

# Knowledge, Attitude, and Practice of Napata College's Medical Students towards COVID-19 vaccines in 2021

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## Abstract

**Introduction:** In December of 2019, the first case report of what later would be identified as COVID-19 was made (1). Little did anyone know that the illness would evolve to what it has. Now, we thankfully have a number of vaccines available on the market to address the ever-rising issue. **Objectives: General:** To Evaluate COVID-19 vaccination among Napata College's Medical Students in December 2021. **Specific:** 1. To determine the percentage of vaccinated medical students attending Napata College's school of medicine. 2. To evaluate the attitude these students have towards the idea of vaccination. 3. To evaluate the effects medical history and history of vaccination have on the idea of vaccination. **Research Methodology:** This was a cross-sectional KAP study that took place in the Napata College campus. **Results:** A total of 107 participants answered our questionnaire. Most of our respondents (69.2%) were female and were in their 1<sup>st</sup> year of medical school (39.3%). They illustrated a low vaccination rate amongst the participants as well as a rather poor attitude (35.8% of our participants would not recommend someone else receive the vaccine). **Conclusion:** In conclusion, this research project has found that the majority of Napata College junior medical students (defined as those who have yet to initiate their clerkships) were not vaccinated. We have also found that a considerable percentage have been previously infected with COVID-19. If this is an indicator, it is an indicator of a disaster to come especially given the recent high-spreading **Omicron** variant of the illness. This illustrates the need for immediate, well-thought out interventions with the end-goal of putting an end to the pandemic that has taken the world by storm.

Keywords: COVID-19; Vaccination; COVID-19 vaccine; Napata College

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## Introduction

In December of 2019, the first case report of what later would be identified as COVID-19 was made (1). Little did anyone know that the illness would evolve to what it has. Now,

we thankfully have a number of vaccines available on the market to address the ever-rising issue. As per a paper discussing vaccinations in Africa:

'Many countries in Africa are unable to reach the target endorsed Global Vaccine Action Plan (GVAP)' (2). Despite the paper not discussing the COVID-19 vaccine per se, it clearly illustrates an issue regarding the distribution of vaccines throughout the continent. As per a study discussing COVID-19 vaccines:

‘COVID-19 is a pandemic of unprecedented proportions in recent human history. Less than 18 months since the onset of the pandemic, there are close to two hundred million confirmed cases and four million deaths worldwide. There have also been massive efforts geared towards finding safe and effective vaccines. By July 2021 there were 184 COVID-19 vaccine candidates in pre-clinical development, 105 in clinical development, and 18 vaccines approved for emergency use by at least one regulatory authority. These vaccines include whole virus live attenuated or inactivated, protein-based, viral vector, and nucleic acid vaccines. By mid-2021 three billion doses of COVID-19 vaccine have been administered around the world, mostly in high-income countries. COVID-19 vaccination provides hope for an end to the pandemic, if and only if there would be equal access and optimal uptake in all countries around the world.’ (3).

Until 2020, the primary concern regarding COVID-19 was the development of a vaccine, as per a 2020 NEJM paper (4):

‘The need to rapidly develop a vaccine against SARS-CoV-2 comes at a time of explosion in basic scientific understanding, including in areas such as genomics and structural biology, that is supporting a new era in vaccine development.’

As per the same article, ‘Vaccines for severe acute respiratory syndrome (SARS), Ebola and Zika did not follow a similar path. The SARS and Zika epidemics ended before the vaccine development was complete, and federal funding agencies [referring to those of the United States’ government] reallocated funds that had been committed to vaccine development, leaving manufacturers with financial losses and setting back other vaccine-development programs (4).

As per a US-based study, ‘Vaccination rates in medical students present concerns both for both patients and public safety and may reflect the attitudes of future physicians.’ (5). The same paper also reported, ‘there was a significant difference between vaccinated and unvaccinated groups regarding COVID-19 testing, suggesting that those who are vaccinated are more likely to have been tested for COVID-19..... This suggests that many students who did not have strictly “pro-vaccine” attitudes or behavior likely demonstrate vaccine hesitancy rather than outright opposition. Furthermore, it is possible that additional training, information, and clinical exposure will motivate those who are uncertain about vaccination to have more “pro-vaccine” attitudes and behaviors. For example, there was 1 instance of a student who had not received childhood vaccinations who received the COVID-19 vaccine, suggesting that family attitudes about or childhood exposure to vaccines do not necessarily predict future vaccination behaviors.’ (5).

