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Cholera Outbreak amongst Migrants in Vulnerable Communities - A Call for Vaccination Upscale and Risk Assessment in Southwestern Nigeria

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Annotation: **Introduction:** The continued prevalence of cholera outbreaks and cholera-related mortality in Nigeria despite the vast improvements in health globally has necessitated the need for mass immunization of affected communities with cholera vaccines. Although the initiative was initially criticized, mass immunization has gained traction in preventing cholera. Migrant populations constitute a population that is vulnerable to epidemics due to their sub-standard lifestyle and poor living conditions. To understand how protected migrants are from outbreaks such as cholera, we must gauge the level of vaccination uptake and acceptance among this group.

Methods: A cross-sectional study was conducted in four local government areas of Oyo State between October and November 2024, among migrant communities. Data was collected using

an interviewer-administered, semi-structured questionnaire with sections eliciting responses to questions on the socio-demographic characteristics, their knowledge and awareness of cholera and the vaccination. In addition, the respondents were quizzed to ascertain if they had received the cholera vaccine. Descriptive statistics were used to present the data, while simultaneously carrying out chi-square tests at a significance level of 5%.

Results: Most of the respondents were males (55.4%), aged between 30 and 39years (26.9%). While 48.9% of responses came from Benin Republic nationalities, only 38.1% had formal education. At one time or another, 68.1% of the population knew about cholera. Awareness in the existence of the National Health Insurance Scheme was significantly associated with awareness about the cholera vaccine ($p<0.001$). Enrollment in the scheme however was not significantly associated with awareness about the cholera vaccine ($p=0.12$).

Conclusion: Prevention demands a multi-faceted strategy for cholera outbreaks. With the help of cholera vaccines, a preventive strategy receiving attention lately is mass immunizations. To draw attention to this approach, more should be done among Christians and the employed populations.

Keywords: cholera, migrant populations, outbreaks, vaccination, vulnerable populations, risk assessment, epidemics.

INTRODUCTION

Cholera, a disease caused by the bacterium Vibrio cholera, is an acute infection that continues to be a global health concern and a reminder of the disparity in the levels of advancement in heath between advanced countries and developing, low-income countries (1). While in many advanced countries, the disease that is caused by water and food contaminated by feces is virtually unheard of in developed countries, while it remains endemic in Africa and some developing parts of South and Central America (2). The disease, which leaves up to three-quarters of those infected with no symptoms, can lead to acute diarrhea with severe dehydration in as many as 20% of those infected. Furthermore, in low-hygiene settings, the fecal-oral transmission route of the disease makes the spread of the bacterium particularly virulent (3).

The incidence of cholera, as noted earlier, has decreased to minimal levels in advanced countries, a feat that has not been replicated in developing countries. Research into the causes of cholera has

shown that high risk areas include coastal areas, places with poor sanitation and inadequate water networks. Areas that are particularly susceptible to cholera outbreaks are places with mass migration of people such as Internally Displaced People (IDP) camps, refugee camps, disaster hit and war ravaged areas (4,5). Even within developing countries, the incidence of cholera is concentrated in densely populated areas with low levels of hygiene. In these areas, the spread of bacterium is aided by the state of the impoverished people left without sources of clean water (4,6).

Such areas are on the rise in several cities in South-West Nigeria due to the rural-urban migration and in certain cases, the inter-regional but intra-country migration. While the former has been around for several years due to what is perceived to be a more favorable agricultural and business climate in Southern Nigeria, the latter has recently been on the increase due to the Boko Haram insurgence which has sparked the mass exodus of Northerners to South-West Nigeria (7). These developments have led to an increase in the migrant population in this region. As documented by other studies, migrant communities or clusters are usually urban slums characterized by a lack of basic amenities such as access to clean water sources and sanitary services. Further exacerbating their risk of contracting cholera is their usually low socio-economic and educational status which mean that in many cases they cannot afford to construct these facilities for themselves (8–10). As such, special attention needs to be given to these areas in the development of cholera prevention strategies.

