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Perception and COVID-19 Vaccine Acceptance among Nurses and Midwives in Rivers State Tertiary Hospitals

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Abstract

The study is aimed at ascertaining perception and COVID-19 vaccine acceptance among nurses and midwives in Rivers State Tertiary Hospitals. The cross-sectional survey design was used for the study. Among a population of 800 nurses and midwives at Rivers State Tertiary Hospitals, 241 were chosen as the sample size. A self-structured questionnaire was used to collect data for the study. Descriptive statistics was used to analyse the data. Simple percentage and charts were used to answer the research questions. The finding of the study revealed that 74.3% of the nurses and midwives have the perception that COVID-19 vaccine is safe, 74.3% were willing to take Covid-19 vaccine. The study, therefore, concluded that nurses and midwives were willing to be vaccinated with COVID-19 vaccine. Hence the study recommends that the vaccine should be made available so that those who are willing can get vaccinated and that religious organisations should ensure they encourage their member to take the vaccine.

Keywords: *COVID-19, Perception, Willingness, Tertiary Hospital.*

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Introduction

In 2019, China reported the first cases of the viral pandemic known as COVID-19. The wet market in Wuhan, a Chinese city in Hubei province, was where the viral illness first appeared. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the virus that causes the illness (Cucinotta & Vanelli, 2020).

As of 10 February 2022, there were 402,044,502 confirmed cases of COVID-19 worldwide, with 5,770,023 fatalities, and the number is continuously rising (WHO, 2020). As of February 8th, 2022, there were 253,838 confirmed cases of COVID-19 in Nigeria, resulting in 3,139 fatalities (Fisher, 2020). Numerous countries' economy, health, and quality of life have suffered nearly inconceivable losses as a result of the COVID-19 epidemic. The most effective method of reducing or preventing viral infection and dissemination, together with sanitary and behavioral control measures, is vaccination. The greatest vaccination won't help you if you don't utilize it. According to recent studies, 20% of Americans are denying the vaccination, 30% are undecided, and 50% of Americans are eager to receive the vaccine (Palamenghi *et al*., 2020). In another study of adult Americans, 58% said they planned to have the shots, 32% said they weren't sure, and 11% said they didn't plan on getting the shots (Machingaidze & Wiysonge, 2021). Even if a vaccination is available, this population will likely fall below the level required for homogenous herd immunity, leaving many inhabitants susceptible to the illness. Understanding people's willingness to get vaccinations, the reasons for their willingness or unwillingness to do so, and the most reliable sources of information in their decision-making will be necessary to promote vaccine uptake (especially that of those against COVID-19) (Noni, 2015). According to a survey of the general populace in African nations, South Africa had an acceptance rating of 81.6% while Nigeria had 65.2%. Due to the potential for significant regional and sub-regional variations, early knowledge, attitudes, and practices studies regarding COVID-19 from North-Central Nigeria reported an acceptance rate of 29.0%, underscoring the need for additional research to accurately portray COVID-19 vaccine hesitancy in Africa. In order to ensure optimum effectiveness when a vaccine is accessible, the World Health Organization (WHO) suggests a preventive approach to overcome vaccination hesitancy and foster confidence in a vaccine (Daley *et al*., 2018).

Several COVID-19 candidate vaccines are at different stages of development, but only a handful have been given the go-ahead from regulatory agencies and the WHO. The regulatory authorities in several nations across the world have already given their approval for the use of the Pfizer/BoiNTech vaccine, Astrazeneca/University of Oxford vaccine, Sinovac vaccine, and Moderna COVID-19 vaccines (Larson *et al*., 2011). These vaccines come in a variety of forms, including live attenuated viruses and activated viral particles. While few are mRNA vaccines, some candidate vaccines are viral subunits. While some of these potential vaccinations are only supposed to be given once, the bulk are meant to be given twice (2 doses) in order to reach vaccine effectiveness levels over 90%. A total of 84% of these vaccinations must be given intravenously, with 76%, 5%, and 3% of those injections going intramuscularly, intradermally, and subcutaneously, respectively. Several of the vaccinations must be given orally (Olson *et al*. 2020).

