

Knowledge, attitude and practices of nurses in the utilization of COVID-19 vaccine: A case of Matero sub-district, Zambia.

¹Margaret Siatwiko, ²Prof. Victor Chalwe

¹Masters student, Public Health, Chreso University, Lusaka, Zambia.

²Associate Professor, Department of Public Health, Chreso University, Lusaka, Zambia.

Email: msmulabe@yahoo.co.uk

Abstract: *In the midst of the ongoing global COVID-19 pandemic, the utilization of vaccines has emerged as a crucial strategy in mitigating the spread of the virus and reducing its impact on public health. While the COVID-19 vaccine has been developed and distributed. A knowledge gap among nurses regarding vaccine efficacy, safety, and administration procedures could potentially hinder the vaccination campaign's success. The purpose of the study was to establish the association between Knowledge, Attitude and Practice of the Nurses in the utilization of COVID 19 vaccination in Matero Sub-district in Lusaka, Zambia.*

A non- interventional cross-sectional descriptive study design was used. The study targeted a population of 150 nurses from which a sample of 109 was drawn using non-probability convenience sampling technique. The sample composed of 55 nurses from Matero General Hospital, 27 from George and the other 27 from Matero Main Health Centres respectively. The data was collected using self-structured interview schedule.

Findings revealed that all nurses interviewed 109(100%) were knowledgeable of the vaccination programmes in Zambia. The highest number, 96/109 (88.1%) of the nurses indicated that AstraZeneca, Pfizer and Johnson & Johnson were COVID-19 vaccines being administered in Zambia while the lowest number 12/109 (11.9%) gave wrong answers. The highest number 93/109 (85.3%) of the nurses knew the mode of administration of the vaccine and stated that it was through injecting on the left arm (deltoid muscle). The study further established that nurses 94/109 (89.9%) expressed good attitudes on both the need for health workers to receive the COVID-19 Vaccine and the necessity of health workers receiving COVID-19 Vaccine, 89 (90.8%) The attitudes of the nurses towards the COVID-19 programme were generally good with 92/109 (84.4%) being comfortable receiving the vaccine, 101/109 (92.7%) saying that they would recommend the vaccine to others while 102/109 (93.6%) agreed that the vaccine reduced severity of COVID-19. The nurses practiced covid-19 programmes as the majority 84/109 (77.1%) were vaccinated while 25/109 (22.9%) were not. Therefore, this study concluded that there is an association between Knowledge, Attitude, Practice and the utilization of Covid 19 vaccine by nurses in Matero Sub-district ($p < 0.05$) and recommends that, nurses must be continually oriented with regards to vaccine safety and efficacy.

Keywords: *Knowledge, Attitudes, Practices, Utilization, Covid-19 Vaccines, Nurses, Zambia.*

1. INTRODUCTION :

In December 2019, a novel (new) coronavirus known as SARS-CoV-2 was detected in Wuhan, Hubei Province of China causing outbreaks of the coronavirus disease COVID-19 that has now spread globally. Similarly, Zambia recorded first case of covid 19 in a couple which was returning from holiday in France on 18th March, 2020. Detection was during 14 days' surveillance period at Tubalange RHC in Chilanga, Zambia. A case of the second wave was recorded on 13th December, 2020.

By March, 2020, the World Health Organization (WHO) declared the COVID-19 outbreak a public health emergency of International concern and they characterized it as a pandemic and the measures put in place to control the pandemic brought about drastic collapses in the global economy, including mental health issues Guner et al., (2020).

A major advancement in controlling the pandemic was the development of the vaccine. To build herd immunity, lessen the severity of the illness and mortality, and stop the epidemic, at least 70% or more of the population must be immunized (Ayeni et al., 2022). The WHO approved the use of seven vaccines in November 2021 despite the fact that many others were still being developed, including those from Pfizer-BioNTech, Oxford/AstraZeneca, Sinopharm, Moderna, Janssen, Sinovac-CoronaVac, and Bharat Biotech BBV152 Covaxin. The creation and distribution of secure and reliable COVID-19 vaccinations produced outstanding outcomes (Zhang et al., 2022). Globally, more than 12.9 million doses of the COVID-19 vaccination were administered as of 16 November 2022. The African region had the lowest coverage rates, with only 24.1% of the population receiving the complete dose (Lawal et al., 2022).

