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COVID-19 Vaccine Hesitancy in Africa and Asian Continent: A Comparative Study Between Nigeria and Nepal

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Abstract

Of all the Covid-19 intervention programs, the use of vaccines has proven effective in the control as well as prevention of the disease. However, higher cases of vaccine hesitancy have been identified as one of the main challenges affecting the successful implementation of vaccination programs, especially in Africa and Asia. Despite the global acceptance of Covid-19 vaccines, African countries, including Nigeria remain the least vaccinated countries even with the proven data with regards to vaccine safety and efficacy. In both Nepal and Nigeria, Nepal has a higher number of approved Covid-19 vaccines with Nigeria having seven and Nepal having eleven. Among these countries, vaccine hesitancy has been identified as a serious concern affecting the implementation of the Covid-19 vaccination Programme. There are still worries about vaccine efficacy and safety as part of the COVID-19 vaccine challenges both in Nepal and Nigeria. This study conducted in-depth research on the various Covid-19 vaccines that have been approved in both Nigeria and Nepal, and highlights the success and challenges of the successful implementation of Covid-19 vaccination in these two countries as well proffers some solutions to these challenges. The work further focus on the comparison of the pattern of vaccination and the challenges affecting it. This paper will serve as resource material as literature searches in major databases (Scopus, web of science, ProQuest, and google scholar) revealed that similar work on the comparison between these two countries on vaccine hesitancy has not been done.

Keywords: Africa; Covid-19 vaccination; Nepal; Nigeria; Vaccine hesitancy; Vaccine safety

Introduction

The severe acute respiratory syndrome coronavirus 2 (SARS CoV-2) was named by the International Committee on Taxonomy of Viruses (ICTV). This same virus was named 2019-novel coronavirus (2019-nCoV) by World Health Organization (WHO) and later coronavirus disease 2019 (COVID- 19). The WHO later declared the outbreak a

pandemic and a Public Health Emergency of International Concern (PHEIC) [1].

This disease is linked with a cluster of respiratory infections in the Hubei province of Wuhan, China [2], and has since become a global pandemic. To date, more than 623 million cases of COVID-19 have been reported on the John Hopkins University Coronavirus Resource Centre (JHUCRC) database, with over 6.4 million deaths globally [3,4].

To curtail the continual health and economic effects caused by SARS-CoV-2, many therapeutic strategies were proposed and implemented. These strategies include pharmaceutical intervention such as mask-wearing, social distancing, and quarantine as well as other non-pharmaceutical intervention which employs SARS-CoV-2 control at the community level [5]. Of all these interventions, the use of vaccines has proven effective in the control as well as in the prevention of SARS-CoV-2. Vaccines such as Johnson's Janssen COVID-19, AstraZeneca, Moderna, and Pfizer/BioNtech are among the few vaccines that received very high global recognition and have long been accepted in many different countries including Nigeria and Nepal. Among these countries, vaccine hesitancy has been identified as a serious concern affecting the implementation of the SARS-CoV-2 vaccination Programme.

In Nepal, there are more than 1000 Covid-19 cases with 12,018 deaths thus far. Even with just about 3000 active cases so far, Nigeria has recorded a total of 265,816 confirmed cases of COVID-19 out of over 5 million samples tested with 3,155 deaths as of October 2022 [6].

Vaccination programs are currently ongoing against COVID-19 across different countries in the world. The least vaccinated countries are African countries, including Nigeria, even with the proven data with regard to vaccine safety and efficacy [7]. With more than 12 billion doses of vaccines administered globally [3], only about 80 million doses were administered in Nigeria out of a total population amounting to 200 million [8]. While in Nepal with a population of approximately 30 million people, about 58 million doses of vaccines have been administered and approximately 93.32% of the entire country's population receiving at least a single dose [3,9]. In Nigeria, a BBC news publication reported that only 3% of the entire population has received a full course of the COVID-19 vaccine, which is regarded as a very low rate compared with other African countries like South Africa (24%) [10].

