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Knowledge, Infection Prevention Practice, and the Stigma of Monkey Pox Disease among Men Who Have Sex With Men in Rivers State: A Cross-Sectional Study

Golden Owhonda [a,b*], Ihuoma Aaron Wali [b], Chidinma Eze-Emiri [c], Ndubuisi Akpuh [a], Hastings Onu [d], Victor Abiikor [a], Ifeoma Nwadiuto [a,b], Adebola Olayinka [e], Mie Okamura [e], Kumshida Yakubu Balami [e], Olufunmilola Kolude [e], Bosede Ezekwe [e], Chinenye Okafor [e], Victor Oris-Onyiri [e] and Walter Kazadi Mulombo [e]

[a] Public Health and Disease Control Services, Rivers State Ministry of Health, Nigeria.
[b] Department of Community Medicine, Rivers State University, Nigeria.
[c] Department of Epidemiology, School of Public Health, University of Port Harcourt, Rivers State, Nigeria.
[d] Nigeria Field Epidemiology and Laboratory Training Program, Abuja, Nigeria.
[e] World Health Organisation (WHO), Nigeria.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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**Corresponding author;*

ABSTRACT

Background: Monkey pox (Mpox) is a zoonotic viral illness that is endemic to Africa. In contrast to earlier years, the current Mpox outbreak has had an unusually rapid worldwide spread in terms of the number of cases, and most of these cases were among Men who have Sex with Men (MSM). The study aims to assess the knowledge, attitude, practice of infection prevention, and stigma of Mpox disease among members of the MSM community.
Methods: The study was a cross-sectional design. A self-administered questionnaire was given to 498 respondents.
Results: The mean age of the respondents was 30 years; twenty-three (4.6%) of the total respondents identified themselves as female gender. Urban dwellers were 344 (69.1%). Respondents had a good knowledge of both Mpox disease and transmission; an average knowledge of Mpox symptoms; and an average attitude towards prevention and the practice of prevention of Mpox. Age was found to be significantly associated with knowledge of transmission (p-value, 0.015). Mpox infection was evaluated as a low-risk event by most responses, but the existence of both community stigma and self-stigma if infected were rated as high.
Conclusion: The knowledge of Mpox disease and its transmission was good, while the attitude and practice of infection prevention was average. However, the existence of community and self-stigmatization was high; which perhaps may result in the possibility of an iceberg phenomenon of Mpox disease in the MSM community. Community sensitization, advocacy, and key population-friendly services are recommended for the MSM community to improve their general access to healthcare and reduce stigmatisation.

Keywords: Monkey pox; stigmatization; transmission; sexual orientation.

1. INTRODUCTION

Mpox is a viral zoonotic infection endemic to both central and western Africa and occurring in proximity to tropical rainforests. Although the genetic configuration [1] and pathogenesis [2] are similar to smallpox, Mpox presents with a greater degree of lymphadenopathy and is clinically less severe [3]; it also has a lower capacity for human case-to-case spread [4]. The natural host of Mpox virus remains undefined but, rodents, rabbits, prairie dogs, and non-human primates are known reservoirs for the virus [5]. Living near forested areas, handling infected animals, or eating inadequately cooked animal products of infected animals are possible risk factors for zoonotic transmission. Person-to-person spread can occur through direct or close contact, via the placenta from mother to foetus, and possibly through large respiratory droplets [6]. Transmission through direct contact is also suggestive of sexual transmissibility through intimacy [7]; studies by Bragazzi et al. [8] and Thornhill et al. [9] highlight the plausibility of sexual intercourse as an important route of Mpox transmission. The virus is transmissible from when an infected person develops symptoms until the rash fully recovers and a fresh layer of skin forms. The illness typically lasts for a period of two to four weeks [7].

The current Mpox outbreak has been unusual with a rapid spread in the number of cases globally (42,954 cases) compared to previous years. Out of the ninety-five countries with outbreaks, eighty-eight had no previous history of reported cases or known endemicity [10]; a majority of the cases were males who also identified as Men who have Sex with Men (MSM) [9,11]. MSM encompasses a diverse group of individuals based on sexual behaviour, sexual orientation, and the inclusion of transgender men and women based on whether men are defined by sex at birth or current gender identity [12]. They are at an increased risk for Human Immunodeficiency Virus (HIV) and sexually transmitted infections (STIs) because of their sexual network, behavioural factors, and biological factors. These factors may include some anonymous partnerships, multiple concurrent partnerships, condomless sex, anal sex, and/or substance use; and are associated with increased vulnerability to contracting STIs among MSM compared with other groups [13,14]. The plausibility of sexual transmissibility makes the MSM population vulnerable to infection with Mpox.

Disease presentation in the 2022 Mpox outbreak has also been atypical including no or few lesions, which are often localized in the genital or perineal/perianal area, anal pain, and bleeding

[15]. Mpox predominantly occurs in rural areas close to forested regions but, has been increasingly appearing in both urban areas and peri-urban regions with no clear link between reported cases and travel from endemic countries, and no link to infected animals [15].

In Nigeria, confirmed cases of Mpox declined progressively from 2017 to 2020; nevertheless, an exponential increase has been noted in 2022. A total of 398 cases were confirmed between 2017 and 2022, 43.2% (172) of which were reported in 2022; the 12 recorded deaths since September 2017, puts the case fatality rate at 3%. The infection seems to be predominant amongst men (66% of all cases), between the age of 31 – 40 years (approximately 35% of all male cases) in Nigeria. Rivers State bears a considerable burden of Mpox cases in Nigeria; it notably has the highest total number of confirmed cases by State since 2017 (65 cases) and ranks third in reported cases for the year 2022 [16].