Zambia, like many other developing countries, experiences high COVID-19 vaccine hesitancy (Mudenda et al., 2021). Vaccine hesitancy is a multifactorial issue and has been alluded to many factors, such as myths and misinformation about COVID-19 and COVID-19 vaccines, fear of adverse side effects and concerns about their effectiveness, including healthcare provider factors and nurses are at the core in administering these COVID-19 drugs to the Zambian population (Mudenda et al., 2021).

2. LITERATURE REVIEW

2.1 The COVID-19 Vaccine Distribution

According to the European Centre for disease Prevention and Control (2021), as of 26 March 2021, a total of 75 252 407 COVID-19 vaccine doses were distributed by manufacturers to European Union/European Economic Area (EU/EEA) countries representing 68.5% of all doses distributed to EU/EEA countries via the European Commission's Vaccine Strategy. A total of 61 481 829 vaccine doses were administered, which represented 81.7% of the doses distributed. Overall, the proportion of vaccine doses administered from those distributed to EU/EEA countries by vaccine product was 92.1% for Comirnaty, 64.3% for Moderna and 58.9% for AstraZeneca. Since the start of the deployment of COVID-19 vaccines in the EU/EEA in December 2020, the cumulative vaccine uptake in the adult population in the EU/EEA (aged 18 years and older) progressed, reaching 11.6% for the first dose (range: 5.4-21.6%) and 5% for the full vaccination (range: 1.2-9.5%). Priority groups were defined for vaccination. Vaccinations continued to be rolled out in phases through various prioritisation groups.

As of March 2021, six countries were still in their first phase, while 18 countries had already progressed to groups included in subsequent ones. Countries primarily prioritised elderly people and progressed to younger age groups, residents and personnel of long-term care facilities, healthcare workers, social care personnel, and people with certain comorbidities. Seventeen countries have further adapted the prioritised groups to be vaccinated, including additional age groups, healthcare workers in different settings, educational workers, and other groups with high risk of severe disease.

The World Health Organisation (WHO) recommended that the 3.8 billion doses deployed as of 26 July 2021 would be sufficient to cover the initial target of 20% of the population in every country. There were at least 17 vaccines in use, with 5.4 billion doses administered globally as of 6th September 2021, (WHO, 2021).

This level of supply for the vaccine was estimated to be sufficient to vaccinate both health workers and care workers and those at the highest risk of severe disease and death (e.g. older adults and people with co-morbidities that increased their risk of disease). However, the world was not on track to meet this ambition, with the great majority of high-income countries (HICs) exceeding the target and very few low-income countries (LICs) being able to vaccinate even those most at risk of severe disease or death (WHO, 2021).

2.2 COVID-19 in Zambia

As of 14th April 2021, Zambia received the first consignment of 228,000 doses of the vaccine from the COVAX facility, and the Honorable Minister of Health, Dr. Jonas Chanda officially launched the COVID-19 at the University Teaching Hospital in Lusaka. The Minister of Health stated that the nation had started recording an increase in the number of cases as well as deaths from Covid 19 signifying an upsurge in the pandemic. The Minister further indicated that the nation had clearly seen the pandemic returning with increased numbers and that was an indication of the second wave. The strain detected in Zambia was similar to the one which was detected in South Africa (www.xinhuanet.com, 2020). Zambia is among other countries known to have evidence of relatively low vaccination coverage despite universal provision for vaccines in the nation. For example, although Zambia's immunization program has routinely delivered vaccines for free to infants in all public health facilities since the 1970s, in 2013–2014, less than 60% of children had received the recommended vaccinations by 12 months of age. Coverage varied between vaccines and between doses for a given vaccine, with higher uptake among infants of more educated mothers, urban residents, and wealthier households. Lower vaccine coverage in some sub-populations was due to limited availability of vaccines or vaccination hesitancy (WHO, 2013).

