ANALYSIS OF COVID-19 KNOWLEDGE AND VACCINE ACCEPTANCE AMONG AGRICULTURAL EXTENSION WORKERS IN KATSINA STATE, NIGERIA

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ABSTRACT: COVID-19 vaccines were developed for the prevention and control of COVID-19 globally and strong immunity will be developed if most of the world's population accept and get vaccinated with the COVID-19 vaccine. However, vaccine hesitancy is a major threat to the control and prevention of COVID-19 in most countries especially the developing countries. The study was carried out to determine COVID-19 knowledge, risk perception and vaccine hesitancy among extension agents in Katsina State, North Central Nigeria. Due to insecurity, 23 local government areas in the state were purposively sampled across the three agricultural zones in the state. Furthermore, all the five village extension agents and one block extension supervisor in each LGA selected was considered to give a total of one hundred and thirty-eight (138) respondents for the study. Descriptive statistics such as percentage and mean, risk perception score, COVID-19 knowledge scale and a Logit regression model were used to achieve the study objectives. Results show that extension agents in Katsina State have a good knowledge of the COVID-19 vaccine and a high-risk perception towards COVID-19. However, due to trust and safety concerns, majority of the extension workers (73.2%) are still hesitant and yet to get a shot of the vaccine. The major determinants of COVID-19 acceptance include age of the extension worker, years of work experience and knowing a person infected by the virus. It can be concluded from the study that the older and more experienced extension workers can be used as a good starting point for launching a program aimed at reducing COVID-19 vaccine hesitancy among extension workers in Katsina State. The electronic media such as the Radio and Television should be used to produce jingles and skits for educating extension workers on the COVID-19 vaccine. Community and religious leaders should be empowered by the government to help clarify the misconceptions about vaccines that have pervaded communities especially in Northern Nigeria.

KEYWORDS: Extension workers, Vaccine acceptance, KTARDA.

INTRODUCTION

Corona virus disease 2019 (known as COVID-19) is an illness caused by a novel Corona Virus, now called Severe Acute Respiratory Syndrome Corona virus 2 (SARS-CoV-2, formerly called 2019-nCoV). COVID-19 is an emerging respiratory infection that was first discovered in December 2019 in Wuhan City, Hubei Province, China, which has led to the disruptions of health, economics, politics and social order across the world (Oriji et al., 2021).

Affirmatively, as of 13th August, 2020, the World Health Organization (WHO) had documented 20,439,814 cases of COVID-19 with 744,385 deaths globally, and thus, declared it as a pandemic and a highly infectious communicable disease that spreads by human contacts via droplets or direct contact. Although the disease is zoonotic, the intermediate host for transmission is yet to be identified; nevertheless, it has spread to various countries of the world with over 6 million confirmed cases (WHO, 2021). As a result of the overwhelming influence on critical care and frontline healthcare staff, as well as the possibility of transmission by asymptomatic carriers, countries around the world closed their borders, announced total or partial lockdowns, movement restrictions, social distancing, and wearing of facemasks (Al-Hanawi et al., 2020). Evidently, despite all the precautionary and preventive measures put in place, efforts and preventive measures put in by the affected nations of the world, there was a global recurrence of a second wave of COVID-19, and also the third wave has further emerged in France, Spain and Germany (Oriji et al., 2021).

In the African continent, over 2,831,003 COVID-19 cases and 56,342 deaths have been recorded, with South Africa, Morocco, Egypt, Ethiopia, and Tunisia taking the lead (WHO, 2021). In Nigeria, cases of COVID-19 peaked at 266,492 with 3,155 deaths, and Katsina State, one of the northern states of Nigeria, had 744 COVID-19 cases and 24 deaths as at 13th January, 2023 (NCD, 2023). Likewise, in the Northern enclave, Katsina State has witnessed its first COVID-19 outbreak in Daura Local Government on 4th April, 2020, after which it spread to other parts of the state, and within a span of three months; it had recorded 744 COVID-19 cases and 24 deaths (Ahmad et al., 2021). As documented by Oriji et al. (2021) and Post et al. (2020), Nigeria has 12.2% prevalence of COVID-19, with a recovery rate of 82%. This infers that to prevent a similar death toll occasioned by the prevalence of a deadly bird disease (Bird Flu Influenza) in 1918, the world population will have to be vaccinated against COVID-19.