The created COVID-19 vaccinations have given rise to false beliefs and attitudes among a number of groups and individuals throughout the world (Wagner *et al*., 2019). Due to perceived safety concerns, this has caused vaccination hesitation among a number of communities, with a respectable part of the population refusing to get the newly created vaccines. The WHO defines vaccine hesitancy as the delay in accepting or refusing immunization, even when vaccination services are available (Karafillakis *et al*., 2017). Using the epidemiologic triad of environment, agent, and host variables, one may assess the intricate nature of the reasons underlying vaccination reluctance. Public health regulations, societal issues, and media messaging are examples of environmental influences. The impression of vaccination safety and efficacy, in addition to the perceived vulnerability to the illness, are agent (vaccine and disease) factors (Olagoke *et al*., 2020). Knowledge, prior experience, educational attainment, and financial levels all affect host variables. According to earlier research, vaccination hesitancy is a widespread issue throughout the globe, with a wide range of justifications given (Pham *et al*., 2020). The most frequent explanations were perceived dangers vs advantages, particular religious convictions, and a lack of information and understanding. As shown by previous publications that found a substantial association between desire to get coronavirus vaccinations and its perceived safety (Karafillakis *et al*., 2017), the aforementioned explanations may be applied to COVID-19 vaccine reluctance. According to Karafillakis *et al*. (2017), there is a link between having a bad attitude regarding vaccinations and being hesitant to obtaining them, as well as a link between religion and having a lower intention to acquire the vaccine. There hasn't been a previous research looking at how the general populace of Rivers State perceives and accepts the COVID-19 vaccination. This study, was therefore aimed at determining the Perception and COVID-19 Vaccine Acceptance among Nurses and Midwives in Rivers State Tertiary Hospitals.

Literature Review

COVID-19

Coronavirus disease 2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The first known case was identified in Wuhan, China, in December 2019 (Page, Hinshaw and McKay, 2021). The disease has since spread worldwide, leading to an ongoing pandemic (Islam, 2021). Symptoms of COVID-19 are variable, but often include fever, cough, headache, fatigue, breathing difficulties, and loss of smell and taste (Islam 2020). Symptoms may begin one to fourteen days after exposure to the virus. At least a third of people who are infected do not develop noticeable symptoms. Of those people who develop symptoms noticeable enough to be classed as patients, most (81%) develop mild to moderate symptoms (up to mild pneumonia), while 14% develop severe symptoms (dyspnea, hypoxia, or more than 50% lung involvement on imaging), and 5% suffer critical symptoms (respiratory failure, shock, or multi-organ dysfunction) (Jiang, Xia, Ying, Lu 2020). Older people are at a higher risk of developing severe symptoms. Some people continue to experience a range of effects (long COVID) for months after recovery, and damage to organs has been observed. Multi-year studies are underway to further investigate the long-term effects of the disease (Chan *et al*., 2020).
COVID-19 transmits when people breathe in air contaminated by droplets and small airborne particles containing the virus. The risk of breathing these in is highest when people are in close proximity, but they can be inhaled over longer distances, particularly indoors. Transmission can also occur if splashed or sprayed with contaminated fluids in the eyes, nose or mouth, and, rarely, via contaminated surfaces. People remain infectious for up to 20 days, and can spread the virus even if they do not develop symptoms (Chan *et al*., 2020*)*.
Several testing methods have been developed to diagnose the disease. The standard diagnostic method is by detection of the virus's nucleic acid by real-time reverse transcription polymerase chain reaction (rRT-PCR), transcription-mediated amplification (TMA), or by reverse transcription loop-mediated isothermal amplification (RT-LAMP) from a nasopharyngeal swab.

Signs and symptoms of COVID-19

Symptoms of COVID-19 are variable, ranging from mild symptoms to severe illness. Common symptoms include headache, loss of smell (anosmia) and taste (ageusia), nasal congestion and runny nose, cough, muscle pain, sore throat, fever, diarrhea, and breathing difficulties (Oran and Topol, 2021). People with the same infection may have different symptoms, and their symptoms may change over time. Three common clusters of symptoms have been identified: one respiratory symptom cluster with cough, sputum, shortness of breath, and fever; a musculoskeletal symptom cluster with muscle and joint pain, headache, and fatigue; a cluster of digestive symptoms with abdominal pain, vomiting, and diarrhea (Wiersinga *et al*., 2020*)*. In people without prior ear, nose, and throat disorders, loss of taste combined with loss of smell is associated with COVID-19 and is reported in as many as 88% of cases (Blomberg *et al*., 2020*)*.