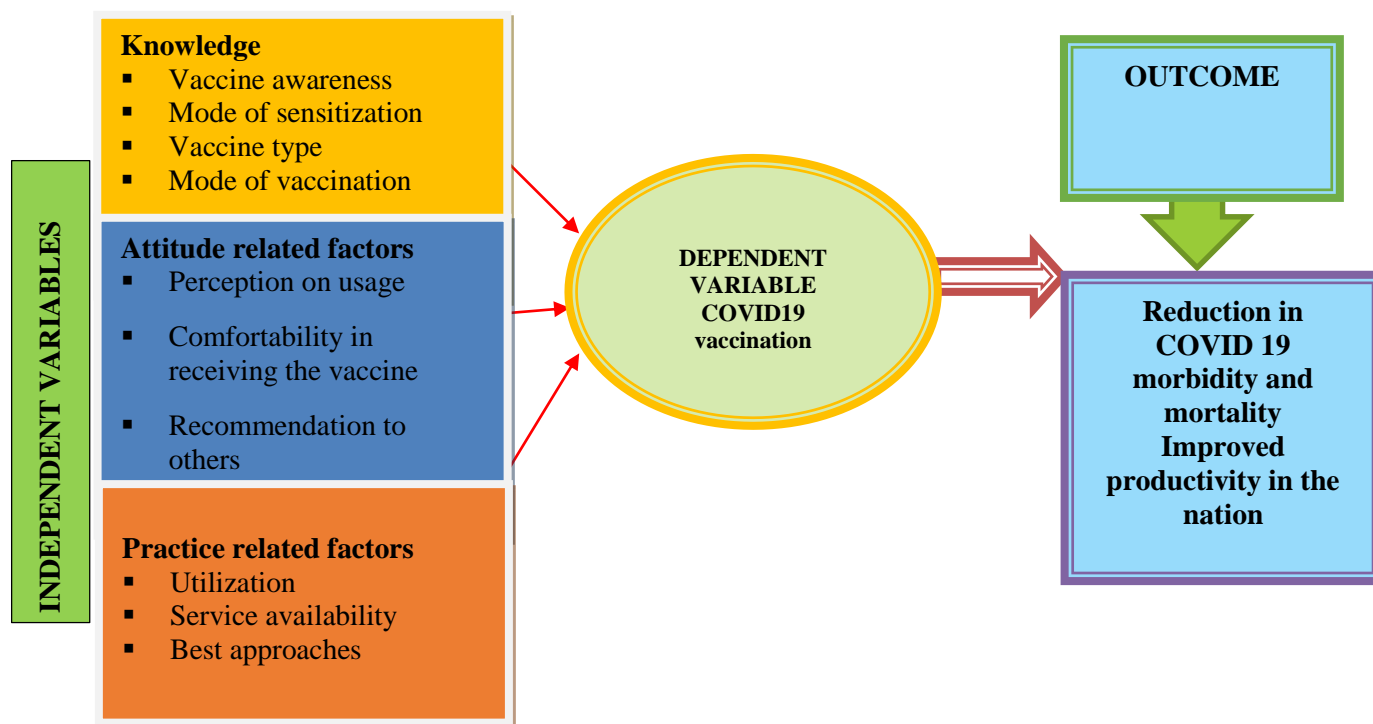
2.3 Knowledge, attitude, and practices of COVID-19 Vaccination amongst nurses

Nurses in many countries are at the core of administering the COVID-19 vaccines and their knowledge, attitude, and practice highly affect the vaccine acceptability of their communities. A study in China indicated that nurses were more reluctant to get vaccinated as compared to doctors (Hum Vaccines Immunotherapeutic, 2021) whilst another study was conducted online among the Health care workers in China after the vaccine was made available. The study reviewed that the Chinese HCWs had a strong willingness to be vaccinated and a high level of knowledge whilst those who are females or nurses had a lower vaccination rate (Huang H. 2021)

Kabamba et al., (2020) conducted a related study in the Democratic Republic of Congo and estimated that only 27.7% of the Health care workers (HCWs) said that they would accept a COVID-19 vaccine if it was available. In that study, there was notable vaccine hesitancy among nurses which calls for timely efforts to address the barriers and improve attitude and perception towards COVID-19 vaccination. In Zambia, a study by Mudenda et al., (2021) concluded that overall, acceptance of the COVID-19 vaccine among Health Care Workers in Lusaka, Zambia, was high, especially by those with positive attitudes. However, the hesitancy among some Health Care Workers was of great concern.

2.4 Conceptual framework

Figure 1: BMC- Knowledge, Attitude, and Practice (KAP) Model



Source: Aiga, et al. (2016).

