Research Article

Motivators and Barriers to Uptake of Covid-19 Vaccination among Health Workers in Uganda

Alex Mukembo[1]*, Victoria Nabunya[1], Abdulaziz Tugume[2], Rachel Auma[1], Chris Derrick Opio[1], Benon Musasizi[1], Elisha Nangosha[1], Isaac Charles Beigareza[1], Charles Kayemba[1], Gabriel Ocom[2] and Fiona Kisakye[2]

[1]*World Vision Uganda, Uganda*

[2]*Ministry of Health Uganda, Uganda*

*Corresponding author: Alex Mukembo, World Vision Uganda, Uganda

ARTICLE INFO

Citation: Alex Mukembo. Motivators and Barriers to Uptake of Covid-19 Vaccination among Health Workers in Uganda. Biomed J Sci & Tech Res 48(2)-2023. BJSTR. MS.ID.007633.

ABSTRACT

Uptake of coronavirus disease 2019 (COVID-19) vaccination is critical for the control and management of COVID pandemic. Healthcare workers (HCWs) are among the highest risk groups for infection yet studies have shown vaccination rates among the health workers. The objective of this study was to assess the motivators and barriers to uptake of the COVID-19 vaccine among health workers in Uganda.

Methodology: A cross-sectional study was conducted across five 5 districts from April to June 2021 targeting health workers both in the private and public sectors. A total of 560 health workers (280 vaccinated, 280 non-vaccinated health workers) were enrolled on this study. Being vaccinated was defined as having received at least on a dose of COVID-19 vaccine at the time of the study. The participants were sampled in three stage approach; the first district then cluster sampling using vaccination site as cluster then systematic sampling for final participants using vaccination registers. For each vaccinated health worker was matched with non-vaccinated health workers from the same community. The data was collected by trained research assistants using electronic questionnaires on Mobile Data collection tools on Smartphones. Collected data was downloaded in Excel for cleaning and then exported to Stata version 15 for analysis. Factors were considered significant at P less than 0.05.

Results: In total, 518 (92.5%) health workers completed the interviews of which 265 (51.2%) had been vaccinated. Fear of side effects and lack of vaccines at the vaccination site were the main reason for not being vaccinated among the non-vaccinated health workers. Factors that were associated with the likelihood of being vaccinated were age above 49 years, having a family member who had ever contracted COVID-19, high perceived risk of contracting COVID-19, trust in the COVID-19 vaccine and perceived severity of COVID-19 diseases. Factors that were associated with reduced likelihood of being vaccinated were not being married, fear of side effects, A-level education, not being aware of any Covid patient in the participant's communit.

Conclusion: Efforts to increase uptake of COVID-19 vaccines should target increasing access to vaccines, addressing fear of vaccine side effects as well as increasing vaccination site.

Introduction and Background

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes Coronavirus Disease 2019 (COVID19; often written COVID-19), emerged in late 2019 in Wuhan, China (Huang, et al. [1]) Rapid, the global spread of the virus is presently causing a pandemic. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is responsible for over 214 million confirmed cases of COVID-19 and over four million deaths globally to date (World Health Organization [2]) The coronavirus belongs to a family of viruses that may cause various symptoms such as pneumonia, fever, breathing difficulty, and lung infection (Adhikari, et al. [3]). These viruses are common in animals worldwide, but very few cases have been known to affect humans. The World Health Organization (WHO) used the term 2019 novel coronavirus to refer to a coronavirus that affected the lower respiratory tract of patients with pneumonia in Wuhan, China on 29 December 2019 (Huang, et al. [1]). Several Public Health interventions ranging from lockdown, closure of public places like schools, churches, and promotion of preventive methods like handwashing, use of facemasks, social distancing and vaccination have been encouraged (Sohrabi, et al. [4]). Amidst these, vaccination remains the most effective method recommended by WHO (World Health Organization (WHO) [5]). However, the availability of vaccines may not translate into the willingness of the population to get vaccinated.

