9
No	50	23.9
I don't know	15	7.2
It can be gotten through the use of objects used by infected persons		
Yes	156	74.3
No	38	18.1
I don't know	16	7.6
Monkeypox is caused by a virus		
Yes	142	67.7
No	53	25.2
I don't know	15	7.1
Monekypox is caused by bacteria		
Yes	50	23.8
No	141	67.1
I don't know	19	9.1
Can be transmitted through blood transfusion		
Yes	154	74.0
No	35	16.8
I don't know	19	9.1
Travels to infected areas is a risk factor		
Yes	204	97.1
No	5	2.4
I don't know	1	0.5
Incubation period is usually 6-16days		
Yes	104	50.0
No	53	24.9
I don't know	53	25.0
It takes less than 5 days for symptoms to appear after an infection		
Yes	87	42.4
No	71	34.6
I don't know	47	22.9
It is associated with fever and headache		
Yes	200	94.8
No	6	3.3
I don't know	4	1.9
Flu like syndrome is one of the early sign or symptoms of monkeypox		
Yes	184	88.5
No	16	7.7
I don't know	8	3.8
Skin rash is one of the signs or symptoms of human monkeypox		
Yes	199	95.2
No	6	2.9
I don't know	4	1.9

Table 3: Association between socio-demographic characteristics of respondents and their knowledge of Mpox

Variable	Poor knowledge	Good Knowledge	Test- statistics	p-value
Age				
25-34	33(55.0)	90(59.2)		
35-44	20(33.3)	46(30.3)	Fisher's exact	0.972
45-54	5(8.3)	12(7.9)		
55-64	2(3.3)	4(2.6)		
Sex				
Male	38(63.3)	105(70.5)	Fisher's exact	0.328
Female	22(36.7)	44(29.5)		
Rank				
House officer	9(15.0)	24(16.0)		
Medical officer/Registrar	20(33.3)	66(44.0)	χ^2=2.948	0.400
Senior medical officer/SR	24(40.0)	43(28.7)		
PMO/consultant	7(11.7)	17(11.3)		
Place of work				
PHC	0(0)	2(1.0)		
Secondary health facility	10(16.7)	19(12.7)	Fisher's exact	0.637
Tertiary health facility	50(83.3)	126(84.0)		
Years of working experience				
0-5	23(38.3)	71(46.7)		
6-10	16(26.7)	50(32.9)	χ^2=8.958	**0.012**
>10	21(35.0)	31(20.4)		

χ^2 Pearson's chi-square; PMO Principal Medical Officer; SR Senior Registrar

Table 4: Predictors of Knowledge of Monkeypox

Variables	aOR	95% CI Lower- Upper	p value
Age (25-44 vs >44*)	1.25	0.718 – 2.170	0.431
Sex (Male vs Female*)	0.626	0.323 – 1.215	0.166
Place of work (PHC/Secondary health facility vs Tertiary health facility*)	1.318	0.678 – 2.562	0.416
Years of experience (1-10 vs >10years*)	0.522	0.288 – 0.945	**0.032**

aOR = Adjusted Odds Ratio **CI** = Confidence Interval * = Reference group

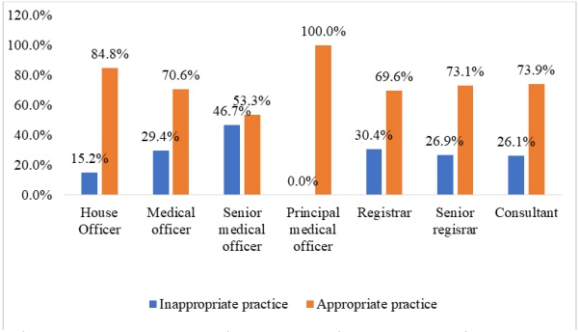

Figure 5: Preventive practice towards Monkeypox by the respondents' cadre

Table 5: Preventive practices of respondents towards monkeypox

Variable	Yes (%)	No (%)
Wearing of facemask at all times while attending to a patient	161(78.2)	45(21.8)
Maintaining hand hygiene at all times	169(82.8)	33(16.2)
Using hand gloves at all times while attending to the patient	175(86.2)	25(12.3)
Washing hands with soap and water after removing gloves	152(74.5)	49(24.0)
Always avoiding touching of eyes with unwashed hands	188(92.2)	9(4.4)
Always avoiding touching of nose/mouth with unwashed hands	119(68.4)	47(27.0)