Owing to the uncharacteristic occurrence of Mpox within the MSM community, an assessment of knowledge and prevention practice would give insight into public health interventions suitable for the community to mitigate transmission. It is also to be noted that members of this community face criminalisation in Nigeria [17] and are vulnerable to stigma, hence may be unwilling to report infection and seek treatment; this would cause health inequality, especially in a population that is socially marginalized [18]. The study aims to assess the knowledge of Mpox disease; attitude and the practice of prevention, and stigma among members of the MSM community.

2. METHODS

2.1 Study Setting

The study was conducted among the MSM communities in Rivers State, Nigeria.

2.2 Study Design

The study used a cross-sectional design to determine knowledge of Mpox and its transmission and evaluate the attitude, risk perception, and practices towards prevention of Mpox transmission.

2.3 Study Population

The study population was MSM who also identified as a member of the MSM community in Rivers State. The population estimates for MSMs in Rivers state is 56,900 [19].

2.4 Sampling Method

Because the population of interest is a hard-to-reach population, a targeted sampling method was used. Targeted sampling is a non-probability sampling method that relies on ethnographic practices to identify locations within cities for sampling; it identifies individuals in specified targeted areas or populations, who are then approached and screened; and can reach individuals who may not associate in networks (Peterson et al. 2008). Ten persons who were members of different clusters in the MSM community in Rivers State were recruited as data collectors; they were responsible for the distribution of the questionnaires to members of their community, as well as subsequent retrieval.

2.5 Sample Size Determination

The required minimum sample size, (n) was determined using the Cochrane formulae for a cross-sectional study:

$$\mathrm{n} = \frac{\mathrm{z}^2 \times \mathrm{pq}}{\mathrm{d}^2}$$

$where$:

$z = standard\ deviation$
$p = Population\ proportion\ (0.5\ for\ an\ unknown\ proportion)$
$q = 1 - p$
$d = error\ margin\ tolerated$

$$\text{therefore, } \mathrm{n} = \frac{1.96^2 \times (0.5 \times 0.5)}{0.05^2}$$
$$\mathrm{n} = 384$$

The sample size was increased to 422 after consideration of a non-response of 10%. A design effect will not be applied to the sample size calculations because of the peculiarity of the study population.

2.6 Study Instrument

The study will use a self-administered questionnaire using the kobocollect toolbox. The questionnaire has five components with close-ended questions. Socio-demographic responses were categorised; a 3-point rating scale was utilized for responses to questions on the knowledge of Mpox and its transmission, practices towards prevention of transmission;

perception of risk and psychosocial responses were binary in the questionnaire. Response to stigmatization is rated on a 3- point scale of 0 to 2.

2.7 Statistical Analysis

The data were summarised using frequencies and cross-tabulations for descriptive statistics. The data for knowledge, attitude, and practice (KAP) was scored to determine the total KAP. Scores of 60% and above were considered to have either a good knowledge of Mpox, or a good attitude or practice towards prevention; scores between 40% − 59% were categorized as average, and scores below or equal to 39% were classified as poor. A Chi-square test of association was conducted to determine the association between knowledge scores and participant characteristics, all significant variables would be further tested in a regression model.

2.8 Validity and Reliability of Instrument

The questionnaire was peer-reviewed for validity and reliability. The Cronbach Alfa test was conducted, and a minimal criterion of 0.7 indicates good internal consistency [20].

Confidentiality and anonymity: To maintain confidentiality and anonymity of the participants no personal identifier was used. The survey can only be completed once by each respondent, and responses once submitted, cannot be viewed by the respondent.

3. RESULTS

Out of the 509 responses received, 498 were analysed; 11 were discarded for lack of authorized consent. The mean age of the respondents was 30 years; twenty-three (4.6%) of the total respondents identified themselves as female gender and respondents in multiple partner relationships 159 (31.9%). Urban dwellers were 344 (69.1%). More than half the respondents had two or more male sex partners (52.4%). Also, more respondents had one or no cis-gender female sex partners (65.7%). Respondents with unknown HIV status were 128 (25.7%) while 41 (8.2%) respondents were HIV positive. Table 1 summarises the sociodemographic characteristics of the respondents.

3.1 Assessment of the Knowledge of Mpox Disease and Its Transmission

The majority of the respondents –311 (62.4%)— agreed that Mpox disease is a viral infection; 224 (45%) respondents also knew that Mpox is like smallpox. There were over 70% correct responses on questions of Mpox only affecting people that live close to forested areas and those working with animals, as well as Mpox affecting men only.

On the transmission of Mpox, contact during sex was correctly identified by 209 (42.0%) respondents. Table 3 summarises the knowledge of Mpox transmission among the MSM community.

3.2 Attitude towards Mpox Prevention

Majority of respondents –321 (64.5%) believe Mpox is real and is not a means to stigmatise the MSM community (265, 51.4%). Only 173 (34.7%) persons responded that if they have a rash, they will call the helpline. Table 4 describes the complete responses to attitudes towards Mpox prevention.

