COVID-19 Vaccine Uptake and Associated Factors among Selected Security Personnel in Edo State, Nigeria

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Authors' contributions

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

Article Information

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ABSTRACT

Background: Vaccination is a cost-effective public health intervention to prevent and or contain the spread of communicable diseases such as COVID-19. The level of uptake of vaccines across selected population such as security personnel is strategic towards attaining herd immunity. This

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study assessed the level of uptake of COVID-19 vaccination among security personnel in Edo State, Nigeria to aid planning for improved vaccine roll out among target population.

Materials and Methods: A descriptive cross-sectional study was conducted to obtain quantitative data from 482 security personnel from selected Security Agencies in Benin City between 1st February 2021 and 31st May 2021. Data collected were analysed using IBM SPSS version 20.0 statistical software with statistical significance set at $p < 0.050$ and 95% Confidence Interval.

Results: The mean age of respondents was 41.5 ($\pm$ 7.2) years. Three hundred and forty-four (71.4%) had positive attitude towards COVID 19 preventive measures. Furthermore, 242 (50.2%) had been vaccinated against Covid-19 respectively. The category of security agency was a significant determinant of COVID-19 vaccination with the odds of being vaccinated being higher among police officers (OR: 4.724; CI= 2.674- 8.344; p <0.001), Immigration Officers (OR: 3.401; CI=1.960 - 5.902; p < 0.001), FRSC (OR: 3.096; CI=1.785 - 5.374; p < 0.001) compared to EDSTMA Officers. Finally, the odds of being vaccinated was significantly lower among respondents with negative attitude (OR: 0.412; CI=0.270 - 0.629; p < 0.001) compared to respondents with positive attitude towards COVID-19 preventive measures.

Conclusion: A gap was identified between the attitude of security personnel towards COVID-19 preventive measures and their vaccination uptake. Strategic stakeholder engagement and continuous sensitization meetings are essential to help dispel myths and clarify misconceptions on COVID-19 vaccine for improved vaccination uptake among target population.

1. INTRODUCTION

COVID-19 is a global pandemic with established means of spread from person to person through infected air droplets that are propagated during talking, sneezing or coughing and or contact with contaminated hands and surfaces [1-4]. Currently, COVID-19 has spread to 220 countries with 174,801,412 confirmed cases, 3,764,240 deaths with 158,223,318 recovered persons and 12,813,854 active cases reported [5]. In Nigeria, there are currently 166,918 confirmed cases, with 2117 deaths and 1542 active case s and 163,259 recoveries [5] with Lagos state having the highest burden of the disease [6]. In Edo state, there are currently 4,908 confirmed cases, 4723 recoveries and 185 deaths [7]. The emergence of COVID-19 has affected virtually all aspects of life with enormous burden on health care provision; physical and mental health of COVID-19 victims and those affected directly and indirectly; including educational and other socio-economic losses locally, nationally and globally that have resulted from COVID-19 [8-10].

Despite the devastating scourge of the disease, there has not been any proven treatment against the SARS-CoV-2 [8]. Hence, implementation of effective preventive measures such as vaccination and non-pharmaceutical interventions are cost effective strategies in containing COVID-19 and breaking the chain of transmission [11-12].

Vaccination is considered as one of the most successful public health intervention of the twentieth century in combating infectious diseases as up to 2 to 3 millions of lives are saved each year through vaccination [10-11]. The following vaccines are available and received emergency use authorization against COVID-19 by the World Health Organization (WHO) and they include: Pfizer-BioNTech, Moderna, Johnson and Johnson/Janssen and AstraZeneca, however as at February 2021, clinical trials started on Novavax vaccine [12-13]. The vaccine available for distribution in Nigeria as at March 2021 is the AstraZeneca vaccine [14]. Nigeria received nearly 3.94 million doses of COVID-19 vaccine in Abuja on 2nd March, 2021 based on COVAX facility arrangement, a partnership between CEPI, GAVI, UNICEF and WHO [1]. As at May 2021, 1,637,078 and 38,716 doses of COVID-19 vaccines have been administered in Nigeria and Edo State respectively [11].

The dramatic and rapid multidimensional impacts of COVID-19 worldwide have led to several public health experts to rate it as the worst public health emergency since the Spanish Flu pandemic in 1918 [15]. Vaccination is therefore a key Public Health intervention in combatting this disease, hence it is important to ensure fair and equitable access to safe and effective COVID-19 vaccine for individuals and countries at large. Current efforts towards effective vaccination against the coronavirus might be challenged by

vaccine hesitancy; one of the ten global threats to public health [16-17].