Of people who show symptoms, 81% develop only mild to moderate symptoms (up to mild pneumonia), while 14% develop severe symptoms (dyspnea, hypoxia, or more than 50% lung involvement on imaging) and 5% of patients suffer critical symptoms (respiratory failure, shock, or multiorgan dysfunction). At least a third of the people who are infected with the virus do not develop noticeable symptoms at any point in time. These asymptomatic carriers tend not to get tested and can spread the disease. Other infected people will develop symptoms later, called "pre-symptomatic", or have very mild symptoms and can also spread the virus (Stadnytskyi *et al*., 2020*)*.

As its common with infections, there is a delay between the moment a person first becomes infected and the appearance of the first symptoms. The median delay for COVID-19 is four to five days. Most symptomatic people experience symptoms within two to seven days after exposure, and almost all will experience at least one symptom within 12 days.

Most people recover from the acute phase of the disease. However, some people – over half of a cohort of home-isolated young adults – continue to experience a range of effects, such as fatigue, for months after recovery, a condition called long COVID; long-term damage to organs has been observed. Multi-year studies are underway to further investigate the long-term effects of the disease (Tang *et al*., 2021*)*.

Prevention of COVID-19

Preventive measures to reduce the chances of infection include getting vaccinated, staying at home, wearing a mask in public, avoiding crowded places, keeping distance from others, ventilating indoor spaces, managing potential exposure durations, washing hands with soap and water often and for at least twenty seconds, practising good respiratory hygiene, and avoiding touching the eyes, nose, or mouth with unwashed hands (Baig *et al*., 2020*)*.
Those diagnosed with COVID-19 or who believe they may be infected are advised by the CDC to stay home except to get medical care, call ahead before visiting a healthcare provider, wear a face mask before entering the healthcare provider's office and when in any room or vehicle with another person, cover coughs and sneezes with a tissue, regularly wash hands with soap and water and avoid sharing personal household items.

The first COVID-19 vaccine was granted regulatory approval on 2 December 2020 by the UK medicines regulator MHRA. It was evaluated for emergency use authorization (EUA) status by the US FDA, and in several other countries. Initially, the US National Institutes of Health guidelines do not recommend any medication for prevention of COVID-19, before or after exposure to the SARS-CoV-2 virus, outside the setting of a clinical trial (Gu *et al*., 2020*)*. Without a vaccine, other prophylactic measures, or effective treatments, a key part of managing COVID-19 is trying to decrease and delay the epidemic peak, known as "flattening the curve". This is done by slowing the infection rate to decrease the risk of health services being overwhelmed, allowing for better treatment of active cases, and delaying additional cases until effective treatments or a vaccine become available.

Face masks and respiratory hygiene

The WHO and the US CDC recommend individuals wear non-medical face coverings in public settings where there is an increased risk of transmission and where social distancing measures are difficult to maintain (Subbarao, 2021*)*. This recommendation is meant to reduce the spread of the disease by asymptomatic and pre-symptomatic individuals and is complementary to established preventive measures such as social distancing. Face coverings limit the volume and travel distance of expiratory droplets dispersed when talking, breathing, and coughing. A face covering without vents or holes will also filter out particles containing the virus from inhaled and exhaled air, reducing the chances of infection (Greenhalgh *et al*., 2021*)*. But, if the mask include an exhalation valve, a wearer that is infected (maybe without having noticed that, and asymptomatic) would transmit the virus outwards through it, despite any certification they can have. So the masks with exhalation valve are not for the infected wearers, and are not reliable to stop the pandemic in a large scale. Many countries and local jurisdictions encourage or mandate the use of face masks or cloth face coverings by members of the public to limit the spread of the virus.

Masks are also strongly recommended for those who may have been infected and those taking care of someone who may have the disease. When not wearing a mask, the CDC recommends covering the mouth and nose with a tissue when coughing or sneezing and recommends using the inside of the

elbow if no tissue is available. Proper hand hygiene after any cough or sneeze is encouraged. Healthcare professionals interacting directly with people who have COVID-19 are advised to use respirators at least as protective as NIOSH-certified N95 or equivalent, in addition to other personal protective equipment (Bundy *et al*., 2017).