Undoubtedly, vaccines are being produced for the prevention and control of COVID-19 globally, and strong immunity will be developed if most of the world's population accept and get vaccinated with the COVID-19 vaccine (Kwok, 2021). However, as at 13th January, 2023, the total number of infected persons worldwide had risen to 662 million cases with 6.7 million deaths reported globally (WHO, 2023), while Nigeria had 266,858 confirmed cases and 3,155 deaths as at 6th January, 2023 (NCDC, 2021).

Extension workers are expected to provide requisite knowledge to the farming communities in the event of any major outbreak, as in the case of COVID-19 outbreak; they concurrently provide both agricultural extension advisory services required for adapting to shocks or disruptions to the food system and advisory initiatives on Corona Virus prevention and mitigations measures (FAO, 2020).

In Nigeria, the extension system is not substantially developed and the face to face individual and group extension delivery methods are still very effective, popular and cannot be replaced

overnight with the radio or other virtual means of extension delivery (Akinnagbe et al., 2010). The radio for instance has a disadvantage of being only a one-way means of communication (Jahid et al., 2020). However, for effective communication, the extension delivery must be two-way, i.e., providing advisory services to farmers and reporting back to research centres for solutions (Antwi-Agyei & Stringer, 2021). By implication, extension workers are exposed to the risk of contracting the virus and also spreading among farming communities as they do their work and they also put their families at risk of also contracting the virus. Affirmatively, in developing health system capacities and strategies necessary to combat the pandemic, it is pertinent to take into cognizance the factors likely to enhance the uptake of COVID-19 vaccines, and currently, these efforts are in jeopardy with the proliferation of anti-vaccination activists campaigning in multiple countries against the need for vaccines, which some of them even deny its existence (Issa et al., 2021).

The specific objectives of the study are to:

1. Identify the information needs of agricultural extension agents on the COVID-19 vaccine.

2. Identify agricultural extension workers' sources of information on the COVID-19 vaccine.

3. Describe the level of knowledge among agricultural extension workers on COVID-19.

4. Describe the risk perception towards COVID-19 among agricultural extension workers.

5. Describe the level of acceptance of COVID-19 vaccine.

6. Determinants of COVID-19 vaccine acceptance among agricultural extension agents.

Description of Study Area

Katsina State covers a landmass of 24,192km² and a population of 8,761,794 (NPC, 2020) with an average annual rainfall of 300-700mm and crops are grown all year round. Apart from farming during the rainy season, dry season farming is done along river banks and along the numerous dams built by the State and the Federal Governments. It shares a border to the South by Kaduna State, to the North by Niger republic, to the West by Zamfara State, and to the East by both Jigawa and Kano States. Katsina State is about 23,938 square kilometres and it is situated on latitude between 110° 07' 49N' 130 2257" and Longitude 6052'03 East and 990 02' East. The state is from the tropical grassland known as savannah to the north and it has two major seasons which are the rainy season and the dry season (Wikipedia, 2021).

Sampling Procedure and Sample size

All the extension workers in Katsina State are the target population for this study. Currently, there are about a total of two hundred and ninety-two (292) extension workers in Katsina State. This population is made up of both Village Extension Agents (VEWs) and Block Extension Agents (BEAs) respectively.

Due to insecurity, only twenty-three (23) out of the thirty-four (34) local government areas in the state were purposively selected for the study.