There is paucity of literature in relation to COVID-19 vaccination and available data on vaccination uptake among security personnel is scarce. This study seeks to provide baseline statistics on the uptake of COVID-19 vaccination and associated factors by security officials within the study area and by extension Nigeria. Security personnel are frontline workers who should be protected through vaccination since they are involved with enforcement of COVID-19 guideline and regulations making them exposed to the risk of COVID-19 transmission, morbidity and mortality. Due to global vaccine shortage especially in African continent, Nigeria just like other countries have prioritized Health Care workers, Front line workers and Strategic Leaders as target groups for the first phase of the COVID-19 vaccine roll out due to global shortage. Security Officials are classified as font-line workers due to the scope of their job description in relation to enforcement and establishing Law and Order.

This study assessed the level of uptake of COVID-19 vaccination among security personnel in Edo State, Nigeria to aid planning for improved vaccine roll-out among target population.

2. MATERIALS AND METHODS

The study was carried out among personnel of security agencies (Police, Edo State Traffic Maintenance Agency, Road Safety and Immigration) in Benin City, Edo State. Benin City is Edo State capital [18]. Benin city has 3 local government areas; Egor, Oredo and Ikpoba-Okha but is however expanding to include Ovia North East and Uhumnwonde [19]. Benin City has a number of security agencies such as the Nigerian Army, Airforce, Nigeria Correctional Service, Nigeria Security and Civil Defence Corps, Nigeria Immigration Service, Federal Road Safety Commission, Edo State Traffic Management Agency and the Nigerian Police Force [20-23]

A descriptive cross-sectional study design was used for this study involving a sample size of 482 security personnel, calculated using Cochran formula [24] based on a prevalence of uptake of COVID-19 preventive measures (55%) [25] from a previous study. Self-administered questionnaire adapted from previous studies was utilized for the study. Pre-test was conducted at

Military Supply and Training barracks at Egor LGA, Benin City, Edo State.

The security personnel were selected in the study area using multistage sampling technique that involved Four stages;

Stage 1: Listing of Security Agencies-Involved obtaining a nominal list of all security agencies in Benin City Edo State.

Stage 2: Selection of security Agencies- Four were selected by simple random sampling technique from the list in stage 1.

Stage 3: Listing of security personnel: Obtaining nominal roll of all personnel available in the selected Security agencies and carrying out proportional allocation in relation to sample size.

Stage 4: Selection of respondents: involved selection of final respondents by systematic sampling technique per security agency till the calculated sample size was achieved.

Data collected was assessed for completeness, coded, subsequently entered and analyzed using IBM SPSS version 20.0 statistical software. The rank of respondents was used to categorize them into higher, middle and lower cadre.

Furthermore, attitude towards COVID 19 preventive measures was assessed using 18 question Likert scale. Responses were scored as appropriate or inappropriate responses depending on the question asked. Each appropriate answer was scored as 1 and inappropriate answers were scored as 0. The scores were totaled, the maximum score obtainable was 18 and the minimum score was 0. Scores were then converted to percentages and scores of less than 50% was categorized as negative attitude while score of 50% and above as positive attitude. Vaccination status was assessed as vaccinated or not vaccinated based on a question relating to if the respondents have been vaccinated or not.

In relation to study limitation, timeline was used to reduce recall bias in the course of data collection and data was also subject to self-reporting.

3. RESULTS

In relation to the socio-demographic characteristics of the study population (See

Table 1 Above) The mean age of respondents studied was 41.5 (± 7.2) years. Two-third 332 (68.9%) of the respondents were males with about two-fourth 255 (52.9%) having tertiary level of education. A higher proportion of respondents 229 (47.5%) were Benin. Majority 431 (89.4%) were Christians and 393 (81.5%) had been married. Two hundred and twenty (45.6%) of the respondents were mid ranking officers.

All respondents 482 (100%) were aware of the term COVID-19. Television media 330 (68.5%) and health care workers 274 (56,8%) were reported as the main sources of information (See Table 2) among study respondents.