There are still worries about vaccine efficacy and safety as part of the COVID-19 vaccine challenges both in Nepal [11] and Nigeria [12]. Therefore, more Randomized controlled trials are required to validate the efficacy of the vaccines. Vaccine hesitancy is one of the challenges of COVID-19 vaccination programs in Nigeria. Different studies have reported a high level of Vaccine hesitancy even among the elite class. The studies conducted by Uzochukuwu, et al. [13] among students and staff in Nigerian tertiary institutions have further explained this notion. The problems of vaccine hesitancy are attributed to mainly safety issues, problems of accessibility to vaccination centers especially by the rural residents, as well as misinformation about vaccines from social media [14]. Ilyasu, et al. [12] have identified insufficient information, distrust, fear of long-term effects, and rumors on the possible problems of infertility issues as relates to covid-19 vaccination as the four top bases for vaccine hesitancy in Northern Nigeria [12,15]. However, despite the existing high levels of vaccine hesitancy against covid-19 amongst the educated class, the high levels of this hesitancy in Northern Nigeria as obviously evident publicly, might not be unconnected with the existing high poverty levels as well as a high illiteracy rate in this region. More so, vaccine hesitancy can negatively affect the implementation and achievement of a successful global vaccination campaign [16].

This study identified the problems of COVID-19 vaccine acceptance in both Nigeria and Nepal, and highlight the differences in both the two countries containment strategies, along with some possible solutions to the problems.

Origin of Covid-19

Covid-19 which is caused by SARS-Cov-2 was first detected in 2003. To date, this disease has contributed to the high level of morbidity and mortality caused by infectious diseases at a global scale. The first Covid-19 cases in humans were reported in Wuhan City, China in December 2019 [1,8]. This virus was thought to have emerged in wild and jump from bats to humans, through other animals or directly from bats. Early genomic comparison carried out by Zhou, et al. [17]. Reported that the genome of the 2019-nCoV is 96% similar to that of a bat coronavirus. But a recent research conducted by Pekar et al. stated that the SARS CoV-2, just like other coronavirus emerges likely from multiple zoonotic occurrences [4,18].

A team of international Scientists co-lead by Dr Peter Ben Embarek anf Professor Liang Wannian was convened by WHO to study the origins of SARS-CoV-2 and it was reported that there was widespread contamination with SARS-CoV-2 in Wuhan, China at the Huanan market but the actual source of contamination could not be identified. The team also assessed several laboratories in Wuhan to check the possibility of a Laboratory incident that could lead to the

virus entering the human population, however, they reported that a laboratory leak is unlikely to have occurred [19].

Approved Covid-19 Vaccines in Nepal

A total of 44 different vaccines have been approved for use by at least one national regulatory authority out of which 11 vaccines are in WHO's emergency use listing. So far, the Department of Drug Administration (DDA) has approved nine vaccines for Emergency / conditional use in Nepal, these vaccines are Pfizer, AstraZeneca, Janssen, Moderna, Gamaleya, Sinopharm, Sinovac, BBIL, and Covishield [20].

The Department of Drug Administration (DDA) serves as the regulatory authority in charge of regulating the registration of drugs and vaccine candidates in Nepal [21]. The first vaccine to be approved by DDA is ChAdOx1 nCOV-19 (Covisheild), a vaccine developed by the University of Oxford and pharmaceutical giant AstraZeneca and supplied by Serum Institute of India. After a month, Sinopharm's BBIBP-CorV received approval on February 17, 2021, becoming the second vaccine to be approved for Nepal [22]. On September 15, 2021, Moderna-Spikevax, an RNA-based vaccine received approval, bringing the country's total number of licensed vaccines to nine (Table 1).