Table 1: Agricultural Zones and Local Government Areas in Katsina State

Agricultural Zones	Number of Local Governments (Per Zone)	Number of Local Government Selected (Per Zone)
ZONE I Ajiwa	15	Batagarawa, Baure, Bindawa, Charanchi, Daura, Dutsi, Katsina, Mai-adua, Mani, Mashi, Rimi, Sandamu, Zango
ZONE II Funtua	9	Bakori, Danja, Funtua, Kafur, Malumfashi
ZONE III Dutsin-ma	10	Dutsinma, Ingawa, Kankia, Kusada, Kurfi, Matazu,

Analytical Technique

Descriptive statistics such as percentage and mean, risk perception score, COVID-19 knowledge scale and a Logit regression model were used to achieve the study objectives.

COVID-19 Knowledge Score

Knowledge score was used to achieve Objective Two (2); the scale for the level of knowledge of COVID-19 will consist of a 13-item scale based on previous studies (Al-hanawi et al., 2020; Iorfa et al., 2020). For knowledge score, participants will be given three options: Yes, No and fill in the blank. One mark will be given for any correct answer and 0 marks for any wrong answer and do not know answers. Those who obtained marks above the median of the total score will be categorized as having good knowledge and below the median will be categorized as having poor knowledge (Mohamed, 2021).

COVID-19 Risk Perception Score

COVID-19 risk perception score was used to achieve Objective Three (3); the risk perception scale by Ya-jun (2018) will be adopted for use in this study. The scale can be used for "Public Risk Perception Scale for Public Health Emergencies." The scale was first introduced in 2018, 0has gone through a rigorous development process and has been published in the Chinese Journal of Public Health (Ya-jun, 2018). The scale has three components of risk perception namely susceptibility (3 items), severity (4 items), and controllability (2 items) (Ning et al., 2020). The respondents will be required to rate each question on a five point Likert scale ranging from 1 - "strongly disagree" to 5 - "strongly agree". A summed average score for all the three components will be calculated and a score above 3 will be deemed as high in risk perception, and scores less than 3 will indicate low risk perception.

The data was analyzed using descriptive statistics and Logit regression model. Descriptive statistics such as percentage and mean was used to achieve socio-economic characteristics of the respondents while knowledge score scale was used to develop COVID-19 knowledge for the research.

The model is specified as follows:

$$P_1 = \frac{1}{1+e-}Z$$

$$Z = \beta_0 + \beta_1 X_1 \beta_2 X_2 \beta_3 X_3 \ldots \ldots \beta_k X_k + \mu$$

P_1 = is the probability of accepting the COVID-19 vaccine

X_i = household specific indicator hypothesized to influence COVID-19 acceptance

β_i = vector of parameters indicators to be estimated using maximum likelihood method

μ_i = error term (Sanni & Doppler, 2007).

The dependent variable takes the value of 1 if an extension worker is willing to accept the COVID-19 vaccine and 0 if otherwise.

The independent variables hypothesized to determine vaccine acceptance are as follows:

X_1 = Age of Household Head (Years)

X_2 = Gender = This will take a value of 1 for a male and 0 for a female extension worker

X_3 = COVID-19 knowledge score

X_4 = Number of preventive practices adopted (Number)

X_5 = Having an existing medical condition such as BP, diabetes, asthma, etc.) = 1 if yes and 0 if no

X_6 = Working experience (Years)

X_7 = Satisfaction with the state government COVID-19 intervention (Yes/No)

X_8 = Knowing someone that has COVID-19 (Yes/No).

RESULTS AND DISCUSSION

The analysis on socio-economic characteristics of the extension workers was based on age, gender, level of education, work experience, marital status and household size, as presented in Table 1. The result shows that the age of the extension workers ranges from 25-55 years with a mean age of 43 years. This indicates that the extension workers are productive and are highly expected to be very effective in carrying out their responsibilities. In the case of gender, the majority (84.8%) of the respondents are males, which implies that male extension agents dominate the extension services of Katsina State Agricultural and Rural Development Agency.

Furthermore, about 42% of the respondents possessed Ordinary/National Diploma (OND/ND) as their educational qualification; 32.6% had NCE; 13.8% had Higher National Diploma (HND); 9.4% were Secondary School Certificate holders and 2.2% possessed University first degree. This implies that majority of the extension staff at KTARDA have the required training and qualification required for extension activities. The result on marital status reveals that 87.0% of the respondents are married and have from 1-35 years of work experience with a

mean of 28 years. This indicates that most of the extension workers spent more than two decades in carrying out agricultural extension services in the study area. This is also an indication of the high level of experience in extension activities.