Willingness or Motivation to get vaccinated varies from individual to individual, from community to community and also varies across the globe. The uptake of COVID-19 vaccine is influenced by several factors ranging from individual, community and health system (World Health Organization (WHO) [5]). Uptake of COVID-19 vaccines is a result of a combination of factors, like social-demographic factors, perceived risk and severity of infection, access and availability of vaccines, confidence in vaccines, values and emotions (Cooper, et al. [6-9]). Studies have shown that people who perceive that they are at low risk of contracting COVID-19, or that the consequences of becoming infected will not be severe, will be less willing to get vaccinated (Wake, et al. [10]). Compared to those with high perceived risk. Further studies have shown that access to information and misinformation can greatly affect the uptake of covid-19 vaccine (Loomba, et al. [11]). This misinformation can even lead to the halting of vaccination programs like conspiracy theories and information surrounding the use of AstraZeneca vaccine in Denmark and Germany with no backed with scientific evidence resulting in reports of halting the use of AstraZeneca vaccine in some developed countries across the world such as Germany, Denmark, Netherlands etc. are believed to have caused mixed reactions among some sections of the population (Boytchev, et al. [12,13]). Although the Ministry of Health has continued to put in place measures via different media platforms to counteract misinformation about COVID-19 vaccination, the vaccine uptake is still slow. The slow uptake of COVID-19 vaccination may sabotage the success of the vaccination campaign, making it difficult for the country to contain the pandemic.

Due to the scarcity of vaccines worldwide, the government prioritized high-risk populations to be vaccinated first, awaiting the next consignments. They include persons that provide essential services and are at high risk of exposure such as health workers, security personnel, teachers, all persons aged 50 years and above, and persons of 18 years and above with comorbidities such as cancer, hypertension, diabetes, liver, heart and kidney disease (MoH, [14]). One year after Uganda confirmed its first COVID-19 case, the country launched its vaccination exercise, targeting an estimated 22 million people. The launch happened on March 10th 2021 at Mulago National Referral Hospital following delivery of the initial batch of 864,000 doses of AstraZeneca COVID-19 vaccines through the COVAX facility and a donation of more100,000 doses from the government of India, totalling 964,000 doses in the country as of April 15th 2021 (MoH, [14]). As of April 14th 2021, approximately one month after the COVID-19 vaccination roll-out, the country was still experiencing a low uptake of the vaccine, having administered only 28% of the total doses issued. Surprisingly, the performance of many districts across the country is way below 10%. So far, the observed uptake of the COVID-19 vaccine is contrary to previous studies in Uganda and other countries which indicated that 50% to 72% of the population would agree to be vaccinated when the COVID-19 vaccine becomes available and would also take their child or close relative to get vaccinated against coronavirus (2) -(3). The country is expecting another donation of 300,000 vaccines from the People's Republic of China, 2.6 million vaccines from the COVAX facility and plans to procure more doses to vaccinate at least 60% of the population. Amidst these anticipated vaccine dosages, uptake may remain low as observed earlier unless barriers and motivators for vaccination are understood to inform the design of evidence-based strategies and improve vaccine uptake. Therefore, this study examined the barriers and motivators to COVID-19 vaccination uptake among health workers in Uganda.

Methodology

Design and Setting

We conducted casual comparative research employing quantitative methods. The health workers were compared between DOERS (vaccinated) and NON-DOERS (non-vaccinated) within the selected 5 Districts in Uganda of Busia, Bugiri, Hoima, Rakai and Oyam.

Study Population

Health workers from both private and public sectors aged 18 and above who were currently in active service at the time of the study and consented to participate. They were working in the study areas at the time of the study. nformation from the target respondents was collected using smartphones on the ODK/Kobo collect the application. The data collection process/fieldwork was conducted for 7-10 days in each district.

Sampling

The sample size for the study was determined using the Kish and Leslie formula for calculating sample size. N= Where N = minimum sample size required, Z = standard normal deviate (1.96) corresponding to 95% confidence level of significance. p= is the proportion of estimated vaccinated people in the community; since this is unknown at this stage, 50% will be used; q = (1-p), and δ = absolute precision of 5%. Then N==384 Catering for non-response = = using a 10% nonresponse rate Thus, a total of 106 (53 doers and 53 non-doers) respondents were interviewed through the household survey for each of the 5 Districts. An overall number of 530 respondents participated and were interviewed for the 5 selected Districts. For each category, a total of 106 per category were interviewed and split into two categories of 53 doers and non-doers for each District. The use of 53 was informed by a literature review from similar barrier analysis studies.