3. METHODS AND MATERIALS

This study was conducted as a non-interventional cross-sectional descriptive study to establish the association between Knowledge, Attitude and Practice of the Nurses in the utilization of COVID-19 vaccination in Matero Sub-district in Lusaka, Zambia. The study included the nursing staff at Matero general hospital, George and Matero Main Health Centres. A cumulative sample size of 109 was picked from all the sites using the Yamane formula and an equal size proportion was used to pick participants from each study site. All eligible participants were engaged through a non-probability convenience sampling procedure. Data was collected via a survey questionnaire and respondents including

the health facility administration were consented prior to data collection. To heighten the reliability and validity of the study, the researcher administered the survey questions in clear, and concise manner to the respondents, and a pilot study was conducted prior to data collection. All the data was analysed using excel and SPSS v23. Chi square tests were used to measure the association Finding were expressed as graphs, charts, tables and proportions.

4. RESULTS

Table 1: Demographic Characteristics of the Study Population

Variable	Category	Frequency	Percent
Age	16-19	4	3.7
	20-29	59	54.1
	30-39	27	24.8
	40-49	16	14.7
	50 and above	3	2.8
	Total		109
Gender	Female	92	84.4
	Male	17	15.6
	Total	109	100.0
Marital Status	Divorced	1	.9
	Married	45	41.3
	Single	62	56.9
	Widow	1	.9
	Total	109	100.0
Religion	Christian	106	97.2
	Islam	3	2.8
	Total	109	100.0
Education Level	Bachelor's Degree	11	10.1
	Certificate	15	13.8
	Diploma	82	75.2
	Master's Degree	1	.9
	Total	109	100.0
Title Designation	BSc Nurse	13	11.9
	Enrolled Midwife	2	1.8
	Enrolled Nurse	11	10.1
	Registered Midwife	19	17.4
	Registered Nurse	64	58.7
	Total	109	100.0

According to table 4.1 above, majority of the nurses were in the age groups,20-29 ,59 (54.1%) and 30-39,27 (24.8%), were female,92 (84.4), single ,62(56.9%) or married,45(41.3%), were Christians,106 (97.2%), had diploma qualification,82 (75.5%) and were Registered Nurses,64(58.7%).

KNOWLEDGE OF NURSES IN MATERO ON THE COVID 19 VACCINE

4.2.1 Nurses' knowledge on the COVID-19 Vaccines that were administered in Zambia

Knowledge was further assessed by asking the nurses on the COVID-19 vaccines administered in Zambia.

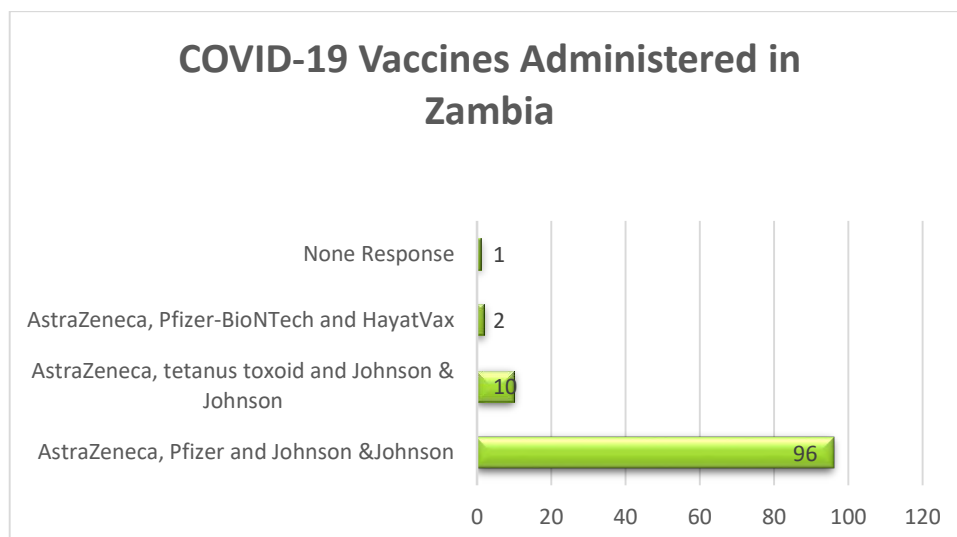


Figure 2: Vaccines available in Zambia

The above chart shows that 96 (88.1%) of the nurses were knowledgeable about the COVID_19 vaccine being administered in Zambia compared to the 12, (11.9%) who were not. 1 person did not answer the question.