Approved Covid-19 Vaccines in Nigeria

As of 7th October 2022, a total of seven vaccines have been approved for use against Covid-19 in Nigeria [21]. These include Sinopharm (Beijing) Covilo, Oxford/AstraZeneca formulation, Oxford/AstraZeneca Vaxzevria, Janssen (Johnson & Johnson) Jcovden, Gamaleya Sputnik V, Pfizer/BioNTech Comirnaty and Moderna Spikevax [6].

RNA Moderna Spikevax Covid-19 Vaccine

Spikevax is a vaccine approved for use in people aged 6 years and above. Spikevax vaccines is known to contain messenger RNA molecule (elasomeran) which triggers the production of a protein that confers lifelong immunity to the host.

Pfizer/BioNTech Comirnaty COVID-19 Vaccine

Comirnaty is a monovalent vaccine approved for use in people aged 12 years and above. The vaccine is produced by Fosum Pharma, BioNTech and Pfizer companies. Comirnaty vaccine is used as a two-dose primary series [8,19]. Among immunocompromised, Comirnaty vaccine is the vaccine of choice. The vaccine is being administered in primary doses of 3 and 2 for people aged 6 months to below 5 years and 5 years and above respectively. A single booster dose and bivalent booster dose may as well be administered [18].

Gamaleya Sputnik V COVID-19 Vaccine

Sputnik V vaccine is produced by Gamaleya Research Institute of the National Center of Epidemiology and Microbiology in Russia and has been reported to be 90% effective against the vaccine recipients. The vaccine is known to have some level of similarity with the Oxford-AstraZeneca vaccine. Their main difference is that Oxford-AstraZeneca vaccine is produced from a common cold virus that has been weakened while Sputnik V vaccines are made from human adenovirus vectors. Sputnik V vaccine is made from adenoviruses (common cold viruses) where SARS-Cov-2 spike protein gene is added to Ad5 and Ad26, (unique types of adenovirus) followed by engineering them in a manner they can only invade but not replicate within the cells [8,19].

Janssen (Johnson & Johnson) Jcovden

Jcovden vaccines are used for people aged 18 years and above. Jcovden vaccines are made from the adenovirus gene, modified to produce the spikes protein of the SARS-CoV-2 virus. Following this modification, once the virus gains entry into the host, it triggers the host immune cells (T and Be cells) to produce antibodies [8]. The good thing here is that the adenovirus portion of the vaccine neither replicates nor causes any form of a disease in the host.

Vaxzevria (Oxford/AstraZeneca)

Like the Jcovden vaccines, Vaxzevria vaccines are recommended for use in adults (people aged 18 years and above). The vaccines use a weakened form of adenovirus to deliver the SARS-oV-2 glycoproteins [8]. Vaxzevria further contains polysorbate, L-histidine, magnesium chloride hexahydrate salt, sodium chloride salt, and sucrose sugar among many others [18].

Covishield

Covishield was developed by Oxford University's Jenner Institute and European pharmaceutical company AstraZeneca. The vaccine uses a weakened version of adenovirus (a common cold virus) isolated from chimpanzees [19]. It has been modified to have similar material to the coronavirus so that once it has been injected into the body, it will trigger the body's immune cells to produce SARS-CoV-2 antibodies [18].

Sinopharm (Beijing) Covilo COVID-19 Vaccine

Sinopharm vaccine is been produced by Sinopharm Beijing Institute of Biological Products. The vaccines contain inactivated virus vaccines using SARS-CoV-2 viruses. In Sinopharm vaccine, the inactivated virus is treated with heat, radiation, or chemicals. Once the infectivity of the virus

is altered, the virus cannot multiply but can trigger the host immune cells to produce SARS-CoV-2 antibodies [7,8].