Sampling Procedure

A two-stage sampling technique was employed to select study participants. In the first stage, districts to participate were selected randomly from each of the five regions of the country. In each of the selected districts, health facilities that conducted Covid vaccination exercises were used as proxy clusters. These were health centres III and above. From each of the clusters (health facilities), a list of health workers who had been vaccinated from that Centre was constructed using the Covid vaccination register to constitute the sampling frame for the doers. the number of vaccinated health workers to participate from each of the clusters was calculated using probability proportional to the size (PPS) of the population of each category within the District. Each sampled vaccinated health worker was paired with a non-vaccinated from the sample area using a snowball approach. (Each vaccinated was required to identify a fellow health worker who was not vaccinated).

Data Collection and Tools

In each of the selected districts, data was collected by 10 enumerators who had been trained for 4 days including orientation on COVID and COVID SOP's using a semi-structured questionnaire that was programmed into Kobo/ODK collect application to enable electronic data collection using phones.

Variables

Age, gender, location, risk category, vaccination status, reasons for not receiving the vaccine, Perceived Susceptibility / Perceived Risk, Perceived Severity, Perceived Action Efficacy, perceived divine will.

Quality Assurance and Data Management

Inception meetings were held at every district prior to the start of the exercise to ensure district team awareness and involvement in the study. The facilitators supervised the field activity and conducted data quality checks during the whole exercise. At the end of each day, facilitators checked for completeness on the kind of data that each of the data collectors had collected. Further data was downloaded daily to ensure completeness and accuracy from the field teams. To further ensure adherence to COVID- SOPs, the study was also supervised by the MoH and district health team while all study team was provided with PEP mainly masks and hand sanitisers.

Data Management and Analysis

The data were collected using pretested, structured, and self-administered questionnaire prepared by the investigators and loaded on phone for electronic data collection. The data collected was in real-time submitted using ODK/Kobo collected on the Research Assistants' mobile phones and on daily basis data was extracted and checked for consistency and quality and feedback given to the RAs while in the field. Datasets from the ODK/Kobo collect server were downloaded as Excel files and preliminary data cleaning was conducted before exporting to STATA 15.0 for analysis. Everyday validations of submitted data were done to ensure that there was consistency and quality of the data collected and feedback on the extracted data was given to the Research Assistants in real-time or after every day of the field. Quantitative data analysis will be done at the univariate level to generate frequencies, means, median and proportions. Tools during data collection will be given a unique code. The process of unique coding will include sub-county, parish, village and then household numbers following the sampling frame. To ensure that each tool has a unique number, data collectors will be assigned numbers to use before heading to the field. The tool consists of socio-demographic characteristics, media exposure and access to Covid related information, access to vaccination services, health beliefs (perceived susceptibility, perceived severity, perceived benefit/ efficacy, perceived divine healing, perceived social norms and cultural factors, perceived barrier, and cues to action), knowledge about COVID-19, preventive behaviours towards COVID-19, and COVID-19 vaccination status variables.

Data Processing and Analysis

Coded Data from kobo collect was downloaded and exported to excel for cleaning. Cleaned data from excel was exported to STATA version 15 statistical software for analysis. Descriptive analysis like medians, means, proportions, standard deviations, interquartile range, and frequencies were computed. Bivariate analysis was done in STATA using the odd ratio (OR) as a measure of association with significance level at 0.05 and confidence intervals. All factors were considered significant at P-value =< 0.05.

Ethics Approval and Consent to Participate

Ethical approval and clearance was sought from the Institutional Review Board (IRB) for the Mbale regional referral REC. Further

confirmation and approval was provided from MoH through the different technical working groups and relevant authorities to the Director-General MoH Uganda that sanctioned the study since the research is about an ongoing pandemic of COVID-19. All participants provided written consent to participate in the study.