Prioritizing the prevention of cholera over management of the disease has been accepted as best practice as prevention protects the population from unnecessary fatality and morbidity. The means to achieve this has, however, split stakeholders into factions. While the generally accepted first step in the prevention of cholera is raising the hygiene and sanitation levels of a community, preventive measures that should be employed in cases when this first step cannot be immediately achieved, such as in IDP and urban slums, have been a subject of debate for some time (5).

A particularly controversial preventive measure has been the mass immunization of populations using cholera vaccines. Although initial pessimism greeted the idea of mass immunizations using cholera vaccines, subsequent advancements in health technology and successful demonstrations of such mass immunizations have revealed that the cholera vaccine can indeed be an effective cholera prevention strategy (3,11). Cholera vaccines have, for example, been successfully used as a preventive strategy in cases such as the post-war South Sudan and Post-earthquake Haiti (11–13). Despite its increasing popularity, little research has been conducted to ascertain the awareness and use of cholera vaccination among the different population segments in Nigeria especially among high-risk populations like migrants. This study seeks to provide this information among the migrant population in Oyo State, Nigeria.

Methods

The study was carried out in Oyo North senatorial district, located in Oyo North of Oyo State Nigeria. The district consists of six Local Government Areas (LGA); Atisbo, Itesiwaju, Iwajowa, Kajola, Saki East and Saki West Local Government Areas. A cross-sectional study was conducted in four of the local government areas; Atisbo, Itesiwaju, Iwajowa and Saki West respectively, between October and November 2024 to understand how protected they are from cholera, and their level of cholera vaccination acceptance (14). In Itesiwaju, Atisbo, and Saki East LGA the residents are mostly farmers and others engaged in trading, hawking and agricultural processing (16,17). The rural community of Itesiwaju lacks the basic amenities and has a low-density population (15). The Asabari Hill is a prominent relief feature, and the vegetation is savannah. The study area shares boundary with Atisbo, and Saki East Local Government Areas. Farming is the main occupation of most people in these areas.

The study included migrant populations in these local government areas who had arrived in their current location at least six months prior to the data collected. The sampling method used was multistage sampling technique. The first stage involved a purposively sampling of the four local government areas, Atisbo, Itesiwaju, Iwajowa and Saki West based on the high migrant settlement

in these LGAs. In addition, cluster sampling was used to select enumeration areas and all respondents in the selected communities in each of the local government areas were interviewed.

A semi-structured interviewer-administered questionnaire was used to collect data for the study. The questionnaire questions on the socio-demographic characteristics of the respondents, their awareness of cholera as a disease and cholera vaccination. In addition, the respondents were quizzed to ascertain if they had received the cholera vaccine. The questionnaire was translated into Yoruba Language before it was back translated into English Language by an independent translator to ensure accuracy. The questionnaire was pre-tested among migrant population in another senatorial district prior to the main survey. The interviewers recruited for the study were trained at a 2-day training course on the administration of the questionnaire using question-and-answer sessions, lectures, and role plays. Interviewers recruited had completed some form of post-secondary education. The interview was conducted in a secluded area in the house at a time convenient for the respondents.

Analysis was carried out using Statistical Package for Social Sciences (SPSS) software version 21. Data collected were analyzed using descriptive statistics such as frequency counts and percentages, while Chi-square test was used as inferential statistical tool to test association between categorical independent and dependent variables. Statistically significant associations were recorded at 5%.

Results

The majority of the respondents (55.4%) were males. Almost half (48.9%) of the respondents were from Benin Republic while Nigerians formed the next most common nationality with 41.9% of the respondents. The least common age bracket was 50 years and older while 30-39 years was the most common age bracket (26.9%). The majority (81.4%) were married while farming was the most common occupation among the respondents (53.3%). More than half (53.9%) of the respondents earned 10,000 Naira or less per month (Table 1).