Most respondents had neither had a Mpox infection –434 (87.1%), known someone confirmed to have had the infection –479 (96.2%) nor someone that may have had Mpox –471 (94.6%).

3.3 Perception of Community and Self-stigmatization

Regarding community stigma, most respondents think having Mpox will cause employment-related problems for people –238 (47.8%); and that infected persons would not want others to know about their condition –230 (46.2%); Table 6 describes the thoughts around community stigma and self-stigma.

3.4 The practice of Prevention of Mpox Transmission

Using condoms to prevent Mpox transmission was affirmed by 290 (58.2%) persons; 306 (61.4%) persons responded that they would avoid sex if they had a rash; but only 225 (45.2%) agreed to isolate if they had a rash as shown in Table 5.

Table 1. Sociodemographic Characteristics of Respondents, N =498 (100)

Variables	n (%)
Age*	30 ± 7.7 (12-71)
≤14	2 (0.4)
15 – 24	131 (26.3)
25 – 44	344 (69.1)
45 – 64	19 (3.8)
≥65	2 (0.4)
Gender Identity	
Male	475 (95.4)
Female	23 (4.6)
Relationship Status	
Single	192 (38.6)
Dating	168 (33.7)
Married	138 (27.7)
Relationship Type	
Monogamous	339 (68.1)
Multiple Partners	159 (31.9)
Highest Educational Level	
None	3 (0.6)
Primary	4 (0.8)
Secondary	230 (46.2)
Tertiary	261 (52.4)
Employment Status	
Student	122 (24.5)
Unemployed	128 (25.7)
Self-employed	150 (30.1)
Employed	94 (18.9)
Retired	3 (0.6)
No Response	1 (0.2)
Residential Area	
Rural	154 (30.9)
Urban	344 (69.1)
HIV Status	
Negative	328 (65.9)
Positive	41 (8.2)
Unknown	128 (25.7)
No Response	1 (0.2)
PREP Use Status	
PREP Use Naive	259 (52.0)
Current PREP User	184 (36.9)
Discontinued PREP Use	53 (10.6)
No Response	2 (0.4)
Any Substance Used This Year	
Yes	61 (12.2)
No	436 (87.6)
No Response	1 (0.2)
Recreational drugs use this year	
None	406 (81.5)
Daily (at least once a day)	44 (8.8)
Weekly (at least once a week)	22 (4.4)
Monthly (at least once a month)	25 (5.0)
No response	1 (0.2)
Alcohol use this year	
None	65 (13.1)
Daily (at least one drink a day)	32 (6.4)
Weekly (at least one drink a week)	358 (69.8)
Monthly (at least one drink a month)	51 (10.2)
Engagement in Sex Work	
Yes	26 (5.2)
No	471 (94.6)
No response	1 (0.2)
Condom Use	
Every time	91 (18.3)
Often	263 (52.8)
Rarely	105 (21.1)
Never	37 (7.4)
No response	2 (0.4)

Variables	n (%)
Any Sexually transmitted infection this year	
Yes	89 (17.9)
No	408 (81.9)
No response	1 (0.2)

**Mean ±SD (IQR)*

Table 2. Knowledge of Mpox Disease, N=498

Questions / Statements	Responses, n (%)			
	Bacteria	**Parasite**	**Virus**	**No Response**
What Causes Mpox?	99 (19.9)	87 (17.5)	311 (62.4)	1 (0.2)
	Yes	**No**	**I Don't Know**	**No Response**
Is Mpox Similar to Smallpox?	224 (45.0)	106 (21.3)	167 (33.5)	1 (0.2)
Is Mpox a New Disease?	102 (20.5)	319 (64.1)	75 (15.1)	2 (0.4)
Mpox only affects people that live close to the forest area	73 (14.7)	377 (75.7)	46 (9.2)	2 (0.4)
Mpox only affects people that live, work with, or hunt animals	87 (17.5)	368 (73.9)	42 (8.4)	1 (0.2)
Mpox only affects men	44 (8.8)	407 (81.7)	45 (9.0)	2 (0.4)
Mpox can be treated	361 (72.5)	54 (10.8)	82 (16.5)	1 (0.2)
There is a vaccine for Mpox	285 (57.2)	46 (9.2)	166 (33.3)	1 (0.2)
Symptoms of Mpox may include				
Rashes	432 (86.7)	65 (13.1)	0 (0.0)	1 (0.2)
Weight Loss	239 (48.0)	258 (51.8)	0 (0.0)	1 (0.2)
Body Sore	268 (53.8)	229 (46.0)	0 (0.0)	1 (0.2)
Headache	187 (37.6)	310 (62.2)	0 (0.0)	1 (0.2)
Genital Rash	140 (28.1)	357 (71.7)	0 (0.0)	1 (0.2)
Vomiting	122 (24.5)	375 (75.3)	0 (0.0)	1 (0.2)
Genital Sore	85 (17.1)	412 (82.7)	0 (0.0)	1 (0.2)
Cough	76 (15.3)	421 (84.5)	0 (0.0)	1 (0.2)
Abdominal Pain	53 (10.6)	444 (89.2)	0 (0.0)	1 (0.2)
Swollen Lymph Node	25 (5.0)	472 (94.8)	0 (0.0)	1 (0.2)
Sore Throat	24 (4.8)	473 (95.0)	0 (0.0)	1 (0.2)