Problems of Covid-19 Vaccine Acceptance in Nigeria

Concerns with vaccination safety and uncertainty pose the biggest threat to the COVID-19 vaccine's acceptability in Nigeria. Due to safety concerns sparked by reports of blood clots and deaths associated with the vaccine in the United States and some European nations like Austria, Lithuania, Italy, Luxembourg, Norway, Estonia, Latvia, Malawi, Denmark, Iceland, Sierra Leone, and Chad, many other African countries were hesitant to vaccinate their citizens with the Oxford/AstraZeneca COVID-19 vaccines [23]. In certain African countries, particularly Nigeria, that started the vaccination program, this also led to poor vaccination rates even among medical professionals and some susceptible educated people. In addition, many African nations lack the systems and capacity to document and monitor reports of unexpected and infrequent side effects in vaccination recipients; this raises questions about vaccine safety and discourages individuals from obtaining the shots. For instance, the results of a sizable study on perceptions of the COVID-19 vaccine in Uganda, Tunisia, Niger, Malawi, Burkina Faso, Morocco, Ethiopia, Côte d'Ivoire, the Democratic Republic of the Congo, Nigeria, Senegal, South Africa, Sudan, Kenya and Gabon by the Africa Center for Disease Control showed that the majority of respondents had concerns about the safety of the vaccine [15]. The majority of respondents from Ethiopia, Niger, Tunisia, and the Democratic Republic of Congo, in contrast, flatly refused to receive the vaccination. Additionally, issues with false information and superstitious beliefs that have surfaced since the start of the pandemic in some African nations and around the globe, as well as unproven theories about the manufacture of the COVID-19 vaccines that are circulating on social media, are posing a threat to the uptake of the vaccines in the world and Nigeria, especially in rural communities.

Solutions to the Problems of Covid-19 Vaccine Acceptance in Nigeria

In other to create a successful vaccination program in Nigeria, measures to overcome these problems must be implemented promptly and continuously. In other to ensure uninterrupted vaccine procurement, storage, transit, distribution, and administration to intended people, a vaccination program must be adequately planned at the national level. This was impressive and produced positive results early in the vaccination exercise, as evident in Ghana and Angola, which vaccinated their targeted populations very early [7]. Before the COVID-19 vaccination program began in Africa, the majority of the continent's nations revealed pre-planned outlines of how and when the vaccinations would take place. Planning for the succeeding phases is essential as the vaccination exercise advances, in other to replicate the outstanding outcomes attained early in the first phase and to address the errors noted in the ongoing first phase [15]. The standard storage facilities for vaccines to assure safety and sustain efficacy, as well as the lack of appropriate vaccines at vaccination stations, are some of the major obstacles to meeting the goals of vaccination exercise. To retain the efficacy and safety of the vaccine doses before administration, African nations must invest more in cold chain facilities to store more important vaccines for the vaccination program in the second phase [6,8]. There should be enough cold chain logistics in place to maintain the vaccinations that will serve the target and intended populations because the second phase of the vaccination exercise will involve greater populations than the first phase. Additionally, using well-known people, respectable individuals, and national heroes to spread vaccine-promotional messages may increase public acceptance of vaccines. Additionally, by providing additional people and material resources necessary to address COVID-19 vaccine hesitancy in Nigeria, strong intra- and inter-sectoral cooperation would aid in improving the acceptance and uptake of the COVID-19 vaccines [1,23]. The public health system may be strengthened by the inclusion of the COVID-19 vaccine in the normal vaccination schedule and as a requirement, which would also serve to promote and increase the COVID-19 vaccine's acceptance while also enhancing the general wellbeing of everyone living in Nigeria.

Problems of Covid-19 Vaccines Acceptance in Nepal

In 2019, the WHO reported covid-19 vaccine hesitancy as one of the top ten problems affecting the global effort in the containment of Covid-19. The WHO defines vaccine hesitancy as a "delay in acceptance or the complete refusal to get vaccinated even though vaccination services are readily available" [24]. Among different countries in the globe, the rate of vaccine acceptance varies significantly with no specific trend [23,25,26]. In earlier research, Indonesia (93.3%), Malaysia (94.3%), China (91.3%), and Ecuador (97%), had greater (>90%) vaccination acceptance rates [27-32]. While the Democratic Republic of Congo, Jordan, and Kuwait reportedly had a low acceptance rate of 27.7%, 28.4%, and 23.6% respectively [31, 32]. According to research conducted in Indonesia, when effectiveness dropped from 95% to 50%, the acceptance rate dropped from 93.9% to 67% [29]. One multi-country study found that Nepal having a score of 74%, has the highest acceptance rates among the Southeast Asian nations [33].