Results

A total of 518 health workers (central region 24%, eastern region 49%, western region 24.5%, and northern 2.5%) completed the survey. Of these 51.16% had been vaccinated (doers) while 48.84% had not been vaccinated (non-doers) at the time of the survey. Most were between the ages of 30-39 years (39.2%) majority (73.48%) were married at the time of the survey with 55.49% females and. The majority (72.1%) have tertiary or university education as table below At the time of the survey, only 0.19% was not aware of the COVID-19 pandemic outbreak in the country while 98.11% of the respondent were aware of the vaccination exercise in the country. 51.16% of the respondents had been vaccinated at the time of the survey with the majority preferring to be vaccinated from a health facility and least from the Ministry of health office as per the table below (Table 1).

Table 1: Socio-demographic Characteristic of the participants.

		Frequency	Percentage (%)
Participation by region	Central	104	24
	Eastern	212	49
	Northern	11	2.5
	Western	106	24.5
Age	19-29	198	37.5
	30-39	206	39.2
	40-49	76	14.39
	>49	48	9.09
Sex	Male	235	44.51
	FEMALE	293	55.49
Marial status	Married	388	73.48
	Not married	133	25.19
	Separated+devorced	7	1.23
Educational level	Secondary (o-level)	21	8.67
	Secondary (a-level)	39	7.39
	Tertiary/University Level	381	72.1
	Postgraduate	7	1.33
Vaccination status	Vaccinated	265	51.16
	Not vaccinated	253	48.84

Note: Socia-Demographic Characteristic

Motivators or Barriers to COVID-19 Vaccination Uptake

Following bivariate analysis using Stata, results show that health workers aged above 50 years were significantly 4 times more likely to get vaccinated compared to those less than 30 years (OR=3.4, P 0.001, CI 1.602-7.23), non-married health workers were 0.57times significantly less likely to get vaccinated (OR 0.57, P 0.015 CI 0.366-0.897). Further analysis showed that health workers with postgraduate education levels were 6times more likely to get vaccinated compared to those with O-level education though significantly A- level education was less likely to get vaccinated (OR= 0.29 P 0.01 CI 0.11-0.75). health workers who had ever had a family or close member diagnosed with COVID were significantly 3 times more likely to get vaccinated compared to those that had not (OR 2.64, P 0.000 CI 1.762-3.97) and so were health workers who had advised or were willing to advise the close family member to get vaccinated (OR =5.8 P=0.002 CI 1.94-17.4) (Table 2)

Table 2: Factors associated with uptake of covid-19 vaccination among health workers.

Factor		OR	P	CI
AGE	30-39	1.92	0.04	1.23-2.99
	40-49	2.55	0.02	1.40-4.65
	=>>50	3.4	0.001	1.60-7.23
Marriage	Not married/single	0.57	0.015	0.3666-0.897
Education	A'LEVEL	0.29	0.01	0.11-0.75
Family member previous diagnosed with Covid	YES	2.64	0	1.762-3.974
Advise family member to vaccinate	YES	5.83	0.002	1.959-17.396
Easy access to the vaccination site		5.7	0	2.53-13.21
Not aware Covid patients in their community		0.23	0.016	0.071-0.76
Don't know risk of contract Covid		0.21	0.004	0.07-0.62
Perceived risk of contracting Covid due to vaccination	NOT LIKELY	1.706	0.063	0.97-3.00
	DON'T KNOW	0.283	0.012	0.104-0.759
Side effect of Covid vaccine	Not serious	2.16	0.009	1.21-3.87
	Don't know	0.05	0	0.011-0.21
Trust in Covid vaccine	Trust little	3.08	0.009	1.32-7.16
	moderate	5.4	0	2.31-12.70
	A lot	1.6	0.47	0.43-5.93
Perceived severity of consequences in case of contracting Covid	Every serious consequence	1.7	0.026	1.066-2.743

Health workers who had no difficulty in accessing vaccination were 6 times more likely to get vaccinated (OR=5.7, P=000, CI 2.53-13.21).