4.3 ATTITUDES REGARDING THE USE OF COVID 19 VACCINE.

Table 2: Nurses Need for Health workers receiving the COVID-19 Vaccine and Necessity of Health workers receiving the COVID-19 Vaccine

Statement	Response					Total
	Agree	Disagree	Not Sure	Strongly Agree	Strongly Disagree	
Need for Health workers to receive the COVID-19 Vaccine	40(40.4%)	5(4.6%)	4(3.7%)	54(49.5%)	2(1.8%)	109(100%)
Necessity of Health workers receiving COVID-19 Vaccine	46(42.2%)	4(3.7%)	6(5.5%)	53(48.6%)	0(0%)	109(100%)

According to the table 4.3.1, the attitudes of the nurses were such that on the need for health workers to receive the COVID-19 Vaccine, 94 (89.9%) of the nurses were for the idea while on the necessity of Health workers receiving COVID-19 Vaccine, 89 (90.8%) were for the idea.

4.3.1 Comfortability Receiving the COVID-19 Vaccine, willingness of recommending the COVID-19 Vaccine to others, and whether COVID-19 reduced the severity of COVID-19

Table 3: Nurses attitudes towards COVID-19 Vaccination Programme

Statement	Response				Total
	Yes	No	Not Sure	None Response	
Comfortable Receiving the Vaccine	92(84.4%)	16(14.7%)	1(0.9%)	0(0%)	109(100%)
Recommending the Vaccine to others	101(92.7%)	8(7.3%)	0(0%)	0(0%)	109(100%)
Vaccine Reducing Severity of COVID-19	102(93.6%)	6(5.5%)	0(0%)	1(0.9%)	109(100%)

The attitudes of the nurses towards the COVID-19 programme were generally better with 92 (84.4%) being comfortable receiving the vaccine, 101 (92.7%) saying that they would recommend the vaccine to others while 102 (93.6%) agreed that the vaccine reduced severity of COVID-19.

4.4 PRACTICE REGARDING THE USE OF COVID 19 VACCINE

4.4.1 COVID-19 Vaccination amongst the Nurses.

When asked if they were vaccinated or not, the following responses were given by the nurses.

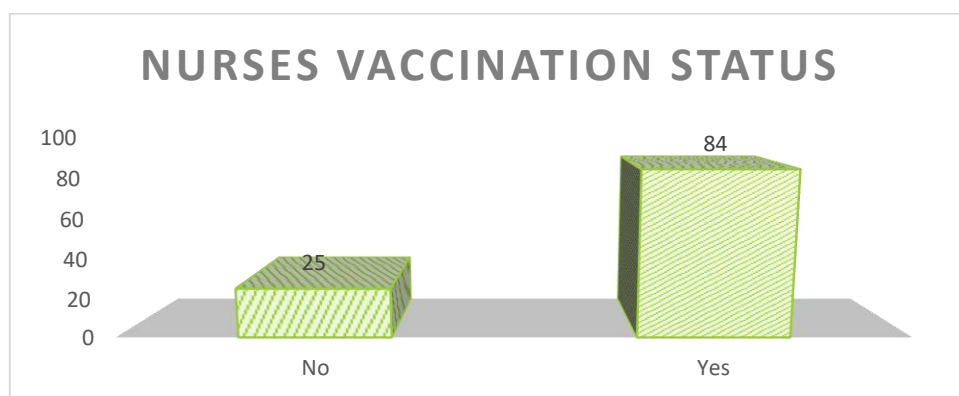


Figure 3: Vaccination Status

According to figure 4.4.1, 84/109 (77.1%) of the nurses were vaccinated while 25/109 (22.9%) were not.

4.4.2 Reasons for not taking the COVID-19 Vaccine

Of the nurses who were not vaccinated, they were asked reasons for not taking. The recorded responses are shown below.

Table 1: Nurses reasons for not being vaccinated.

Reason for not taking up the Vaccine	Frequency	Percent
I don't know the impact on my health	19	76.0
The vaccine causes future complications	2	8.0
None Response	4	16.0
Total	25	100.0

Of the 25 nurses that were not vaccinated, 19 (76.0%) said they did not know the impact of the vaccines on their health, 2 (8.0%) believed the vaccine may cause future complications while 4 (16.0%) did not give any specific reasons.