In relation to attitude of respondents towards COVID-19 (See Table 3) Four hundred and seventy-one (97.7%) respondents agreed that COVID 19 is real, 480 (99.6%) agreed that facemasks should always be worn in public, 481 (99.8%) and 472 (97.9%) respondents respectively agreed that it is important to wash hands with soap and water and that surfaces should be sanitized respectively. Similarly, 407 (84.4%) and 224 (46.5%) respondents respectively agreed that public places should restrict number of persons and that social distancing should be practiced when it is convenient. Furthermore, in relation to treatments, 477 (99.0%) respondents agreed that infected persons should stay at home while 471 (97.7%) of respondents agreed that early diagnosis improves treatment. Finally, 467 (96.9%) respondents agreed that it is important to test for COVID 19, 335 (69.5%) were willing to be tested for COVID 19 while 440 (91.3%) agreed that vaccination prevents COVID 19.

In relation to the determinants of COVID 19 vaccination among security officers (See Table 4),The category of security agency was a significant determinant of COVID-19 vaccination with the odds of being vaccinated being higher among police officers (OR: 4.724; CI= 2.674-8.344; p <0.001), Immigration officers (OR: 3.401; CI=1.960-5.902; p <0.001), FRSC (OR: 3.096; CI=1.785-5.374; p <0.001) than EDSTMA officers. Also, the odds of being vaccinated was significantly lower among respondents with negative attitude (OR: 0.412; CI=0.270-0.629; p <0.001) compared to respondents with positive attitude towards COVID-19 preventive measures.

Finally, the Age (p>0.999), sex (p=0.898), marital status (p=0.135), Household size (p=0.160),

Level of Education (p=0.402), Rank of personnel (p=0.550) and Knowledge of COVID-19 preventive measures (p=0.153) were not identified as significant predictors of vaccination uptake.

Table 1. Sociodemographic characteristics of security agents in Edo State

| Variable	Frequency(n=482)	Percent
Age group(years)		
20-29	31	7.1
30-39	141	29.3
40-49	246	51
50-59	60	12.4
60-69	1	0.2
Mean age ± SD (41.5 ± 7.2)		
Sex		
Male	332	68.9
Female	150	31.1
Level of education		
Primary	5	1
Secondary	222	46.1
Tertiary	255	52.9
Ethnic group		
Benin	229	47.5
Esan	90	18.7
Etsako	74	15.4
Igbo	45	9.3
Yoruba	20	4.1
Urhobo	24	5.0
Religion		
Christianity	431	89.4
Islam	51	10.6
Marital status		
Never married	89	18.5
Ever married	393	81.5
Family type		
Nuclear	419	85.9
Extended	63	13.1
Family structure		
Monogamous	407	84.4
Polygamous	75	15.6
Household size		
1-5	228	47.3
>5	254	52.7
Security Agency		
Police	122	25.3
Immigration	120	24.9
FRSC	120	24.9
EDTSMA	120	24.9
Cadre		
Higher	115	23.9
Middle	220	45.6
Lower	147	30.5

Table 2. Awareness of COVID 19 and source of information among security agents in Edo State

Variables	Frequency(n=482)	Percent
Awareness of COVID		
Have heard	482	100
Source of information*		
Television	330	68.5
Health workers	274	56.8
Social media	258	53.5
Friends	175	36.3
Billboards	112	23.2
Family	1	0.2