Indoor ventilation and avoiding crowded indoor spaces
The CDC recommends that crowded indoor spaces should be avoided. When indoors, increasing the rate of air exchange, decreasing recirculation of air and increasing the use of outdoor air can reduce transmission. The WHO recommends ventilation and air filtration in public spaces to help clear out infectious aerosols. Exhaled respiratory particles can build-up within enclosed spaces with inadequate ventilation. The risk of COVID-19 infection increases especially in spaces where people engage in physical exertion or raise their voice (e.g., exercising, shouting, singing) as this increase exhalation of respiratory droplets. Prolonged exposure to these conditions, typically more than 15 minutes, leads to higher risk of infection (Kraus *et al*., 2020*).*
Displacement ventilation with large natural inlets can move stale air directly to the exhaust in laminar flow while significantly reducing the concentration of droplets and particles. Passive ventilation reduces energy consumption and maintenance costs but may lack controllability and heat recovery. Displacement ventilation can also be achieved mechanically with higher energy and maintenance costs. The use of large ducts and openings helps to prevent mixing in closed environments. Recirculation and mixing should be avoided because recirculation prevents dilution of harmful particles and redistributes possibly contaminated air, and mixing increases the concentration and range of infectious particles and keeps larger particles in the air.

Hand-washing and hygiene
Thorough hand hygiene after any cough or sneeze is required. The WHO also recommends that individuals wash hands often with soap and water for at least twenty seconds, especially after going to the toilet or when hands are visibly dirty, before eating and after blowing one's nose. When soap and water are not available, the CDC recommends using an alcohol-based hand sanitiser with at least 60% alcohol (Szarpak *et al*., 2020*).* For areas where commercial hand sanitisers are not readily available, the WHO provides two formulations for local production. In these formulations, the antimicrobial activity arises from ethanol or isopropanol. Hydrogen peroxide is used to help eliminate bacterial spores in the alcohol; it is "not an active substance for hand antisepsis." Glycerol is added as a humectant.

Social distancing
Social distancing (also known as physical distancing) includes infection control actions intended to slow the spread of the disease by minimising close contact between individuals. Methods include quarantines; travel restrictions; and the closing of schools, workplaces, stadiums, theatres, or shopping centres. Individuals may apply social distancing methods by staying at home, limiting travel, avoiding crowded areas, using no-contact greetings, and physically distancing themselves from others (Nussbaumer-Streit *et al*., 2020*)*. Many governments are now mandating or recommending social distancing in regions affected by the outbreak (Pansini and Fornacca, 2021*).*

Outbreaks have occurred in prisons due to crowding and an inability to enforce adequate social distancing. In the United States, the prisoner population is aging and many of them are at high risk for poor outcomes from COVID-19 due to high rates of coexisting heart and lung disease, and poor access to high-quality healthcare (Comunian, Dongo, Milani and Palestini 2020).

Surface cleaning
The CDC says that in most situations, cleaning surfaces with soap or detergent, not disinfecting, is enough to reduce risk of transmission. The CDC recommends that if a COVID-19 case is suspected or confirmed at a facility such as an office or day care, all areas such as offices, bathrooms, common areas, shared electronic equipment like tablets, touch screens, keyboards, remote controls, and ATM machines used by the ill persons should be disinfected (Pansini and Fornacca, 2021). Surfaces may be decontaminated with 62–71 percent ethanol, 50–100 percent isopropanol, 0.1 percent sodium hypochlorite, 0.5 percent hydrogen peroxide, and 0.2–7.5 percent povidone-iodine. Other solutions, such as benzalkonium chloride and chlorhexidine gluconate, are less effective. Ultraviolet germicidal irradiation may also be used. A datasheet comprising the authorised substances to disinfection in the food industry (including suspension or surface tested, kind of surface, use dilution, disinfectant and inoculum volumes) can be seen in the supplementary material.

Self-isolation
Self-isolation at home has been recommended for those diagnosed with COVID-19 and those who suspect they have been infected. Health agencies have issued detailed instructions for proper self-isolation. Many governments have mandated or recommended self-quarantine for entire populations. The strongest self-quarantine instructions have been issued to those in high-risk groups. Those who may have been exposed to someone with COVID-19 and those who have recently travelled to a country or region with the widespread transmission have been advised to self-quarantine for 14 days from the time of last possible exposure.

COVID-19 Vaccine
A COVID-19 vaccine is a vaccine intended to provide acquired immunity against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes coronavirus disease 2019 (COVID-19). Prior to the COVID-19 pandemic, an established body of knowledge existed about the structure and function of coronaviruses causing diseases like severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS). This knowledge accelerated the development of various vaccine platforms during early 2020. The initial focus of SARS-CoV-2 vaccines was on preventing symptomatic, often severe illness (Huang *et al*., 2020). On 10 January 2020, the SARS-CoV-2 genetic sequence data was shared through GISAID, and by 19 March, the global pharmaceutical industry announced a major commitment to address COVID-19.