respondents had good knowledge about Mpox, while only 9 (4.3%) had poor knowledge, with a mean knowledge of 74.7±12.5 (Figure 3). Among the different cadres, principle medical officers had the highest proportion with good knowledge (100%), followed by registrars and senior medical officers (78.3and 73.3% respectively) (Fig. 4). On cross tabulation of the socio-demographic charcteristics with knowledge of Monkey pox, only years of working experience was significantly associated with knowledge of respondents (p=0.012) (Table 3). Doctors who had 1-10 years working experience were (1.8 times) times less likely to have poor knowledge of Mpox than those who had more than 10years working experience (aOR: 0.522; 95%CI = 0.288 – 0.945) (Table 4).

Table 6: Factors associated with the preventive practices of the respondents

Variable	Inappropriate practice	Appropriate practice	Test- statistics	p-value
Age				
25-34	36(62.1)	87(56.5)		
35-44	13(22.4)	53(34.4)	Fisher's exact	0.234
45-54	7(12.1)	10(6.5)		
55-64	2(3.4)	4(2.6)		
Sex			A	
Male	38(65.5)	105(69.5)	χ^2=0.131	0.619
Female	20(34.5)	46(30.5)		
Rank				
House officer	5(8.6)	28(18.3)		
Medical officer/registrar	26(44.8)	60(39.2)	χ^2=3.497	0.321
Senior medical officer/SR	21(36.2)	46(30.1)		
PMO/consultant	6(10.3)	19(12.4)		
Place of work				
PHC	0(0)	2(1.3)		
Secondary health facility	7(12.3)	22(14.4)	Fisher's exact	0.706
Tertiary health facility	50(87.7)	126(82.4)		
Years of working experience				
0-5	22(37.9)	72(46.8)		
6-10	21(36.2)	45(29.2)	χ^2 1.458	0.490
>10	15(25.9)	37(24.0)		
Knowledge score				
Poor knowledge	18(31.0)	42(27.3)	χ^2=0.294	0.610
Good knowledge	40(69.0)	112(72.7)		

χ^2= Pearson's chi-square

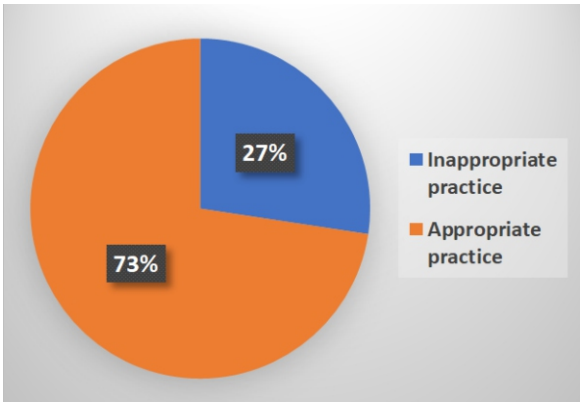

Figure 6: Overall preventive practice of respondents towards Monkeypox

Up to 161(78.2%) of the respondents said they always wear facemasks while attending to patients, 169(82.2%) said they maintained hand hygiene at all times while 188(92.2%) said they avoid touching their eyes with unwashed hands (Table 5). The principal medical officer 1(100) and more house officers 28(84.8%) compared to other cadres of medical doctors carried out appropriate practices of prevention of Mpox while the senior medical officers showed the least 8(53.3%) appropriate preventive measures (Figure 5). Overall, 154(73.2%) of the medical doctors had appropriate practices with regards to the prevention of Mpox (Figure 6). More medical officers/registrars [60(39.2%)] compared to other ranks of the doctors carried out appropriate preventive practices of Mpox while the PMO/Consultant showed the least appropriate preventive measures (Table 6).

Discussion

As the world continues to witness more and more cases of Mpox, the frontline health workers are once again called to action to contain this highly infectious outbreak. The medical doctors who are the gate keepers to the health sector in the country are saddled with the task of establishing appropriate and effective strategies for the control, prevention and treatment of outbreaks including Mpox. To be able to carry out this onerous task, they require the necessary knowledge of the infection. Therefore our study was carried out aimed at assessing the

knowledge and preventive practices of medical doctors in Sokoto metropolis.