Health workers who believed no person in their family and community had contracted Covid were 0.3 less likely to get vaccinated compared to those who believed that a high proportion had contracted Covid (OR 0.23 P 0.016 CI 0.07-0.77) and so were health workers who did not know the likely hood of contracting Covid from their community (OR=1.7, P =0.063 CI 0.97-3.0). Furthermore, health workers who believed severe conditions in case of contracting Covid were 2times like to vaccinate compared to those who did not believe so (OR= 1.7, P=0.026, CI= 1.06-2.74). Related to the COVID-19 vaccine health workers who moderately trusted the Covid vaccine were 6 times more likely to get vaccinated compared to those who did not trust the vaccine 9(OR 5.4, P=0.000 CI 2.31-12.70). Furthermore, health workers who perceived No risk of contracting Covid as a result of COVID-19 vaccine were 2 times more likely to get vaccinated compared to those who perceived a risk (OR=1.7, P=0.063, CI=0.97-3). and health workers who did not perceive a risk of side effects due to Covid vaccine were 3 times likely to get vaccinated compared to those who perceived risk (OR= 2.16, P=0.009, CI 1.214-3.87). Religion, either not approving or disapproving vaccination significantly influenced the decision to get vaccinated (OR 0.54, P 0.034 CI 0.314-0.95TABLE OF SIGNIFICANT FACTORS.

Discussion

This study reveals that age was significantly associated with the likelihood of getting vaccinated with health workers aged above 50years 4 times more likely compared to those below 30 years. This could be due to the perceived risk of contracting Covid increasing with age as revealed by other studies. This finding is consistent with studies by Mohammed et al Determinants of COVID-19 Vaccine Acceptance in Saudi Arabia and a study by Dula and others in Mozambique which showed that older people are at higher risk compared to young people (Al-Mohaithef, et al. [15,16]). There was no significant difference in the likelihood of the vaccinated based on gender. This contradicts the study by Mudende et al on Awareness and Acceptance of COVID-19 Vaccines among Pharmacy Students in Zambia (Mudenda, et al. [17,18]). Increase in education level was associated with the likelihood of vaccination except for A-level group which showed an inverse relationship. This could be high exposure to information and more knowledge as one's education level increases. This helps to demystify some negative beliefs. This is consistent with the study by Oluwatemitope Charles et al which found that high education level was associated with willingness to get vaccinated though contradicts the finding by Jeanine and others which showed that education level showed no association (Guidry, et al. [18,19]).

Having had family members diagnosed with Covid was associated with the likelihood of getting vaccinated, this could be

due to perceived increased risk of contracting Covid but also having been exposed to the experience of nursing a Covid patient. This was further confirmed by results that showed Further in this study revealed less fear of contracting Covid due to vaccination or less fear of side effects of the Covid vaccine being a signification associated with getting vaccinated. This also explains why the fear of side effects was the main reason for not getting vaccinated the health workers. This could be addressed by massive awareness creation by MoH on limited side effects of the COVID-19 vaccine and also ters counselling and sensitization provided by the health workers at the points of vaccination. This finding is consistent with finding from the studies on COVID-19 vaccination intention in the UK which showed that fear of side effects was associated with limited uptake of covid vaccination (Sherman, et al. [13]) and another study in kenya on level of COVID-19 vaccine confidence also showed similar results (Ahmed Mohammed Elhadi, et al. [20,21]). Furthermore, this study revealed that participants who perceived a high risk of contracting the covid from the family members or community were 3 times likely to get vaccinated. Health workers who perceived severe conditions in case of contracting covid were 2 times more likely to get vaccinated. These findings are consistent with finding by Viswanath v. et al on the adult population in USA which showed that risk perceptions (severity of and susceptibility to COVID-19) were significantly associated with vaccine uptake (Viswanath, et al. [19]). Easy access to vaccination centres and availability of vaccines at vaccination centres were significantly associated with the likelihood of being vaccinated.