Table 1: Socio-demographic characteristics of the respondents [N=323]

Variables	n	%
Sex		
Male	179	55.4
Female	144	44.6
Age Group (years)		
<20	58	18.0
21-29	71	22.0
30-39	87	26.9
40-49	57	17.6
≥50	50	15.5
Nationality		
Benin Republic	158	48.9
Nigerian	135	41.9
⌠Others	30	9.2
Religion		
Islam	189	58.5
Christianity	134	41.5
Marital Status		
Married	263	81.4
Single	60	18.6
Educational Status		
No formal education	200	61.9
Formally educated	123	38.1
Occupation		

Farming	172	53.3
Trading	68	21.0
∫Others	53	16.4
Unemployed	17	5.3
Mining	13	4.0
Average monthly income		
**≤10,000	174	53.9
≥10,000	149	46.1

**All costs are in Naira (At the time of this study, $1=₦750); ∫=plumbers, electricians, and carpenters; ⌠= Ghanaians and Togolese.

Analysis of the dependent variables showed that more than two-thirds (68.1%) of the respondents had heard about cholera at one time or the other. However, only 48.3% of them had seen or heard of cholera vaccination. Of the 156 respondents who had heard of cholera vaccination before, only a little over a quarter (26.3%) of them had been vaccinated (Table 2).

Table 2: **Awareness of cholera and cholera vaccination (N=323)**

Variables	n	%
Heard about cholera (N=323)		
Yes	220	68.1
No	103	31.9
Aware of Cholera Vaccination (N= 323)		
Yes	156	48.3
No	167	51.7
Received cholera vaccine (N=156)		
Yes	41	26.3
No	115	73.7

Analysis of the socio-demographic variables showed that slightly higher proportions of males (p=0.22), respondents from other nationalities (p=0.17), Muslims (p=0.43) and currently single respondents (p = 0.51) had heard about malaria than their counterparts. The differences in these proportions were, however, not statistically significant. On the other hand, statistically significant higher proportions of educated (p< 0.001) respondents as well as those with higher income (p=0.003) had heard about cholera before (Table 3).

Table 3: Ever Heard of Cholera and factors amongst participants (N=323)

Variables	Heard About Cholera		p-value
	Yes n (%)	No n (%)	
Sex			**0.22**
Male	127 (70.9)	52 (29.1)	
Female	93 (64.6)	51 (35.4)	
Nationality			**0.17**
Nigerian	97 (71.9)	38 (28.1)	
Benin Republic	100 (63.3)	58 (36.7)	
⌠Others	23 (76.7)	7 (23.3)	
Religion			**0.43**
Christianity	88 (65.7)	46 (34.3)	
Islam	132 (69.8)	57 (30.2)	
Marital Status			**0.51**
Married	177 (67.3)	86 (32.7)	
Single	43 (71.7)	17 (28.3)	
Educational status			**< 0.001***

Uneducated	122 (61.0)	78 (39.0)	
Educated	98 (79.7)	25 (20.3)	
Occupation			**0.12**
Trading	45 (66.2)	23 (33.8)	
Farming	115 (66.9)	57 (33.1)	
Mining	11 (84.6)	2 (15.6)	
∫Others	33 (62.3)	20 (37.7)	
Unemployed	16 (94.1)	1 (5.9)	
Average monthly income			**0.003***
**≤10,000	106 (60.9)	68 (39.1)	
≥10,000	114 (76.5)	35 (23.5)	
Awareness of NHIS[1]			**0.003***
Aware	30 (90.9)	3 (9.1)	
Unaware	190 (65.5)	100 (34.5)	
Enrollment in NHIS			**0.04***
Enrolled	12 (92.3)	1 (7.7)	
Not enrolled	208 (67.1)	102 (32.9)	

*Significant associations; ∫=plumbers, electricians, and carpenters; **All costs are in Naira (At the time of this study, $1=₦750); ⌠= Ghanaians and Togolese.

The results further show that a statistically significant higher proportion of Muslims (p=0.03) were aware of cholera vaccination as opposed to their Christian counterparts. Similarly, more unemployed respondents (p=0.009) were aware of the vaccine than their employed counterparts. Differences in the proportions of average income (p= 0.26) and enrollment in NHIS (p=0.12) were not found to be statistically significant to the awareness of the cholera vaccine (Table 4).