Table 3. Knowledge of Mpox Transmission, N=498

Question	Responses, n (%)		
How is Mpox transmitted?	**Yes**	**No**	**No response**
By contact with an infected animal	368 (73.9)	130 (26.1)	0 (0.0)
From mother to child through the placenta	234 (47.0)	264 (53.0	0 (0.0)
Through close contact with infected humans	303 (60.8)	195 (39.2)	0 (0.0)
By contact during sex	209 (42.0)	289 (58.0)	0 (0.0)
Through contact with wildlife	124 (24.9)	374 (75.1)	0 (0.0)
By eating bush meat	171 (34.3)	327 (65.7)	0 (0.0)
I don't know	40 (8.0)		

Table 4. Attitude Towards Mpox Prevention, N=498

Questions	Responses, n (%)			
	Yes	**No**	**I don't know**	**No response**
Mpox is not real	61 (12.2)	321 (64.5)	116 (23.3)	0 (0.0)
Mpox is a means to stigmatize the MSM community	156 (31.3)	256 (51.4)	84 (16.9)	2 (0.4)
If I have a rash I will:				
Call the helplines	173 (34.7)	325 (65.3)	0 (0.0)	0 (0.0)
Go to a drugstore	351 (70.5)	147 (29.5)	0 (0.0)	0 (0.0)
Go to a health facility	266 (53.4)	232 (46.6)	0 (0.0)	0 (0.0)
Do nothing and see if it will heal	6 (1.2)	492 (98.8)	0 (0.0)	0 (0.0)
If someone I know has a rash I will:				
Call the helplines	160 (32.1)	338 (67.9)	0 (0.0)	0 (0.0)
Advise the person to go to a drugstore	353 (70.9)	145 (29.1)	0 (0.0)	0 (0.0)
Advise the person to go to a health facility	247 (49.6)	251 (50.4)	0 (0.0)	0 (0.0)
Do nothing	4 (0.8)	494 (99.2)	0 (0.0)	0 (0.0)

Table 5. Practise Prevention among the MSM community

Questions	Responses			
I prevent Mpox transmission by:	**Yes**	**No**	**I don't know**	**No response**
Using Condom	290 (58.2)	208 (41.8)	0 (0.0)	0 (0.0)
Avoiding sex if I have a rash	306 (61.4)	192 (38.6)	0 (0.0)	0 (0.0)
By keeping my environment clean	268 (53.8)	230 (46.2)	0 (0.0)	0 (0.0)
By isolating me if I have a rash	225 (45.2)	273 (54.8)	0 (0.0)	0 (0.0)
Social distancing	175 (35.1)	323 (64.9)	0 (0.0)	0 (0.0)
Good Personal Hygiene	159 (31.9)	339 (68.1)	0 (0.0)	0 (0.0)
Avoiding enclosed spaces like saunas and party	77 (15.5)	421 (84.5)	0 (0.0)	0 (0.0)
Avoiding contact with wildlife (Bush Meat)	164 (32.9)	334 (67.1)	0 (0.0)	0 (0.0)

Table 6. Perception of community stigma and self stigma

Questions	Responses				
	Yes	**Maybe**	**No**	**I don't Know**	**No response**
In your community:					
Would having Mpox cause problem for someone to find or keep a job?	238 (47.8)	173 (34.7)	42 (8.4)	43 (8.6)	2 (0.4)
Would someone with Mpox disease worry about others knowing this?	230 (46.2)	177 (35.5)	36 (7.2)	54 (10.8)	1 (0.2)
Does having Mpox cause shame to the person affected?	252 (50.6)	156 (31.3)	23 (4.6)	66 (13.3)	1 (0.2)
Would Mpox cause problem for a person to get married or in an existing marriage?	174 (34.9)	190 (38.2)	57 (11.4)	76 (15.3)	1 (0.2)
Would people try to avoid someone with Mpox?	285 (57.2)	144 (28.9)	13 (2.6)	54 (10.8)	2 (0.4)
Personally:					
Would you avoid people if you have Mpox?	314 (63.1)	116 (23.3)	27 (5.4)	40 (8.0)	1 (0.2)
Would you avoid hiding your illness from others if you have Mpox?	224 (45.0)	163 (32.7)	71 (14.3)	37 (7.4)	3 (0.6)
Would you let people know that you had Mpox after you have been cured?	230 (46.2)	182 (36.5)	35 (7.0)	48 (9.6)	3 (0.6)
Would you be ashamed if you had Mpox disease	243 (48.8)	139 (27.9)	64 (12.9)	51 (10.2)	1 (0.2)
Do you think Mpox would affect your social life if you contract it?	265 (53.2)	134 (26.9)	46 (9.2)	52 (10.4)	1 (0.2)
Would having Mpox prevent you from interacting with people	174 (34.9)	185 (37.1)	90 (18.1)	48 (9.6)	1 (0.2)

3.5 Evaluation of the Knowledge, Attitude towards, and Prevention Practices of Mpox

From the assessment of individual knowledge, respondents collectively had a good knowledge of both Mpox disease and transmission; an average knowledge of Mpox symptoms; and an average attitude towards prevention and the practice of prevention of Mpox. Table 7 depicts the results from the individual evaluation of knowledge, attitude, and practices of Mpox disease and its prevention.

3.6 Assessment of the Perception of Risk, Community Stigma, and Self-Stigma

Following questions on risk and stigma, the average responses rated infection with Mpox as a low-risk event; but the existence of both community stigma and self-stigma if infected were rated as high. Table 8 summarises respondents' perception of stigma if infected with Mpox.