The COVID-19 vaccines are widely credited for their role in reducing the severity and death caused by COVID-19. Many countries have implemented phased distribution plans that prioritize those at highest risk of complications, such as the elderly, and those at high risk of exposure and transmission, such as healthcare workers. As of 13 January 2022, 9.60 billion doses of COVID-19 vaccines have been administered worldwide based on official reports from national public health agencies. By December 2020, more than 10 billion vaccine doses had been pre-ordered by countries, with about half of the doses purchased by high-income countries comprising 14% of the world's population (Por Mohammad *et al*., 2020*).*

Methodology
The study employed the Cross-sectional study design. The 800 nurses and midwives in Rivers State tertiary hospitals formed the population of the study. The sample size of 241 was selected from the total population of 800. The instrument for data collection was a self-structured questionnaire. The questionnaire was divided into two (2) parts. The first part consisted of personal data while the second part consisted of items designed to measure the objectives of the study. Descriptive statistics was used as data analysis method.

Results
Table 1, show that 35.7% of the respondents were between 18 – 30years, 23.2% were between 31 – 40years, 28.6% were between 41 – 50years while 12.5% were between 50 years and above. 45.6% of the respondents had school Bachelor's degree, 24.9% had master's degree, 29.5% had doctor of philosophy. 29.0% of the respondents were males while 71.0% of the respondents were females.

Table 4.1: Percentage and frequency of demographic data

Age	**Frequency**	**Percent**
18–30	85	35.7
31–40	56	23.2
41–50	69	28.6
>50	30	12.5
Total	**241**	**100.0**
Educational qualification		
B.Sc	110	45.6
M.Sc	60	24.9
Ph.D	71	29.5
Total	**241**	**100.0**
Gender		
Male	100	29.0
Female	141	71.0
Total	**241**	**100.0**

Table 2 revealed that 324 representing 76.4% of the respondents accepted that they believe Covid-19 vaccine is safe while (23.6%) did not accept, (74.2%)

accepted that they think Covid-19 vaccine can protect against Covid-19 while (25.8%) did not accept. (25.7%) said they think it is necessary to take the vaccine while (74.3%) did not accept. (28.6%) think SARS-CoV-2 vaccines was designed to depopulate the human race and (71.4%) didn't accept. (28.6%) believed that they are going to insert a micro-chip into your body after taking the vaccine (71.4%) didn't accept.

Table 2 Perception of Covid-19 vaccine among nurses and midwives in Rivers State tertiary hospitals.

	Items	Yes	No
1	Do you think Covid-19 vaccine is safe?	(76.4%)	(23.6)
2	Do you think Covid-19 vaccine can protect against covid-19?	(74.2%)	(25.8%)
3	Do you think it is necessary to take the vaccine?	(25.7%)	(74.3%)
4	Do you think SARS-CoV-2 vaccines was designed to depopulate the human race?	(28.6%)	(71.4%)
5	Do you believe that they are going to insert a micro-chip into your body after taking the vaccine?	(28.6%)	(71.4%)

Figure 1 revealed that 74% of the respondents accepted that if they mandate everyone to take the vaccine, that they will take, 74% accepted that even if their religion is against Covid'19 vaccine, they will still take it, 75% accepted that they are willing to take the vaccine.

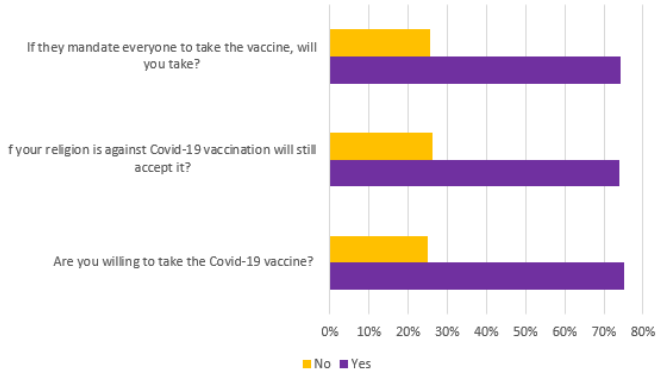

Figure 1: willingness to take COVID-19 among Nurses and Midwives in Rivers State Tertiary Hospitals.