In this study, all the respondents (100%) were aware of MPXV and this level of awareness may not be unrelated to the fact that Nigeria had witnessed similar deadly outbreaks in forms of Ebola, Lassa fever and more recently Covid-19 pandemic. Fatalities associated with these outbreaks had been minimal due to the training and re-training of health care workers in general on their control and prevention. In similar studies though among the general public, the awareness was very high and was attributed to the several online public health advisories on the disease.[15,16] The respondents in our study got information about Mpox through the Internet, print and electronic media, social media and seminars which is in agreement with findings from other studies[15,17,18]. The role of these media outlets in the dissemination of health information cannot be over stressed since adequate knowledge generally leads to good practices.

It is interesting to note that the greater majority, 67.7% of our respondents knew that monkey pox was caused by a virus. This is consistent with the findings amongst physicians from Saudi Arabia and Italy with figures of 61.9 and 61.5% respectively.[18,19] In contrast to the figure obtained in our study, other studies observed a value of 92.6% among HCWs in Jordan,[20] and 99% among physicians in Kuwait,[21]

Concerning the transmission route, the majority (74.2%) opined that it can be gotten through contacts with contaminated objects used by persons infected with the Monkeypox virus. This is in agreement with the findings from similar studies elsewhere,[18,22-24]

Overall, 72% of the physicians in our study had good knowledge of Mpox ; however, in contrast to our study, lower levels of knowledge were recorded amongst physicians in Bangladesh, Indonesia, Saudi Arabia, Italy and Ohio USA,[14,25-28]

In a separate study among the general public in Nigeria,[15] it was observed that 58.7% of the study subjects had good knowledge of Mpox which is lower that the level of knowledge observed amongst our respondents and this difference could be attributed to the background of the study subjects. The high level of awareness and knowledge recorded amongst our study subjects may not be unrelated to the fact that Nigeria had seen several outbreaks of similar epidemics in the forms of Ebola, Lassa fever and very recently COVID-19. All these outbreaks must have increased the knowledge and epidemic preparedness of the Nigerian medical workforce. Monkey pox is a re-emerging infectious disease and therefore exposure to the actual cases is critical to having good knowledge, better perception and cognition towards the disease and any other infectious disease in our medical settings.[14,29]

In this study, only years of working experience was significantly associated with knowledge of Mpox amongst the medical doctors. In contrast to our findings, another study amongst Physicians in Saudi Arabia[26] observed that age significantly correlated with high knowledge scores, which increased with age and this was attributed to the fact that Mpox has been around over years and therefore the older generations were more familiar with it.[30]

The practice of appropriate preventive measures by health workers in the hospital setting is a sine qua non if the devastating effects of infectious diseases are to be nipped in the bud. In this study, the majority, 73% of the respondents exhibited appropriate preventive practices towards Monkey pox disease. These preventive practices included wearing of facemask at all times while attending to a patient, provision of facilities for water and sanitation hygiene, the use of hand gloves and avoiding touching eyes, nose and mouth with unwashed hands.

This high level of preventive practices was more amongst the most senior medical doctors including the consultants and principal medical officers. This may not be unrelated to their long years of practice and also the fact that they must have come across similar highly infectious diseases including Lassa, Dengue, Ebola and other hemorrhagic and re-emerging diseases that Nigeria witnessed in the past. No doubt their experiences over the years helped reduced the case fatality rates of these diseases. However, this is not without challenges as some health facilities and the health workers have to work in extremely difficult situations without personal protective equipment which have led to the death of some health workers.

Conclusion

Although Mpox is a re-emerging infectious disease in Nigeria, not much research had been carried out about it, probably due to the low mortality associated with it. Our findings indicate that the clinicians in Sokoto metropolis have high levels of knowledge related to Mpox. Overall, participants in this study reported higher intentions to adopt practices that assisted in limiting the spread of Mpox. The lessons learnt during the previous Ebola outbreak in Nigeria and most recently, the COVID-19 pandemic represents the starting point to deal with this new pathogen and other new zoonotic viruses that may arise in the future.

If the gains of previous control of outbreaks in the country are to be sustained, we must ensure continuous training and re-training of the health workforce, be in a state of epidemic preparedness and ensuring the provision and availability of personal protective equipment to all health workers

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Conflict of Interest: Authors declare that they do not have any conflict of interest.

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