The extension workers have a mean of 12 individuals in their households units. Majority (63.8%) had a household size of 11-22 persons.

Table 2: Socio-economic Characteristics of the Respondents

Socio-economic characteristics	Frequency	Percentage
Age		
25-35	34	24.6
36-46	56	40.6
47-57	48	34.8
Minimum	**25**	
Maximum	**55**	
Mean	**43**	
Gender		
Female	21	15.2
Male	117	84.8
Level of education		
Secondary	13	9.4
OND/ND	58	42
NCE	45	32.6
HND	19	13.8
B.sc	3	2.2
Work experience		
1-10	42	30.4
11-20	53	38.4
21-30	40	29.0
31-40	3	2.2
Minimum	**1**	
Maximum	**35**	
Mean	**28**	
Household size		
0-10	50	36.2
11-22	88	63.8
Minimum	**0**	
Maximum	**19**	
Mean	**12**	
Marital status		
Single	8	5.5
Married	120	87.0
Divorced	8	5.8
Widow/widower	2	1.4
Total	**138**	**100**

Source: *Field Survey (2022)*

Information Needed by Extension Workers on COVID-19 Vaccine

The information needs of extension agents on COVID-19 are presented in Table 2. The extension agents in Katsina State require information on how the vaccine works, its possible side effects and its safety in the human body. This finding implies that COVID-19 vaccine acceptance will increase if adequate information on the three major areas indicated above is provided by the public health institutions in Katsina State. Information on detection of a fake and expired vaccine is however the least sourced among the extension agents in Katsina State. This may be due to the very technical nature of the expertise required to detect a fake and expired vaccine.

Table 3: Information Needs of the Extension Workers

Type of information needed	Frequency	Percentage
How it actually works	73	52.9
Safety	87	63.0
Possible side effects	93	67.4
Management of the side effects	58	42.0
Types of COVID-19 vaccines available	69	50
Number of shorts required	15	10.9
Detect of a fake vaccine	5	3.6
Detection of an expired vaccine	4	2.9
Total*	*	*

Source: *Field Survey (2022)* Multiple responses allowed*

COVID-19 Vaccine Knowledge Status of Extension Workers

The COVID-19 vaccine knowledge score of the extension agents is presented in Table 3. The scores range from a minimum of 2 to a maximum of 13, with mean and median scores of 7.3 and 8 respectively.

Table 4: COVID-19 Vaccine Knowledge Score

Score	Frequency	Percentage
1-5	32	23.2
6-10	92	66.7
11 above	14	10.1
Minimum 02		
Maximum 13		
Median 08		
Total	**138**	**100**

Source: *Field Survey (2022)*

The COVID-19 vaccine knowledge status of the extension agents is presented in Table 4. Using the median (8) as the cut-off for determining COVID-19 vaccine knowledge status, about half of the extension agents sampled for the study in the state have a relatively good knowledge of the vaccine. However, knowledge level was unexpected considering the very robust public awareness campaign on the COVID-19 pandemic in Katsina State and Nigeria as a whole. The general skepticism about the COVID-19 Vaccine as well as other vaccines such as the polio vaccine in Northern Nigeria could be responsible for the lack of interest to acquire adequate information on the vaccine by the extension agents in the study area.

Table 5: Covid-19 Vaccine Knowledge Status and Status among Extension Workers

SCORES	FREQUENCY	PERCENTAGE	REMARKS
> median	70	50.8	good knowledge
< median	68	49.2	poor knowledge
TOTAL	**138**	**100**	

Source: *Field Survey (2022)*

Level of Acceptance of the COVID-19 Vaccine

The level of acceptance of the COVID-19 vaccine among the extension agents is presented in Table 6. The results show that (48.6%) of less than half of the extension workers were willing to accept the COVID-19 vaccine and (51.4%) were not ready to accept the vaccine.