A cross-tabulation of sociodemographic factors and outcome variables showed that people aged 25 – 44 years old were most knowledgeable about Mpox disease, its symptoms, and its transmission. Age was found to be associated significantly with knowledge of transmission ($\chi^2_{(df),\alpha} = 24.928_{(12)}, 0.015$). Relationship status was also significantly associated with all outcome variables –knowledge of Mpox disease, symptoms, and transmission ($16.183_{(6)}, 0.013, 9.493_{(4)}, 0.049, and\ 36.674_{(6)}, 0.000$) r espectively. relationship type and educational level were both significantly associated with knowledge of transmission. Substance and condom use were not associated with any

Table 7. Evaluation of knowledge, attitude, and practices of mpox disease and its prevention

	Knowledge of			Attitude towards Prevention	Practices of Prevention
	Disease	**Symptoms**	**Transmission**		
Mean Score (IQR)	5.4 (0-8)	5.4 (0-10)	3.6 (0-6)	5.4 (2-10)	3.3 (1-8)
Average Grade	Good (67.5%)	Average (45%)	Good (60%)	Average (54%)	Average (41%)
Grade					
Excellent (100%)	29 (5.8)	0 (0.0)	48 (9.6)	1 (0.2)	22 (4.4)
Good (60% - 99%)	349 (70.1)	39 (7.8)	205 (41.2)	228 (45.8)	95 (19.1)
Average (40 – 59%)	66 (13.3)	317 (63.7)	131 (26.3)	212 (42.6)	89 (17.9)
Poor (0 – 39%)	54 (10.8)	142 (28.5)	114 (22.9)	57 (11.4)	292 (58.6)

Table 8. Assessment of the perception of risk, community stigma, and self-stigma

	Community Stigma	**Personal Stigma**
Mean Rating (IQR)	6.4 (0 – 10)	6.9 (0 – 12)
Average Rating	High (64%)	High (57%)
Rating		
High (56 – 100%)	319 (64.1)	310 (62.2%)
Neutral (45 – 55%)	54 (10.8)	47 (9.4%)
Low (0 – 44%)	125 (25.1)	141 (28.3)

Table 9. Cross-Tabulation of Sociodemographic Characteristics and Outcome Variables, N =498 (100)