According to a study conducted in Nepal, a total of 8.8% of respondents refused to be administered the covid-19 vaccine, while a similar study reported a vaccine hesitancy rate of 6.3% in phase 1, and later reduced to 1.7% in phase 2 which was before and after the drug was approved by the national regulatory body respectively [34,35]. Similarly, a study of 1196 people found that only 2.6% of them refused vaccination [36]. The lower refusal rate in these studies may be because the majority of participants in this survey were highly educated, had a medical background, and were economically stable. However, many studies found that the main reason behind the refusal of most people to get vaccinated was a major lack of confidence in the entire vaccination program, concern about their safety as well as the side effects which are likely to follow after the vaccination. These problems are further explained in detail below;

Concern About the Vaccination Side Effect

The fast nature in which many different vaccines were developed left many questioning their safety. Many were skeptical due to the rapid, continuous development of vaccines. These raised the fear of short-term and long-term side effects among the public. Few Individuals who received the vaccines experienced side effects such as tingling and redness in the injection site, sore arm, body pain, and fever within a few days of vaccination. These made many hesitate in taking their second dose. It was observed that pregnant women and people with chronic diseases were more concerned about the possible side effects of the vaccine. “vaccine safety” was a key factor for many people not to get vaccinated. A study conducted in a medical college in Nepal revealed that 15% of participants were concerned about vaccine safety and 20.7% of participants were willing to take vaccination if there are fewer adverse effects [37]. Another survey done with 589 respondents found that among the non-recipients (52 participants), the majority (34%) did not receive the vaccine due to fear of potential side effects [34].

Rumours and Misinformation

Earlier during the pandemic, many people were hesitant to be vaccinated due to misleading information and rumors about the vaccine. Social media was being used to spread false information that alleged the vaccine would cause serious adverse effects, including death, or would cause people to become infected with the Covid- 19 [38].

There is also a myth among people that vaccine will affect their fertility. People have a misconception that the Indian government’s donation of one million Covishield vaccines is defective and that Nepalese people are being treated as test groups or guinea pigs. Later, China offered to provide Nepal with 500,000 doses of Sinopharm, but the Nepali Government was hesitant to accept the gift due to the possibility of increased public mistrust [39].

Lack of Confidence in Certain Vaccine Brands

People are concerned about the efficacy of certain vaccine brands, particularly some brands which they feel it’s unsafe for their health. They are unwilling to accept Chinese and Indian vaccines but are willing to take Pfizer and Moderna vaccines. They would rather wait to get vaccinated till they can pick which vaccine they want to get. Due to the single dosage and lesser efficacy of the Janssen vaccine, some people are hesitant to use it. Additionally, if a specific vaccine is rejected by other nations, individuals are denied to get it injection.

Different Vaccines for the Same Individuals

Specialists generally recommend using the same vaccine for both the first and second doses for the same individuals. Due to limited stock of vaccines of one kind, many individuals are forced to take different vaccines for a second dose. People are hesitant to take the booster dose of a different kind as they are concerned that there might be a problem of reactivity between the two different vaccine brands.

Traditional Beliefs

As soon as covid-19 hit Nepal, People started practicing yoga and taking traditional medicines to boost their immune systems. Most people were taking medicinal plants like turmeric ginger, curry leaves, pepper, etc. in various forms as home remedies. The most common is Kadha, an ayurvedic drink made by boiling a variety of herbs and spices with water to strengthen the immune system. They believe more in these traditional remedies than vaccines. According to a study by Khadka et al. 86.5% of the participants recommended using medicinal plant species to ward off COVID-19 [40].