multiple response
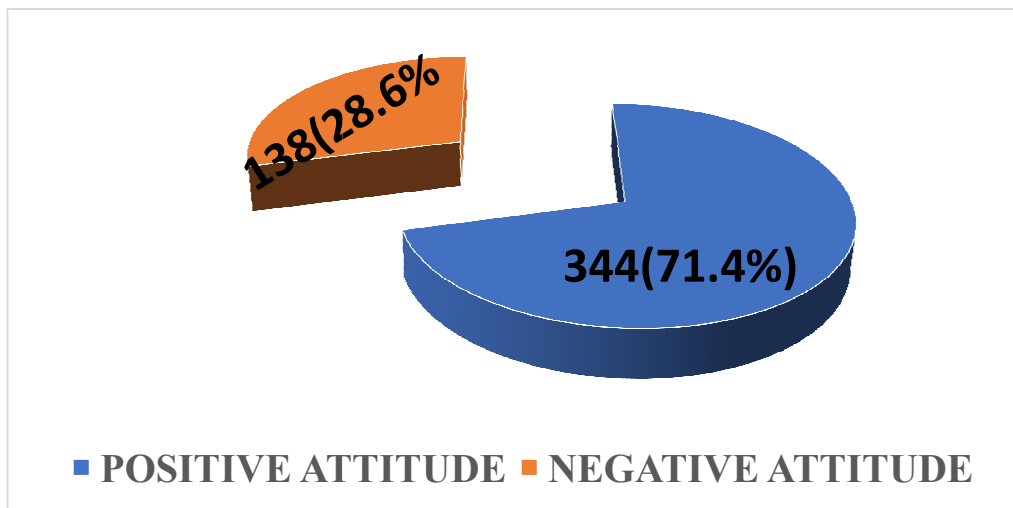
Fig. 1. Attitude towards COVID 19 preventive measures among security agents in Edo State
Majority 408(85%) of respondents had a positive attitude towards COVID 19 preventive measures
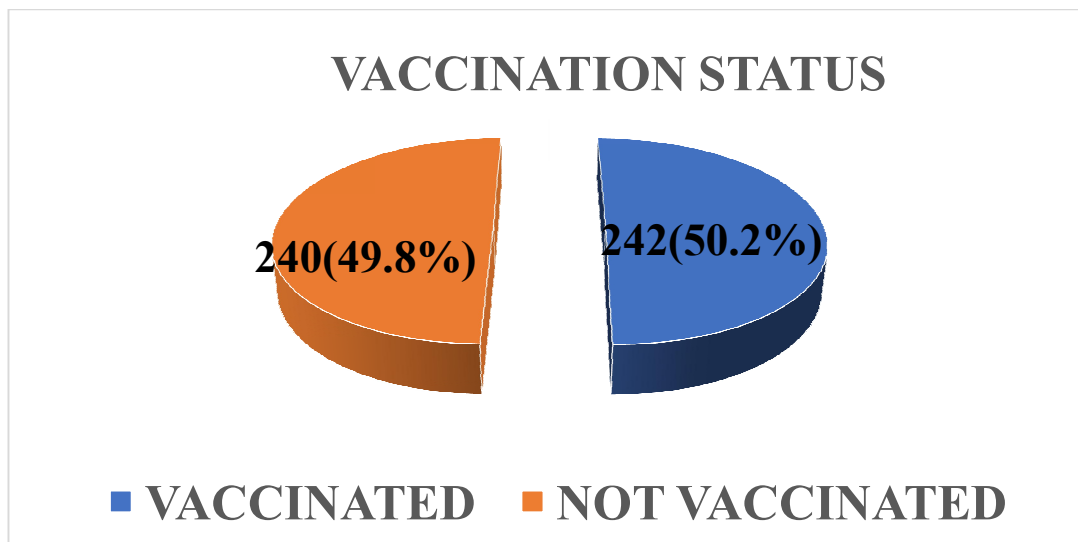
Fig. 2. The vaccination status of security personnel in Benin City, Edo State
Slightly more than half 242(50.2%) of security personnel studied had been vaccinated against COVID-19

Table 3. Attitude of security agencies towards COVID 19 and its preventive Measures (n=482)

	Attitudinal Responses	
Variable	**Appropriate response**	**Inappropriate response**
COVID19 is real	471(97.7)	11(2.3)
Face masks should always be worn in public	480(99.6)	2(0.4)
It is ok to remove face mask around family and friends	324(67.2)	158(32.8)
It is important to wash hands with soap and water	481(99.8)	1(0.2)
Hand washing stations at strategic locations	467(96.9)	15(3.1)
It is important to sanitize hands	481(99.8)	1(0.2)
It is important to sanitize surfaces	472(97.9)	10(2.1)
Public places should restrict number of persons	407(84.4)	75(15.6)
Social distancing should be practiced when it is convenient	224(46.5)	258(53.5)
Ginger and garlic should be taken every morning to prevent COVID 19	217(45.0)	265(55.0)
Chloroquine should be taken daily to prevent COVID 19	353(73.2)	129(26.8)
Ivermectin should be taken daily to prevent COVID 19	310(64.3)	172(35.7)
Infected persons should stay at home	477(99.0)	5(1.0)
Persons with suspicious symptoms should stay at home	460(95.4)	22(4.6)
Early diagnosis improves treatment	471(97.7)	11(2.3)
It is important to test for COVID 19	467(96.9)	15(3.1)
I would be willing to be tested for COVID 19	335(69.5)	147(30.5)
Vaccination prevents transmission of COVID 19	440(91.3)	42(8.7)

Table 4. Logistic regression model for determinants of vaccination status of COVID 19 among respondents' security agencies in Edo State