	Knowledge of Disease					Knowledge of symptoms				Knowledge of transmission				
Variables	**Excellent**	**Good**	**Average**	**Poor**	$\chi^2_{(df),\alpha}$	**Good**	**Average**	**Poor**	$\chi^2_{(df),\alpha}$	**Excellent**	**Good**	**Average**	**Poor**	$\chi^2_{(df),\alpha}$
Age*														
≤14	0 (0.0)	2 (100.0)	0 (0.0)	0 (0.0)	$10.078_{(12)}, 0.580$	0 (0.0)	1 (50.0)	1 (50.0)	$5.115_{(12)}, 0.743$	0 (0.0)	0 (0.0)	0 (0.0)	2 (100.0)	$24.928_{(12)}, 0.015$
15 – 24	5 (3.8)	19 (14.5)	96 (73.3)	11 (8.4)		8 (6.1)	79 (60.3)	44 (33.6)		12 (9.2)	43 (32.8)	47 (35.9)	29 (22.1)	
25 – 44	24 (7.0)	238 (69.2)	43 (12.5)	39 (11.3)		30 (8.7)	223 (64.8)	91 (26.5)		34 (9.9)	151 (43.9)	82 (23.8)	77 (22.4)	
45 – 64	0 (0.0)	12 (63.2)	3 (15.8)	4 (21.1)		1 (5.3)	12 (63.2)	6 (31.6)		2 (10.5)	11 (57.9)	2 (10.5)	4 (21.1)	
≥65	0 (0.0)	1 (50.0)	1 (50.0)	0 (0.0))		0 (0.0)	2 (100.0)	0 (0.0)		0 (0.0)	0 (0.0)	0 (0.0)	2 (100.0)	
Gender Identity														
Male	28 (5.8)	329 (69.3)	65 (13.7)	53 (11.2)	$2.592_{(3)}, 0.423$	39 (8.2)	302 (63.6)	134 (28.2)	$1.866_{(2)}, 0.357$	48 (10.1)	204 (42.9)	121 (25.5)	102 (21.5)	$22.969_{(3)}, 0.000$
Female	1 (4.3)	20 (87.0)	1 (4.3)	1 (4.3)		0 (0.0)	15 (65.2)	8 (34.8)		0 (0.0)	1 (4.3)	10 (43.5)	12 (52.2)	
Relationship Status														
Single	8 (4.2)	140 (72.9)	26 (13.5)	18 (9.4	$16.183_{(6)}, 0.013$	19 (9.9)	112 (58.3)	61 (31.8)	$9.493_{(4)}, 0.049$	7 (3.6)	64 (33.3)	72 (37.5)	49 (25.5)	$36.674_{(6)}, 0.000$
Dating	6 (3.6)	110 (65.5)	26 (15.5)	26 (15.5)		15 (8.9)	115 (68.5)	38 (22.6)		24 (14.3)	75 (44.6)	39 (23.3	30 (17.9)	
Married	15 (10.9)	99 (71.7)	14 (10.1)	10 (7.2)		5 (3.6)	90 (65.2)	43 (31.2)		17 (12.3)	66 (47.8)	20 (14.5)	35 (25.4)	
Relationship Type														
Monogamous	20 (5.9)	239 (70.5)	41 (12.1)	39	$1.541_{(3)}, 0.673$	26 (7.7)	217 (64.0)	96 (28.3)	$0.071_{(2)}, 0.965$	24 (7.1)	133 (39.2)	110 (32.4)	72 (21.2)	$24.675_{(3)}, 0.000$
Multiple Partners	9 (5.7)	110 (69.2)	25 (15.7)	15		13 (8.2)	100 (62.9)	46 (28.9)		24 (15.1)	72 (45.3)	21 (13.2)	42 (26.4)	
Highest Educational Level														
None	0 (0.0)	2 (66.7)	1 (33.3)	0 (0.0)	$12.356_{(9)}, 0.130$	0 (0.0)	2 (66.7)	1 (33.3)	$8.664_{(6)}, 0.143$	0 (0.0)	1 (33.3)	1 (33.3)	1 (33.3)	$27.210_{(9)}, 0.000$
Primary	0 (0.0)	1 (33.3)	1 (33.3)	1 (33.3)		1 (25.0)	1 (25.0)	2 (50.0)		0 (0.0)	2 (50.0)	0 (0.0)	2 (50.0)	
Secondary	10 (4.3)	153 (66.5)	36 (15.7)	31 (13.5)		13 (5.7)	144 (62.6)	73 (31.7)		21 (9.1)	75 (32.6)	61 (26.5)	73 (31.7)	
Tertiary	19 (7.3)	192 (73.6)	28 (10.7)	22 (8.4)		25 (9.6)	170 (65.1)	66 (25.3)		27 (10.3)	127 (48.7)	69 (26.4)	38 (14.6)	
Employment Status														
Student	4 (3.3)	93 (76.2)	19 (15.6)	6 (4.9)	$39.911_{(15)}, 0.000$	13 (10.7)	73 (59.8)	36 (29.5)	$12.931_{(10)}, 0.207$	13 (10.7)	39 (32.0)	46 (37.7)	24 (19.7)	$46.888_{(15)}, 0.000$
Unemployed	12 (9.4)	83 (64.8)	21 (16.4)	12 (9.4)		10 (7.8)	85 (66.4)	33 (25.8)		14 (10.9)	74 (57.8)	25 (19.5)	15 (11.7)	
Self-employed	13 (8.7)	101 (67.3)	11 (7.3)	25 (16.7)		6 (4.0)	96 (64.0)	48 (32.0)		17 (11.3)	59 (39.3)	29 (19.3)	45 (30.0)	
Employed	0 (0.0)	70 (74.5)	14 (14.9)	10 (10.6)		10 (10.6)	62 (66.0)	22 (23.4)		4 (4.3)	31 (33.0)	31 (33.0)	28 (29.8)	
Retired	0 (0.0)	2 (66.7)	1 (33.3)	0 (0.0)		0 (0.0)	1 (33.3)	2 (66.7)		0 (0.0)	2 (66.7)	0 (0.0)	1 (33.3)	
No Response	0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0))		0 (0.0)	0 (0.0)	1 (100.0))		0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0))	
Residential Area														
Rural	11 (7.1)	103 (66.9)	22 (14.3)	18 (11.7)	$1.481_{(3)}, 0.696$	20 (13.0)	92 (59.7)	42 (27.3)	$8.224_{(2)}, 0.016$	17 (11.0)	53 (34.4)	47 (30.5)	37 (24.0)	$4.666_{(3)}, 0.197$
Urban	18 (5.2)	246 (71.5)	44 (12.8)	36 (10.5)		19 (5.5)	225 (65.4)	100 (29.1)		31 (9.0)	152 (44.2)	84 (24.4)	77 (22.4)	
Number Of Male Sex Partners This Year														
None	7 (10.3)	48 (70.6)	6 (8.8)	7 (10.3)	$10.974_{(12)}, 0.531$	1 (1.5)	44 (64.7)	23 (33.8)	$9.662_{(8)}, 0.258$	2 (2.9)	3 (4.4)	27 (39.7)	36 (52.9)	$74.200_{(12)}, 0.000$
1	4 (2.4)	120 (71.0)	23 (13.6)	22 (13.0)		15 (8.9)	105 (62.1)	49 (29.0)		18 (10.7)	72 (42.6)	48 (28.4)	31 (18.3)	
2 To 5	16 (7.2)	153 (69.2)	30 (13.6)	22 (10.0)		19 (8.6)	146 (66.1)	56 (25.3)		24 (10.9)	112 (50.7)	44 (19.9)	41 (18.6)	
6 To 10	2 (6.7)	20 (66.7)	6 (20.0)	2 (6.7)		3 (10.0)	15 (50.0)	12 (40.0)		2 (6.7)	14 (46.7)	8 (26.7)	6 (20.0)	