This is consistent with findings for no vaccinations as most health workers pointed out lack of vaccines at vaccination centres as one of the reasons for not getting vaccinated. This is also in line with WHO objective and recommendation of increasing access and availability of vaccines in the communities (World Health Organization (WHO), [5]). Trust in the Covid vaccine was significantly associated with the likelihood of vaccination. Health workers who could advise family members to get vaccinated were more likely to get vaccinated. Trust is associated with increased willingness for uptake of recommended behavior/practice. This is consistent with other studies like study by Galanis- et al in US which showed that 80% of the population were willing to get vaccinated due to trust in the vaccination (Galanis, et al. [22,23]). Furthermore, this finding showed that participants trusted COVID-19 related information from health workers more than other sources. This could be due to the belief that health workers have correct and uptodate information compared to other sources. This finding is consistent with findings from study on COVID-19 vaccine, acceptancy and uptake from middle and low income countries and other studies (Loomba, et al. [24-26]). However our findings on trusted source of information contradicted with findings from a study by kazi and khandaker on Knowledge, Attitude and Acceptance of a COVID-19 Vaccine which showed that the most trusted source was government sources (Mannan, et al. [27]).

Limitation

These study findings may have been influenced by the lockdown as the study was carried out during the second wave and during the lockdown, which may have affected participation. Results could have also been affected by the government directive of having all health workers vaccinated. In addition, the broad definition of health workers could have influenced the results.

Conclusion

Perceived risk of contracting Covid and severity of COVID-19 as well as the availability of vaccines at vaccination sites increases the likelihood of getting vaccinated among the health workers while the fear of side effects, reduces the likelihood of one getting vaccinated.

Recommendations

Efforts should be geared towards increasing risk communication, the safety of Covid vaccines and increasing vaccination and vaccination sites in the community like outreach posts.

Availability of Data and Material

The dataset used and analyzed during this study are available from the corresponding author organization on reasonable request.

Acknowledgement

References

1. Huang C, Wang Y, Li X, Ren L, Zhao J, et al. (2020) Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. The Lancet 395(10223): 497-506.

2. (2020) World Health Organization. Coronavirus disease 2019 (COVID-19): situation report World Health Organization 104(May), 15.

3. Adhikari SP, Meng S, Wu Y J, Mao YP, Ye RX, et al. (2020) Epidemiology, causes, clinical manifestation and diagnosis, prevention and control of coronavirus disease (COVID-19) during the early outbreak period: A scoping review. In Infectious Diseases of Poverty 9(1): 29.

4. Catrin Sohrabi, Zaid Alsafi, Niamh Oneill, Mehdi Khan, Ahmed Kerwan, et al. (2020) World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19). International Journal of Surgery 76: 71-76.

5. (2020) World Health Organization (WHO). Behavioural considerations for acceptance and uptake of COVID-19 vaccines World Health Organization (WHO).

6. Cooper S, Van Rooyen H, Wiysonge CS (2021) COVID-19 vaccine hesitancy in South Africa: how can we maximize uptake of COVID-19 vaccines?. Expert Review of Vaccines 20(8): 921-933.

7. Kalam MA, Davis TP, Shano S, Uddin MN, Islam MA, et al. (2021) Exploring the behavioral determinants of COVID-19 vaccine acceptance among an urban population in Bangladesh: Implications for behavior change interventions. PLOS ONE 16(8): 0256496.

8. Malik AA, McFadden, SAM, Elharake J, Omer SB (2020) Determinants of COVID-19 vaccine acceptance in the US EClinicalMedicine 26: 100495.

9. Viswanath K, Bekalu M, Dhawan D, Pinnamaneni R, Lang J et al. (2021) Individual and social determinants of COVID-19 vaccine uptake. BMC Public Health 21(1): 818.

10. Wake AD (2021) The Willingness to Receive COVID-19 Vaccine and Its Associated Factors: "Vaccination Refusal Could Prolong the War of This Pandemic" – A Systematic Review. Risk Management and Healthcare Policy 14: 2609-2623.

11. Loomba S, de Figueiredo A, Piatek SJ, de Graaf K, Larson HJ (2021) Measuring the impact of COVID-19 vaccine misinformation on vaccination intent in the UK and USA Nature Human Behaviour 5(3): 337-348.