Table 4: Association between knowledge of the mode of administration of Covid-9 Vaccines being administered in Zambia and being vaccinated

Variable	Response	Mode of Covid-19 Vaccine Administration				p-value
		I do not know	Injection on the left arm (deltoid muscle)	Injecting on the right arm (deltoid muscle)	Total	
Vaccinated Against Covid-19	No	1	17	7	25	0.01
	Yes	0	76	8	84	
Total		1	93	15	109	

From Table 4.5.1.1 above, the calculated p-value (0.01) is less than the level of significance value (0.05). The result is **significant**; therefore, we reject the **null hypothesis**. There is a relationship between having knowledge of the mode of administration of Covid-9 Vaccines being administered in Zambia and being vaccinated amongst the nurses.

4.4.3 Determining association between the Attitude of nurses towards Covid 19 vaccine and its utilization.

Association between attitudes towards Covid-19 vaccine and being vaccinated are shown in the tables below;

Table 5: Association between being comfortable receiving the Covid-19 Vaccine and being vaccinated against Covid-19.

		Comfortable Receiving the Vaccine				p-value
		No	Not Sure	Yes		
Vaccinated Against Covid-19	No	14	1	10	25	0.0000
	Yes	2	0	82	84	
Total		16	1	92	109	

From Table 4.5.2.1 above, the calculated p-value (0.0000) is less than the level of significance value (0.05). The result **is significant**; therefore, we reject **the null hypothesis**. There is a relationship between comfortable receiving the Covid-19 vaccine and being vaccinated amongst the nurses.

Table 6: Association between having a positive attitude of recommending the Covid-9 Vaccines to others and being vaccinated amongst the nurses.

		Recommending the Vaccine to others			p-value
		No	Yes	Total	
Vaccinated Against Covid-19	No	6	19	25	0.0000
	Yes	2	82	84	
Total		8	101	109	

From Table 4.5.2.2 above, the calculated p-value (0.0000) is less than the level of significance value (0.05). The result **is significant**; therefore, we reject **the null hypothesis**. There is a relationship between having a positive attitude of recommending the Covid-9 Vaccines to others and being vaccinated among the nurses.

Table 7: Association between the Covid-19 Vaccine reducing severity of Covid-19 and being vaccinated against Covid-19.

		Vaccine Reducing Severity of Covid-19				p-value
		No	None Response	Yes	Total	
Vaccinated Against Covid-19	No	4	0	21	25	0.029
	Yes	2	1	81	84	
Total		6	1	102	109	

From Table 4.5.2.3 above, the calculated p-value (0.029) is less than the level of significance value (0.05). The result **is significant**; therefore, we **reject the null hypothesis**. There is a relationship between having a positive attitude towards the vaccine reducing the severity of the disease and being vaccinated amongst the nurses.

5. DISCUSSION :

5.1 Demographic characteristics of the nurses

This study was aimed at establishing the association between Knowledge, Attitude and Practice (KAP) of the nurses and the utilization of COVID 19 vaccine in Matero Sub-district, Lusaka, Zambia. The study captured both male and female 109 nurses, aged 16 years and above whose qualifications ranged from Certificate to Master's Degree and their job titles were BSc, Nurse, Enrolled Nurse, Enrolled Midwife, Registered Nurse and Registered Midwife. These demographic characteristics show similar and contrasting characteristics to studies done elsewhere

(Maurya et al., 2021; Jemal et al.,2021; Hussain et al.,2021; Kumar et al.,2021; Elhad et al.,2021) . The other studies also captured other health workers and their years of experience unlike this study which only concentrated on the Nurses and did not indicate the years of experience. In addition, the current study had a sample size of 109 which is

much lower compared to; 260,422, 176, 713 and 15,087 (Maurya et al., 2021; Jemal et al., 2021; Hussain et al., 2021; Kumar et al., 2021; Elhad et al., 2021)

5.2 Knowledge levels of the nurses on the covid-19 vaccination campaign

The knowledge levels of the nurses on the COVID-19 Vaccination Campaign were generally high and stood at 91.1%. This was comparable to the 88.2% obtained in Jemal et al., (2021) and 85% in Maurya et al., (2021), but higher than the 57.4% in Hussain et al., (2021), the 62.5% obtained from Adane, Ademas and Kloos (2022). These results are in agreement with most KAP studies where the knowledge is usually high though in many cases that does not translate into practices.