Table 4: Factors influencing awareness of cholera vaccine amongst participants (N=323)

	Awareness About Cholera Vaccine		
	Yes	**No**	
Variables	n (%)	n (%)	p-value
Sex			**0.31**
Male	91 (50.8)	88 (49.2)	
Female	65 (45.1)	79 (54.9)	
Nationality			**0.14**
Nigerian	70 (51.9)	65 (48.1)	
Benin Republic	68 (43.0)	90 (57.0)	
Others	18 (60.0)	12 (40.0)	
Religion			**0.03***
Christianity	55 (41.0)	79 (59.0)	
Islam	101 (53.4)	88 (46.6)	
Marital Status			**0.78**
Married	128 (48.7)	135 (51.3)	
Single	28 (46.7)	32 (53.3)	
Educational Status			**0.41**
Uneducated	93 (46.5)	107 (53.5)	
Educated	63 (51.2)	60 (48.8)	
Occupation			**0.009***
Trading	28 (41.2)	40 (58.8)	
Farming	74 (43.0)	98 (57.0)	
Mining	8 (61.5)	5 (38.5)	
∫Others	22 (51.2)	21 (48.8)	

Unemployed	14 (51.9)	13 (48.1)	
Average monthly income			**0.26**
**≤10,000	79 (45.4)	95 (54.6)	
≥10,000	77 (51.7)	72 (48.3)	
Awareness of NHIS			**0.001***
Aware	25 (75.8)	8 (24.2)	
Unaware	131 (45.2)	159 (54.8)	
Enrollment in NHIS			**0.12**
Enrolled	9 (69.2)	4 (30.8)	
Not enrolled	147 (47.4)	163 (52.6)	

*Significant associations; ∫=plumbers, electricians, and carpenters; **All costs are in Naira (At the time of this study, $1=₦750)

Generally low proportions of respondents were found to have received the cholera vaccine. With regard to nationality, less respondents from Benin Republic (25.0%) and Nigeria (26.7%) had received the vaccine than respondents from other countries (p=0.77). However, less educated respondents had received the vaccine than uneducated respondents (p=0.56). No statistically significant results were observed from the socio-demographic variables (Table 5).

Table 5: Factors influencing cholera vaccination uptake among participants (N=156)

Variables	Received Cholera Vaccine			
	Yes	No		
	n (%)	n (%)		p-value
Sex				**0.98**
Male	24 (26.4)	67 (73.6)		
Female	17 (26.2)	48 (73.8)		
Nationality				**0.77**
Nigerian	18 (26.7)	52 (74.3)		
Benin Republic	17 (25.0)	51 (75.0)		
Others	6 (33.3)	12 (66.7)		
Religion				**0.58**
Christianity	13 (23.6)	42 (76.4)		
Islam	28 (27.7)	73 (72.3)		
Marital Status				**0.76**
Married	33 (25.8)	95 (74.2)		
Single	8 (28.6)	20 (71.4)		
Educational Status				**0.56**
Uneducated	26 (28.0)	67 (72.0)		
Educated	15 (23.8)	48 (76.2)		
Occupation				**0.32**
Trading	9 (32.1)	19 (67.9)		
Farming	20 (27.0)	54 (73.0)		
Mining	4 (50.0)	4 (50.0)		
Others	7 (28.0)	25 (72.0)		
Unemployed	1 (7.1)	13 (92.9)		
Average monthly income				**0.78**
**≤10,000	20 (25.3)	59(74.7)		
≥10,000	21 (27.3)	56 (72.7)		
Awareness of NHIS				**0.20**
Aware	4 (16.0)	21 (84.0)		
Unaware	37 (28.2)	94 (71.8)		

Enrollment in NHIS				**0.62**
Enrolled	3 (33.3)	6 (66.7)		
Not enrolled	38 (25.9)	109 (74.1)		