12. Boytchev H (2021) Covid-19: Germany struggles with slow uptake of Oxford AstraZeneca vaccine. BMJ (Clinical Research Ed.) 372: 619.

13. Sherman SM, Smith LE, Sim J, Amlôt R, Cutts, M, et al. (2021) COVID-19 vaccination intention in the UK: results from the COVID-19 vaccination acceptability study (CoVAccS), a nationally representative cross-sectional survey. Human Vaccines and Immunotherapeutics 17(6): 1612-1621.

14. MoH (2021) Update on COVID-19 vaccination in Uganda.

15. Al-Mohaithef M, Padhi BK (2020) Determinants of covid-19 vaccine acceptance in saudi arabia: A web-based national survey. Journal of Multidisciplinary Healthcare 13: 1657-1663.

16. Dula J, Mulhanga A, Nhanombe A, Cumbi L, Júnior A, et al. (2021). Covid-19 vaccine acceptability and its determinants in mozambique: An online survey. Vaccines 9(8): 828.

17. Mudenda S, Mukosha M, Meyer JC, Fadare J, Godman B, et al. (2021) Awareness and Acceptance of COVID-19 Vaccines among Pharmacy Students in Zambia. The Implications for Addressing Vaccine Hesitancy Research Square 34(4).

18. Oluwatemitope Olomofe C, Victor Soyemi K, Felicia Udomah B, Olabisi Owolabi A, Eziashi Ajumuka E, et al. (2021) Predictors of Uptake of a Potential Covid-19 Vaccine Among Nigerian Adults. Journal of Vaccines & Vaccination 1 J Vaccines Vaccin 12(1).

19. Guidry JPD, Laestadius LI, Vraga EK, Miller CA, Perrin PB, et al. (2021) Willingness to get the COVID-19 vaccine with and without emergency use authorization. American Journal of Infection Control 49(2): 137-142.

20. Ahmed Mohammed Elhadi Y, Mehanna A, Adebayo Adebisi Y, Yasir Essar M, El Saeh HM, et al. (2021) Intention of Healthcare Workers to Receive COVID-19 Vaccine: A Cross-Sectional Survey in 10 Countries in Eastern Mediterranean Region. MedRxiv.

21. Orangi S, Pinchoff J, Mwanga D, Abuya T, Hamaluba M, et al. (2021) Assessing the Level and Determinants of COVID-19 Vaccine Confidence in Kenya. Vaccines 9(8): 936.

22. Galanis P, Vraka I, Siskou O, Konstantakopoulou O, Katsiroumpa A, et al. (2021) Predictors of COVID-19 vaccination uptake and reasons for decline of vaccination: a systematic review. MedRxiv.

23. Halbrook M, Gadoth A, Martin Blais R, Gray AN, Kashani S, et al. (2021) Longitudinal assessment of COVID-19 vaccine acceptance and uptake among frontline medical workers in Los Angeles, California Clinical Infectious Diseases.

24. Loomba S, de Figueiredo A, Piatek SJ, de Graaf K, Larson HJ (2021) Measuring the impact of COVID-19 vaccine misinformation on vaccination intent in the UK and USA Nature Human Behaviour 5(3): 337-348.

25. Motta M, Sylvester S, CallaghanT, Lunz Trujillo K (2021) Encouraging COVID-19 Vaccine Uptake Through Effective Health Communication. Frontiers in Political Science 3.

26. Solís Arce JS, Warren SS, Meriggi NF, Scacco A, McMurry, et al. (2021) COVID-19 vaccine acceptance and hesitancy in low- and middle-income countries. Nature Medicine 27(8): 1385-1394.

27. Mannan KA, Farhana KM (2021) Knowledge, Attitude and Acceptance of a COVID-19 Vaccine: A Global Cross-Sectional Study. International Research Journal of Business and Social Science 6(4).
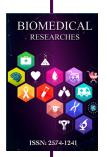
Assets of Publishing with us

- Global archiving of articles
- Im*mm*ediate, unrestricted online access
- Rigorous Peer Review Process
- Authors Retain Copyrights
- Unique DOI for all articles

https://biomedres.us/