Timely Vaccine Availability and Convenient Vaccination Centers

Due to limited supply, vaccines are only given on particular days, hours, and locations. This results in overcrowding. Therefore, working-class citizens are usually left with no option on the available and convenient time to take the vaccine. Vaccination centers usually tend to have long queues and people have to wait in lengthy lines for hours. Also, the distance between vaccination centers and individuals has created a substantial obstacle for those without access to transportation. In addition to these, many respondents expressed their frustration when informed of the absence of available vaccines at a given point in time. In addition to these, vaccination acceptance is greatly influenced by regulatory body approval. After the DDA approved the

vaccinations in Nepal, the percentage of persons who were willing to get vaccinated as soon as possible rose from 43% to 86% [35].

Conclusion

In both Nepal and Nigeria, vaccine hesitancy has been identified as a serious problem affecting the successful implementation of the Covid-19 vaccination Programme. With more than 12 billion doses of vaccines administered globally, only about 80 million doses were administered in Nigeria out of a total population amounting to 200 million. While in Nepal with a population of approximately 30 million people, about 58 million doses of vaccines have been administered and 93.32% of the population received at least one dose. There are still worries about vaccine efficacy and safety as part of the COVID-19 vaccine challenges both in Nepal and Nigeria. These problems are known to be much in Africa with Nigeria as one of the countries having high vaccine hesitancy levels. However, despite the problems of vaccine hesitancy in Nepal, the number of administered Covid-19 vaccines had increased significantly far greater than that of Nigeria. More so, the total number of approved Covid-19 vaccines in Nepal is far greater than that of Nigeria, perhaps this might be among the contributing factors behind the higher number of populace covered in the vaccination program. In order to create a successful vaccination program in Nigeria, measures to overcome the problems of vaccine hesitancy, and easy access to available vaccination centers among other problems must be addressed. More so, for uninterrupted vaccine procurement, storage, transit, distribution, and administration to intended people, a vaccination program must be adequately planned at both the national and local levels.

Ethics Approval and Consent to Participate

Not applicable

Consent for Publication

Not applicable

Availability of Data and Material

All data generated or analyzed during this study are included in this published article.

Competing Interests

The authors declare that they have no competing interests.

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Authors Contributions

IR coined the whole research idea, perform a preliminary literature search, was a major contributor to drafting the paper, and proofread the entire manuscript. ASU contributes to coining the research idea, performing literature searches and downloads, and contributing to the writing and proofreading of the final manuscript. UG contributes to coining the research idea, performing literature searches and downloads, and contributing to writing the final manuscript. UG contributes to coining the research idea, performing literature searches and downloads, and contributing to writing the final manuscript. RP contributes to coining the research idea, performing literature searches and downloads, and contributing to writing the final manuscript. AM contributes to coining the research idea, performing literature searches and downloads, and contributing to writing the final manuscript. All authors read and approved the final manuscript.

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Ismail Rabiu, is from Nigeria, having a BSc in Microbiology and MSc degree in Medical Microbiology, with a PhD in View. His passion for excellence, and wide reading habit made him break the long-standing record where he finished at the top of his class with Distinction during his graduate studies at Bayero University Kano. His motivation to learn novel techniques made him undergo different training on Infectious disease and Antimicrobial resistance with the Bloomberg School of public health and the United State Agency for International Development under the Global e-health learning. All these have provided him with skills in infectious disease Epidemiology and sustainable control strategies. His research interest cut across areas of Medical Microbiology, Epidemiology, and Public Health Microbiology. At present, He is a faculty, in the Department of Microbiology, at Skyline University Nigeria. He holds the credit of being among the youngest faculties that implemented flip teaching and peer-based learning as novel teaching methodologies.

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