Figure 2 revealed that 30.2% of the respondents have taken Modena vaccine, 50.3% had taken AstraZeneca, 15.7% had taken Pfizer while 3.8% had taken Johnson and Johnson.

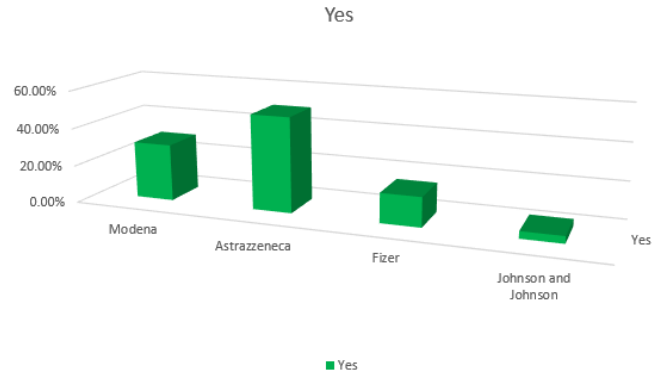

Figure 2: Type of Vaccine taken by Nurses and Midwives in Rivers State Tertiary Hospitals.

Figure 3 revealed that 20.2% of the respondents had taken 1st dose, 68.3% had taken 2nd dose while 11.5% had taken 3rd dose.

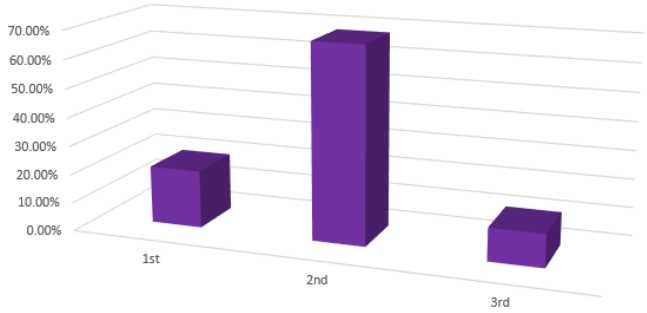

Figure 3: Number of doses taken by Nurses and Midwives in Rivers State Tertiary Hospitals

Discussion

This study assessed perception and willingness to take covid-19 vaccine among Nurses and Midwives in Rivers State tertiary hospitals. In this research, we found that slightly more than half of the nurses and midwives (74.3%) had a positive opinion of the COVID-19 vaccination. This finding is quite instructive since it is often believed that nurses and midwives would view vaccination favourably due to their education and experience.

Significantly, even though only 43% of participants expressed specific safety concerns about the vaccine itself, more than two-thirds of the nurses and midwives reported concerns about getting the vaccination. This conclusion may be justified by the prevalence of conspiracy theories surrounding the outbreak as well as a psychological need to understand all of the events that led up to it (van Prooijen & Douglas, 2017). This finding is intriguing because psychosocial factors, such as perceptions, emotions, confidence in vaccinations, and trust in vaccine providers, have been shown to contribute to vaccine hesitancy and refusal and may have had an impact on the nurses and midwives in this study in terms of vaccine acceptance.

Only 74.5% of the nurses and midwives in this survey said that they would be open to receiving the COVID-19 vaccination. This outcome is striking but not unexpected given that it has been shown that main barriers to vaccine uptake include popular beliefs of the dangers, religion, and advantages of immunization. Since they have more medical information than the general public, health personnel are less likely to make subjective judgements that affect their behaviour and vaccine choices.

Our study's acceptance rate is lower than the 86% offered by (Williams *et al*., 2020), but it is comparable to the 53.5% acceptance rate among US residents published by Guidry *et al*. (2021). The higher acceptance rate discovered by Williams *et al*. (2020) may be connected to their study participants' enhanced perceived susceptibility to COVID-19 infection since all of the participants in their research had chronic respiratory issues. The percentage of people in our study who were willing to get the COVID-19 vaccine fell short of the 75% mark required to build herd immunity and stop the spread of the coronavirus epidemic (Bartsch *et al*., 2020). This is alarming since our research included nurses and midwives, who were expected to be more likely than the general population to get the immunization owing to their medical expertise. According to our respondents, their impressions of the COVID-19 vaccine, their religious beliefs, and their level of medical knowledge were significantly correlated with their readiness to get the immunization (Betsch & Wicker, 2012).