Among the sources of knowledge, Television (53.2%) and social media (20.2%) and supervisors (16.5%) were the highest in this study and comparable to what has been done elsewhere. However, other information sources available from other studies but not included in this study included websites from international and government sources as well as formation courses (Rico et al., 2021).

5.3 Attitudes of the nurses on the covid-19 vaccination campaign

Nurses' attitudes were very high. For example, the nurses supported the need for health workers to receive the COVID-19 Vaccine (89.9%), 84.4% being comfortable receiving the vaccine, while 92.7% would recommend the vaccine to others and 93.6% agreed that the vaccine reduced severity of COVID-19. These attitude levels were somewhat similar to those obtained in Rico et al., (2021) where 95.8% were of the view that vaccines would reduce the severity of COVID-19, and 90.4% indicating that they would accept the COVID-19 vaccine. The high attitude levels amongst the nurses are important in the scaling up of the vaccination campaign to other members of the public as the nurses are likely to encourage other people to get vaccinated. The findings of this study are consistent with Adane, Ademas and Kloos (2022) as well as Singhania, Kathiravan and Pannu (2019). who showed that nurses and midwives were likely to accept being vaccinated for COVID-19. However, in a similar study done in Ethiopia, the nurses had the lowest vaccination acceptance rates (Alle and Oumer, 2021).

There was a relationship between being comfortable receiving the Covid-19 vaccine and being vaccinated amongst the nurses (p -value = 0.0000) in this study. Furthermore, there was a relationship between having a positive attitude of recommending the Covid-9 Vaccines to others and being vaccinated amongst the nurses (p -value = 0.0000). Studies from the Democratic Republic of the Congo and New York also reported that having a positive attitude towards COVID-19 vaccines was significantly associated with the willingness to receive a vaccine (Kabamba et al., 2020; Ciardi et al., 2021).

5.4 Practices of the nurses towards the covid-19 vaccination campaign

In this study, practices were assessed by asking the nurses if the facilities they were working from were offering COVID-19 vaccination services and whether they were vaccinated or not. Follow-up question were asked to those who indicated that they were not vaccinated to give reasons why.

All participants except one, indicated that their facilities were offering vaccination services. The prevalence of COVID-19 vaccination amongst the nurses was 77.1%. Vaccine hesitancy was recorded in 22.9% of the nurses. Similar results were obtained by Maria et al., (2021) in the United States of America where vaccination rates and hesitancy stood at 79% and 21% respectively. However, the USA study was different from the current study in that vaccination in the USA was associated with education. Worldwide, the prevalence of COVID-19 hesitancy amongst health workers is estimated at 22.51% (4.3% to 72%) a figure very close to what has been reported in this study Biswas et al., (2021).

Vaccine hesitancy amongst the nurses was mainly due to health concerns. About 76.0% of those not vaccinated pointed out not knowing the impact of the vaccines on their health, while 8.0% believed the vaccine may cause future complications while 16.0% did not give any specific reasons. Adane, Ademas and Kloos (2022) also obtained similar reasons regarding vaccine hesitancy where 46.9% of the health workers thought vaccines would worsen the existing health conditions. Biswas et al., (2021) reported that concerns about vaccine safety, efficacy, and potential side effects were top reasons for COVID-19 vaccination hesitancy in healthcare workers.

There was a relationship between having a negative attitude towards the vaccine and being vaccinated amongst the nurses ($p = 0.029$).

6. CONCLUSION:

In this study, knowledge, attitudes and practices of the nurses towards the COVID-19 Vaccination Program was associated with them being vaccinated or not. Generally, knowledge, attitudes and practices were high and acceptable.

Negative attitudes and poor perceptions of nurses towards COVID-19 vaccines were the most significant factors in the refusal to accept vaccines. Health concerns were the major reasons for vaccine hesitancy in this study.

7. RECOMMENDATIONS:

Since nurses are among the first to receive vaccines and play a pivotal role in their administration in the population, key factors in their decision-making process, such as knowledge about the safety of vaccines, must be addressed as early as possible. This study also recommends that the vaccination process must be a voluntary and not a mandatory program even for the nurses. There is also need to have a consultative process where all the concerns the nurses may have about the vaccines can be addressed. In addition, facility leaders/Supervisors must lead by example and possibly getting vaccinated in the presence of their subordinates.

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