Table 6: Level of Acceptance of COVID-19 Vaccine among Extension Workers

RESPONSE	FREQUENCY	PERCENTAGE
Accepted	67	48.6
Not accepted	71	51.4
Total	**138**	**100**

Source: *Field Survey (2022).*

Determinants of COVID-19 Vaccine Acceptance

The analysis in Table 7 indicates that variables such as "knowledge of someone that is affected with the COVID-19 and years of working experience" were statistically significant at 1% and 5% respectively and had a negative relationship with the dependent variable which is the COVID-19 vaccine acceptance. This implies that irrespective of the available evidences on the existence of the COVID-19 virus and work experience, the chances that extension workers in the state will agree to take the vaccine will be minimal. On the other hand, the age of the extension workers is positive and significant at 10%. This means that the possibility of accepting the vaccine will increase for older extension workers compared to their younger colleagues.

Table 7: Determinants of COVID-19 Vaccine Acceptance

Variable	Coefficient	S.E.	Z-stat	Sig.
Age of the Extension worker	0.075	2.278	1.5	.131*
Gender	0.006	.000	0.01	.992
Knowledge score	-.044	.016	-0.12	.898
Perception	-0.155	.144	-0.37	.705
Number of preventive practices adopted	0.010	.008	0.09	.930
Having existing medical condition	0.443	.976	0.98	.323
Years of Work Experience	-0.083	3.692	-1.93	.055**
Satisfaction with the State Government COVID-19 Intervention	0.393	.569	0.75	.451
Knowing someone that is infected by COVID-19	-2.207	17.128	4.14	.000***
Constant	-0.899	.179	0.42	.672

Source: Field Survey (2022)

***, **, * denotes significant at 1%, 5% and 10% respective

CONCLUSION AND RECOMMENDATIONS

The extension agents in Katsina State have a good knowledge of the COVID-19 vaccine and a high risk perception towards the COVID-19 virus. However, due to trust and safety concerns, majority of the extension workers are still hesitant and yet to get a shot of the vaccine.

The older and more experienced extension workers can be used as a good starting point for launching a program aimed at reducing COVID-19 vaccine hesitancy among extension workers in Katsina State. Health extension workers and other governmental/non-governmental organizations in Katsina State should provide more enlightenment and information on the COVID-19 vaccine and its possible side effects.

REFERENCES

Akinnagbe, O. M., & Ajayi, A. R. (2010). Challenges of farmer-led extension approaches in Nigeria. World Journal of Agricultural Sciences, 6(4), 353-359.

Antwi-Agyei, P., & Stringer, L. C. (2021). Improving the effectiveness of agricultural extension services in supporting farmers to adapt to climate change: Insights from northeastern Ghana. Climate risk management, 32, 100304.

Afolabi, A.A &Ilesanmi, O.S. (2021). Dealing with vaccine hesitancy in Africa: The Prospective Covid-19 vaccine context. Pan African Medical Journal, 1 (3), 38- 42.

Ahmed, W., Vidal-Alaball, J., Downing, J., &Segui, F.L. (2020). Covid-19 and the 5G conspiracy theory: social network analysis of Twitter data. Journal of Medical and Internet Research, 22:e19458.

Al-Hanawi, M. K, Angawi, K., Alshareef, N., Qattan, A. M. N., Helmy, H. Z., Abudawood, Y., Alqurashi, M., Kattan, W. M., Kadasah, N. A., Chirwa, G. C. and Alsharqi, O. (2020). Knowledge, attitude and practice towards COVID-19 among the Public in the Kingdom of Saudi Arabia: A Cross-Sectional Study. Front. Public Health, 8 (217), 1-6.

Food and Agricultural Organization. (2020). Extension and Advisory Services: at the Frontline of the Response to COVID-19 to ensure Food Security. Journal of extension Rome, 1 (19), 2-3.

Hamed, T. (2019) What Is the Best Response Scale for Survey and Questionnaire Design; Review of Different Lengths of Rating Scale, Attitude Scale, Likert Scale. International Journal of Academic Research in Management, 8 (1), 5-7.