Conclusion and Recommendations

In conclusion, our data show that perception and readiness to receive COVID-19 vaccinations were optimal among this group of nurses and midwives, and this was related to the respondents' views toward vaccination, their religious beliefs, and their level of medical skill. Given their crucial role in public health as key players in the fight against the COVID-19 pandemic and other serious infectious diseases, nurses and midwives must receive vaccinations to protect themselves against infectious diseases. It is crucial to increase vaccine acceptance among this team when it becomes available. In order to relieve their fears and concerns, the government should start early education and training programs for healthcare professionals. Religious organizations should be sure to encourage their members to take the vaccine, and the vaccine should be made available so that those who are willing can get vaccinated.

References

Cucinotta D, and Vanelli M. (2020). WHO Declares COVID-19 a Pandemic, *Acta Biomed*. 91(1): 157–160. pmid: 32191675.

Daley M. F., Narwaney K. J., Shoup J.A., Wagner N.M., Glanz J.M. (2018). Addressing Parents 'Vaccine Concerns: A Randomized Trial of a Social Media Intervention. Am. J. Prev. Med. 2018, 55, 44–54. pmid:29773490.

Fisher KA, Bloomstone S. J, Walder J, Crawford S, Fouayzi H, Mazor KM. (2020). Attitudes Toward a Potential SARS-CoV-2 Vaccine: A Survey of U.S. Adults. *Ann Intern Med*. pmid: 32886525; PubMed Central PMCID: PMC7505019.

French J, Deshpande S, Evans W, Obregon R. Key Guidelines in Developing a Pre-Emptive COVID-19 Vaccination Uptake Promotion Strategy. *Int. J. Environ. Res. Public Health*, 17, 5893. pmid:32823775.

Karafillakis E, Larson H. J, Consortium A. (2017). The benefit of the doubt or doubts over benefits? A systematic literature review of perceived risks of vaccines in European populations. *Vaccine*, 35, 4840–4850. pmid:28760616.

Kwok K. O, Lai F, Wei WI, Wong S.Y.S, Tang J.W.T. (2020). Herd immunity—Estimating the level required to halt the COVID-19 epidemics in affected countries. *J. Infect*. 80, e32–e33. pmid:32209383.

Larson H. J, Cooper L. Z, Eskola J, Katz S. L, Ratzan S. (2011). Addressing the vaccine confidence gap. *Lancet*, 378, 526–535. pmid:21664679.

Machingaidze S and Wiysonge C. S. (2021). Understanding COVID-19 vaccine hesitancy; A new study unpacks the complexities of COVID-19 vaccine hesitancy and acceptance across low-, middle- and high-income countries. *Nature Medicine*, 27:1338–1344.

Noni E. M., (2015). The SAGE Working Group on Vaccine Hesitancy. Vaccine hesitancy: Definition, scope and determinants. Vaccine 33 (2015) 4161–4164. pmid:25896383.

Olson O, Berry C, Kumar N. (2020). Addressing Parental Vaccine Hesitancy towards Childhood Vaccines in the United States: A Systematic Literature Review of Communication Interventions and Strategies. *Vaccines*, 8, 590. pmid:33049956.

Olagoke A. A, Olagoke O. O, Hughes A. M, (2020). Intention to Vaccinate Against the Novel 2019 Coronavirus Disease: The Role of Health Locus of Control and Religiosity. J. Relig. Health 2020. pmid: 33125543.

Palamenghi L, Barello S, Boccia S, Graffigna G. (2020). Mistrust in biomedical research and vaccine hesitancy: The forefront challenge in the battle against COVID-19 in Italy. *Eur. J. Epidemiol*. 35: 785–788. pmid: 32808095.

Pham K, Sharpe EC, Weiss W. M, Vu A. The use of a lot quality assurance sampling methodology to assess and manage primary health interventions in conflict-affected West Darfur, Sudan. Popul Health Metrics; 2016:3–4. pmid: 27757070.

Wagner A. L, Masters N. B, Domek G. J, Mathew J. L, Sun X, Asturias E. J, (2019). Comparisons of Vaccine Hesitancy across Five Low- and Middle-Income Countries. Vaccines, 7, 155. pmid:31635270.

World Health Organization (WHO). WHO Coronavirus Disease (COVID-19) Dashboard, Geneva, Switzerland: WHO; 2022 [Available from: https://covid19.who.int/].

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