	Knowledge of Disease					Knowledge of symptoms				Knowledge of transmission				
Variables	**Excellent**	**Good**	**Average**	**Poor**	$\chi^2_{(df),\alpha}$	**Good**	**Average**	**Poor**	$\chi^2_{(df),\alpha}$	**Excellent**	**Good**	**Average**	**Poor**	$\chi^2_{(df),\alpha}$
> 10	0 (0.0)	8 (80.0)	1 (10.0)	1 (10.0)		1 (10.0)	7 (70.0)	2 (20.0)		2 (20.0)	4 (40.0)	4 (40.0)	0 (0.0)	
HIV Status														
Negative	16 (4.9)	248 (75.6)	31 (9.5)	33 (10.1)	$28.911_{(9)}, 0.001$	30 (9.1)	202 (61.6)	96 (29.3)	$12.838_{(6)}, 0.034$	25 (7.6)	119 (36.3)	89 (27.1)	95 (29.0)	$34.532_{(9)}, 0.000$
Positive	4 (9.8)	21 (51.2)	12 (29.3)	4 (9.8)		3 (7.3)	21 (51.2)	17 (41.5)		9 (22.0)	20 (48.8)	6 (14.6)	6 (14.6)	
Unknown	9 (7.0)	80 (62.5)	23 (18.0)	16 (12.5)		6 (4.7)	94 (73.4)	28 (21.9)		14 (10.9)	66 (51.6)	35 (27.3)	13 (10.2)	
No Response	0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0)		0 (0.0)	0 (0.0)	1 (100.0)		0 (0.0)	0 (0.0)	1 (100.0)	0 (0.0)	
PREP Use Status														
PREP Use Naive	18 (7.0)	182 (70.3)	36 (13.9)	23 (8.9)	$10.500_{(9)}, 0.307$	15 (5.8)	158 (61.0)	86 (33.2)	$15.814_{(6)}, 0.009$	25 (9.7)	93 (35.9)	60 (23.2)	81 (31.3)	$39.361_{(9)}, 0.000$
Current PREP User	9 (4.9)	127 (69.0)	21 (4.9)	27 (14.7)		14 (7.6)	129 (70.1)	41 (22.3)		19 (10.3)	94 (51.1)	44 (23.9)	27 (14.7)	
Discontinued PREP Use	2 (3.8)	39 (73.6)	9 (17.0)	3 (5.7)		10 (18.9)	29 (54.7)	14 (26.4)		4 (7.5)	18 (34.0)	25 (47.2)	6 (11.3)	
No Response	0 (0.0)	1 (50.0)	0 (0.0)	1 (50.0)		0 (0.0)	1 (50.0)	1 (50.0)						
Engagement in Sex Work														
Yes	1 (3.9)	17 (65.4)	4 (15.4)	4 (15.4)	$9.172_{(6)}, 0.338$	4 (15.4)	10 (38.5)	12 (46.2)	$11.102_{(4)}, 0.012$	5 (19.2)	8 (30.8)	7 (26.9)	6 (23.1)	$6.539_{(6)}, 0.344$
No	28 (5.9)	332 (70.5)	62 (13.2)	49 (10.4)		35 (7.4)	307 (65.2)	129 (27.4		43 (9.1)	197 (41.8)	123 (26.1)	108 (22.9)	
No response	0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0)		0 (0.0)	0 (0.0)	1 (100.0)		0 (0.0)	0 (0.0)	1 (100.0)	0 (0.0)	
Condom Use														
Every time	2 (2.2)	65 (71.4)	16 (17.6)	8 (8.8)	$15.795_{(12)}, 0.201$	9 (9.9)	55 (60.4)	27 (29.7)	$14.518_{(8)}, 0.053$	3 (3.3)	31 (34.1)	28 (30.8)	29 (31.9)	$45.317_{(12)}, 0.000$
Often	23 (8.8)	180 (68.4)	32 (12.2)	28 (10.7)		11 (4.2)	177 (67.3)	75 (28.5)		36 (13.7)	128 (48.7)	53 (20.2)	46 (17.5)	
Rarely	4 (3.8)	73 (69.5)	14 (13.3)	14 (13.3)		13 (12.4)	61 (58.1)	31 (29.5)		9 (8.6)	35 (33.3)	30 (28.6)	31 (29.5)	
Never	0 (0.0)	4 (10.8)	30 (81.1)	3 (8.1)		6 (16.2)	23 (62.2)	8 (21.6)		0 (0.0)	11 (29.7)	18 (48.6)	8 (21.6)	
No response	0 (0.0)	1 (50.0)	0 (0.0)	1 (50.0)		1 (50.0)	0 (0.0)	1 (50.0)		0 (0.0)	0 (0.0)	2 (100.0)	0 (0.0)	
Any Sexually transmitted infection this year														
Yes	7 (7.9)	52 (58.4)	13 (14.6)	17 (19.1)	$18.419_{(6)}, 0.008$	6 (6.7)	61 (68.5)	22 (24.7)	$4.032_{(4)}, 0.437$	13 (14.6)	46 (51.7)	16 (18.0)	14 (15.7)	$13.982_{(6)}, 0.013$
No	22 (5.4)	297 (72.8)	53 (13.0)	36 (8.8)		33 (8.1)	256 (62.7)	119 (29.2)		35 (8.6)	159 (39.0)	114 (27.9)	100 (24.5)	
No response	0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0)		0 (0.0)	0 (0.0)	1 (100.0)		0 (0.0)	0 (0.0)	1 (100.0)	0 (0.0)	

outcome variable. Engagement in sex work and prep use status were significantly associated with knowledge of symptoms ($\chi^2_{(df),\alpha} = 11.102_{(4)}, 0.012\ and\ 15.814_{(6)}, 0.009$) respectively. Table 9 summarises the cross-tabulation of sociodemographic characteristics and outcome variables.