Predictors	B (regression co-efficient)	Odds Ratio	95% CI for OR		p-value
			Lower	Upper	
Age					
21-30	18.974	173913785.8	0.000		>0.999
31-40	19.440	277060386.4	0.000		>0.999
41-50	20.1626	563589627.6	0.000		>0.999
51-60		1			
Sex					
Male	-0.035	0.965	0.613	1.519	0.878
Female		1			
Marital status					
Never married	0.496	1.643	0.857	3.147	0.135
Ever married		1			
Household size					
1-5	-0.282	0.755	0.509	1.118	0.160
>5		1			
Level of education					
Primary	-1.093	0.335	0.053	2.123	0.246
Secondary	-0.174	0.840	0.559	1.263	0.402
Tertiary		1			
Security agency					
Police	1.553	4.724	2.674	8.344	<0.001*
Immigration	1.224	3.401	1.960	5.902	<0.001*
FRSC	1.130	3.096	1.785	5.372	<0.001*
EDSTMA		1			
Cadre					
Higher	-0.245	0.783	0.350	1.749	0.550
Middle	-0.400	0.671	0.372	1.209	0.184
Lower		1			
Attitude Towards Vaccination					
Positive		1			
Negative	-0.886	0.412	0.270	0.629	<0.001*
Constant	-21.202				

*R^2 = 6.1% - 9.0%, CI = Confidence interval, OR = Odds Ratio *Statistically significant (p<0.050)*

4. DISCUSSION AND CONCLUSION

Two-Fourth of security personnel studied were vaccinated, this could be because of massive public health campaigns on COVID-19 within the study location and the high level of involvement by security Agencies and their personnel in Government effort to sensitize residents in Edo state. This is in contrast to findings from a study conducted in the United States of America [26] which showed high uptake of COVID-19 vaccination. However, the vaccination uptake in the study area and among the study population can be improved upon through strategic engagement and sensitization campaigns on the importance and benefit of vaccination in relation to reducing the risk of spread and severity of COVID-19 across various security agencies.

In relation to the category of security agencies, this study identified that the police had better vaccination uptake compared to other security agencies. This could be as a result of the increased health campaigns, strategic engagement and involvement of the Police as first line security architecture compared to other security agencies and as such, its men and officers could have had additional opportunity for exposure to health trainings and sensitizations on COVID-19 prevention than other agencies [27]. This findings is in tandem with a study done in Bangladesh among police officers which showed good practice of COVID-19 preventive measures [25]. It is therefore important to conduct regular training and retraining of other security personnel to improve COVID-19 uptake and other health interventions among their various agencies and formations.

In relation to attitude towards COVID-19 Vaccination, respondents with positive attitude had significantly better vaccination uptake. This could be as a result of the increased health campaigns and sensitizations on COVID-19 preventive measures [28]. This finding is in keeping with an online study done in Nigeria [30] that showed a higher proportion of respondents with positive attitude towards COVID-19 and its preventive measures, also had good uptake of preventive measure. Several Studies conducted have also shown that beliefs and attitude shape practice [25,28-29]. A recent study in Nigeria identified that an estimated fifty percent of the population studied showed willingness to take a COVID-19 vaccine prior to the planned Phase 1 vaccine roll-out exercise in March 2021 [30]. It is therefore important to improve and enhance public health campaigns to help drive better attitudinal changes and better willingness to improve uptake of COVID-19 preventive measures such as vaccination among target populations.

Finally, this study identified that over fifty percent of respondents studied had been vaccinated against COVID-19. This as a first step to vaccination roll-out among this unique population is a step in the right direction although it can be improved through better and more strategic engagement and sensitization activities. The category of security agency and their attitude towards COVID-19 were significant determinants for uptake of COVID-19 vaccine among the study population. Strategic stakeholder engagement and continuous health sensitization meetings are essential to help dispel myths and clarify misconceptions on the importance of COVID-19 vaccine for improved vaccination uptake among target population.

CONSENT

Verbal Informed consent was obtained from the respondents with full assurance of confidentiality of information. Health education session was administered to respondents on COVID-19 preventive measures following questionnaire administration.

ETHICAL APPROVAL

Ethical approval (ADM/E 22/A/VOL.VII/ 14831047) was obtained from the Health Research Ethics Committee of the University of Benin Teaching Hospital, Benin City, Edo State before commencement of the study. Institutional approval at the various security agencies were also applied for and obtained before questionnaire administration.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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