Iorfa, S.K., Ottu, I.F.A., Oguntayo, R., Ayandele, O., Kolawole, SO., Gandi, J.C., Dangiwa, A.L &Olapegba, P.O. (2020). COVID-19 Knowledge, Risk Perception, and Precautionary Behavior among Nigerians: A Moderated Mediation Approach, 11 (10), 2-6.

Issa, N., Liddy, W. E., Samant, S., Conley, D. B., Kern, R. C., Hungness, E. S., &Barsuk, J. H. (2021). Effectiveness of a simulation-based mastery learning to train clinicians on a novel cricothyrotomy procedure at an academic medical centre during a pandemic: a quasi-experimental cohort study. BMJ open, 11(11), e054746.

Jahid, A., Alsharif, M. H., & Hall, T. J. (2022). A contemporary survey on free space optical communication: Potentials, technical challenges, recent advances and research direction. Journal of Network and Computer Applications, 1 (1), 103-311.

Josiah, B.O., &Kantaris, M. (2021). Perception of Covid-19 and Acceptance of Vaccination in Delta State Nigeria. The Nigerian Health Journal, 21 (2), 61-62.

Mohamed NA, Solehan HM, Mohd Rani MD, Ithnin M,&CheIsahak C.I (2021) Knowledge, acceptance and perception on COVID-19 vaccine among Malaysians: A web-based survey. Journal Pone, 16(8), e0256110.

NCDC (2020). An update of covid-19 outbreak in Nigeria. (Status update) internet hrrp://covid19.ncdc.gov,ng/indes.html.

NCDC (2021). Nigeria Center for Disease Control. Covid-19 Nigeria. (Status update) internet https://covid-19.ncdc.gov.ng.

Ning W., Shut T., Wu D., Xu J., Han Q., Huang M., Zou X., Yan Q., Yuan Y, Bie Y., Pan S., Mu J., Han Y., Yan X., Zou H., Li R., Ren Y., Chen X.,&Zou X. (2020). Plasma proteomics identify biomarkers and Pathogenesis of Covid 19. Science direct, 5 (52), 1108-1122.

Oriji, P.C, &Allagoa, D.O. (2021). Hesitancy of Covid-19 Vaccination among Health Workers (other than Doctors) in a Tertiary Hospitalin South-South, Nigeria. Asian journal of research in infectious diseases. 7 (1), 21-31.

Post, L., Marogi, E., Moss, B.C., Murphy, L.R., Ison, M.G., Achenbach, C.J., Resnick, D., Jamine, S.L., Welch, S.J.,&Oehmke, J.F. (2020). SARS-COV-2 Surveillance in the Middle East and North Africa: Longitudinal Trend Analysis.Journal of Medical Internet Research, 23 (1), 1-2.

Sanni, A.S & Doppler, W. (2007). Socio Economic Determinants of Household Fertilizer use intensity for Maize-based Production Systems in the Northern Guinea Savannah of Nigeria. Journal of Applied Sciences, 7 (13), 1774-1779.

Status update (2021) internet source; https://www.premiumtimesng.com/news/headlines/499590-covid-19-nigeria-confirms-three-additional-omicron-variant-cases.html

World Health Organization. (2021) Status of COVID-19 vaccines with evaluation process, (status update) accessed 24 June 2021.

What is driving COVID-19 vaccine hestitancy in sub-saharan Africa? (status update). August 11, 2021:https://blogs.worldbank.org/africacan/what-driving-covid-19-vaccine-hestitancy-sub-saharan-africa.

World Health organisation covid-19 vaccines. (2020). (status update) https://www.who.int/emergencies/diseases/novel-coronavirus-2019/covid-19-vaccines.

Wikipedia.info. Nigeria Katsina description. 2021. Available online. (accessed on 6 January, 2021).

Ya-jun, D. (2018). Establishment and Evaluation on Reliability and Validity of Public Risk Perception Scale for Public Health Emergencies. China Journal of Public Health, 1 (1), 1-2.