4. DISCUSSION

This study reported on the knowledge of Mpox disease and the attitude and practices towards prevention of Mpox among 498 participants. The average age of respondents was 30 years with most persons (69.1%) in the 25 – 44 years category. There were two early adolescent respondents. Most respondents identified as male (95.4%) and not in a relationship (38.6%). Almost all study participants were educated (98.6%), with 49% in some form of employment. Reportedly, 52.4% had sexual relations with more than one male partner, and 34.3% with more than one female partner. This is possibly the first globally reported study of Mpox disease among MSM in Nigeria.

Our study showed *good knowledge (67.5%)* of Mpox disease among the MSM community which may be a result of the endemicity of the disease in Nigeria, the ongoing high level of sensitization, and most importantly, following the declaration of Mpox as a disease of Public Health Emergency of International Concern (PHEIC) by the World Health Organization [6]. The latter might have played a more significant role in increasing awareness and boosting knowledge of the disease in general society [21]. Similarly, studies assessing the knowledge of Mpox disease among MSM in China showed that the knowledge of Mpox can be compared with the general population but pointed out that there was still a significant lack of knowledge about the susceptible groups, clinical symptoms, and preventive measures [22]. Al-Mustapha et al in Nigeria collaborated our findings in their study of Mpox disease in the general population and found a high to adequate knowledge of Mpox in the studied cluster [23]; however, Wogu et al., [24] on the assessment of media coverage of Mpox disease in southern Nigeria, showed that the respondents had little or no knowledge of Mpox in the overall. These studies were carried out before the recent global outbreak of Mpox disease and the declaration as a disease of PHEIC, elucidating the varied levels of knowledge among the population. Findings from this study showed that relationship status, employment status, HIV status, and infection with an STI in the current year were significantly associated with knowledge of Mpox disease.

Although there is a lack of clear information on specific routes of animal-to-human transmission as well as the range of potential reservoir hosts [21], 73.9% of study participants rightly responded that Mpox disease is transmitted by contact with an infected animal, close contact with infected humans were correctly identified by 60.8% while contact with wildlife and eating bush meat was correctly identified by 75.1% and 65.7% respectively. This justified the summary of *good knowledge* (60%) of Mpox disease transmission but was quite like the previous study on the general population which showered that despite the high awareness rate, only 58.7% of them had a good knowledge of the incubation period, symptoms, route of transmission, and preventive practice [23].

The respondents had an average attitude towards the prevention of Mpox (54%); general practices towards prevention were also average (41%) with most persons (58.2%) having a poor response to prevention practices. Evidence from Shen et al. [25] revealed the existence of individual barriers such as lack of HIV/STI-related knowledge and substance use; interpersonal-level barriers where safe sex was an indication of distrust; and structural-level barriers that may include power imbalance in the sexual relationship; as reasons for unsafe sexual practices among MSM. These can be extrapolated to the attitude and prevention practices found among the community in this study.

In the recent outbreak of Mpox disease in Europe, it was reported that MSM made up a greater proportion of those infected with the disease and the media associated the communities of MSM with Mpox; this could lead to the stigmatization of persons with the Mpox disease, especially men [26]. The existence of community and self-stigmatization was rated very high (64% and 57% respectively) by the respondents. Also, most persons responded positively (48%) to the feeling of shame if infected by Mpox. This perception of stigma and shame would make individuals who are infected with Mpox not seek healthcare promptly [27]. There is a risk of an outbreak of Mpox disease causing heightened discrimination and stigmatization of MSM due to the misconception that the disease is spread by having sexual

intercourse with the same sex [28,21], whereas, the transmission of the disease is not limited to same sex transmissions alone. This would lead to health inequality among this population of men and result in the spread of the epidemic since they may not be willing to seek formal healthcare [21]. Moreso, in this study, 45% of respondents reported that they would hide their illness from other people and only mention it when they are cured. Although more than half of the respondents (53.4%) said they would visit a health facility if they had rashes on their bodies, a smaller proportion (1.2%) said they would do nothing about it, making prompt detection and containment difficult. Therefore, this justifies the concept of an iceberg phenomenon [29] in Mpox disease, and transmission of the infection could continue unabated within the closed community as a result of poor detection, and late or no deployment of counter measures. The current global outbreak of Mpox has re-emphasized the importance of emerging and re-emerging zoonotic diseases which have been attributed to climate change affecting the vector dynamics as well as urbanization which increases the human, animal, and environmental interface.

5. CONCLUSION

The study found that in the MSM community in Rivers State, the knowledge of Mpox disease and its transmission was good while the attitude and practice of infection were average. However, the existence of community and self-stigmatization was high and may adduce to the possibility of an iceberg phenomenon of Mpox disease in the MSM community. The knowledge of Mpox disease was significantly associated with both relationship status and HIV status.

6. RECOMMENDATION

Community sensitization, advocacy, and community dialogue are recommended for the MSM community to improve their general access to care. Moreover, key population-friendly services should be readily available to reduce stigma, and improve diagnosis and prompt treatment of Mpox disease among the MSM population; other strategies of preventive interventions such as equitable vaccine deployment should also be prioritized.

CONSENT

Informed Consent was obtained from each participant.

ETHICAL APPROVAL

Ethical approval was obtained from Rivers State Ministry of health.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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