**All costs are in Naira (At the time of this study, $1=₦750); ∫=plumbers, electricians, and carpenters

Discussion

Cholera is an endemic disease in Nigeria, it has plagued Nigeria with multiple outbreaks causing high mortality rate of the years. As a result, all avenues of prevention must be used to curb the disease. Cholera vaccines is one of the recent prevention techniques, involves mass immunization of communities which have been proven effective. Initially, the WHO overlooked the use of cholera vaccines due to doubts about their efficacy and affordability. The objective of this study was to investigate the popularity of cholera vaccination as a preventive measure against cholera outbreaks among the migrant population in Oyo State. The socio-demographic profile of the respondents' shoe trends that are common among migrant populations in Nigeria. For example, other studies have shown that migrant populations are usually less educated than the average indigene (18,19). The lower likelihood of government locating free public schools in these areas could also contribute to the lower educational status found among migrants. The direct link between education and socio-economic status could also imply that the less educated are poorer and thus more likely to migrate than their more educated and hence richer counterparts. This trend was also observed in this study. Similarly, the low purchasing power observed among the majority of the respondents in this study (less than $1 a day) has also been detected in other studies (20,21). The predominance of farming as the main occupation of the respondents also supports what other studies have observed to be a preference for farming activities among migrants to South-West Nigeria (22).

The awareness of the respondents of cholera as a disease in this study, although above average, is still less than awareness of respondents in similar settings about related water-related diseases. For instance, in Mozambique, awareness of schistosomiasis was as high as 95% (23). This lower awareness of cholera among respondents could be linked to the lower educational status as the less educated have been observed to report lower awareness levels on health issues. However, the awareness of respondents in this study about cholera vaccines is higher than what was reported in the Democratic Republic of Congo (DRC) (24). The fact that the DRC study was conducted 3 years before this study could however be responsible for the lower awareness reported. The higher proportion of those aware of NHIS who were also aware of the vaccine could be an indication that health education and information among migrant populations cut across several areas. The same trend was observed among actual NHIS enrollees, who had a higher proportion of members aware of the cholera vaccine. The increased interaction of the NHIS enrollees with the health system could be responsible for this.

The uptake of the cholera vaccine was lower than those found in studies in similar settings (24,25). A point to note about these studies is that they were carried in sites where mass cholera vaccination campaigns had been carried out. An interesting point from this study is that unlike in other studies, a higher proportion of uneducated respondents than educated respondents had actually received the cholera vaccine. This is surprising because education is almost always linked to higher acceptability to vaccines. However, it could be these uneducated people are more likely to be targeted by health programs (26).

A limitation of this study is that the results cannot be considered as representative of the migrant population in all areas in the country as this study involved only migrants in Oyo State. It is possible that the situation differs among migrant populations in other states. In addition, this study did not consider the health system factors such as availability of cholera vaccines in health centers that could impact on the popularity of the vaccine among migrants. Similarly, additional exploratory research may be needed in order to understand if socio-cultural barriers to receiving

the vaccine exist as this may necessitate modifications to vaccine delivery programs.

Conclusion

This study has revealed that the awareness of the vaccine among the migrant population needs to be improved especially among Christians, traders, and farmers. Furthermore, using health education campaigns to convey education on the cholera vaccine may prove effective. However, another area that needs consideration is turning this awareness into actual vaccination especially among the educated members of the population.

Declarations

Ethics approval and Consent to participate: Ethical approval for this study was obtained from the Oyo State Ministry of Health Institutional Review Board prior to the commencement of the study. Only eligible participants who willingly signed informed consent forms, after being satisfactorily briefed about the study, participated in the study. Data collected included no identifiers that could be used to link individual questionnaires to specific respondents. All data were kept confidential on a password-protected computer to which only the investigators had access to.

Consent for publication

Not Applicable

Competing Interests

The authors declare no competing interests in the conceptualization, conduct, and publication of study or its findings.

Authors' Contributions

IO, FT and KE conceptualized the study, wrote out the protocol. OB and ODB conducted the literature review. IO supervised the field data collection and data entry. IO conducted the data analysis. FT wrote the first draft of the manuscript. AF and KO revised the first draft of the manuscript. All authors proof-read and approved the final manuscript.

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List of Abbreviations

LGA – Local Government Area

DRC- Democratic Republic of Congo

NHIS – National Health Insurance Scheme

IDP- Internally Displaced People

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