### **Problem Statement**

Sudan is an African nation, and as per a study regarding the distribution of vaccines in the continent, ‘this review of MOV in Africa shows that the prevalence of MOV [Missed Opportunities for Vaccination] varies across the continent with some African settings having more than 90% MOV. The review shows that the varying MOV prevalence and its determinants among African countries may need different approaches to address MOV problem in each setting’s peculiarities’ (2).

### **Justification**

COVID-19 has taken the world by storm. It is, in our estimation, the most widely-covered (by the media) illness in modern history. Recently, a number of vaccines have been introduced with the sole objective of seeing to it that life returns to 'normal'. However, it remains unclear how much acceptance these vaccines will receive. Ergo, it is of the utmost importance that we see to it that this topic is addressed.

### **Research Objectives:**

#### **General**

To assess the Knowledge, Attitude, and Practice of Napata College's Medical Students Towards the COVID-19 vaccines in of 2021

#### **Specific**

1. To assess the knowledge levels of Napata College's medical students regarding the COVID-19 vaccines
2. To assess the attitude of Napata College's medical students towards the COVID-19 vaccines (willingness to receive the vaccine)
3. To assess the practice of Napata College's medical students towards the COVID-19 vaccines (willingness to recommend the vaccine to others).

### **Literature Review:**

'In the history of vaccines, COVID-19 vaccines have accelerated at an unimaginable speed.' (3)

The history of vaccines date back to 1796 and the development of the smallpox vaccine by Jenner (6).

COVID-19 is probably the world's best covered illness (in so far as media coverage is concerned). It is now, as they say, the 'talk of the hour'. The entirety of the planet is looking at solutions to this issue that has plagued it for over 2 years now and a plethora of research efforts are taking place to see to it that this goal is met. Unfortunately, this has shed light on the fact that we, as a species, face the issue of being short-sighted. Given the previous SARA and MERS episodes, we should've been prepared for such an occurrence (1). However, we found ourselves underprepared and highly afraid. Furthermore, the actions set forth by a plethora of individuals, many of whom were, and still are, in positions of power have set us back in our effort to combat this pandemic. Fortunately, many are now seeing into their shenanigans and are now seeing through them.

As per the title of a South African piece 'Conspiracy theories on Covid-19 vaccine can be as deadly as virus itself' (7). As per the piece:

'The common conspiracy theories include that Bill Gates is trying to control the world by implanting microchips in the Covid-19 vaccine; the vaccine will be used to kill Africans as part of an age-old population control plan; big pharmaceutical companies created the virus to profit billions from supplying the vaccine; Covid-19 comes from 5G towers; and so on.

These, and other fears, have dominated social media conversations in South Africa and across the world for the past few months as Covid-19 vaccines were being tested. The concerns have intensified in the past few weeks now that the vaccines are being rolled out.

As South Africa finds itself in the midst of a deadly, second Covid-19 surge, and the first batch of vaccines is on its way to our country, it is alarming that some of these conspiracies and misinformation originate from high profile individuals. Some leaders have suggested any vaccine not developed in Africa should be rejected and Africans should rely on alternatives such as indigenous herbs.' (7).

In December of 2019, the first case report of what later would be identified as COVID-19 was made (1). Little did anyone know that the illness would evolve to what it has. Now, we thankfully have a number of vaccines available on the market to address the ever-rising issue.

As per the World Health Organization (WHO), the 'first mass vaccination programme' took place in December of 2020(8).

However, this has given rise to a new conundrum, that being the public's willingness to accept said vaccine. For example, a paper by Mangla and colleagues reported the following 'The Knowledge score mean was 24 (out of 46), Attitude score 28.9 (out of 55), and Practice score 7.3 (out of 11). Almost 65% of the respondents reported being knowledgeable about COVID-19 variants and vaccination, 55% reported a positive attitude toward available COVID-19 vaccines, and 85% reported engaging in practices that supported COVID-19 vaccination' (9). However, in Nigeria, a country closer to Sudan, a paper reported an overall good/positive attitude towards the COVID-19 vaccines (10).

Unfortunately, the miscommunication of information is a rather serious issue. Findings suggest that knowledge is directly associated with attitude towards the vaccine (11).

Findings from Greece suggest the public are unwilling to participate in vaccination efforts (12).

As per a study out of Germany and Chile:  
'countries with low vaccine availability cannot vaccinate the drivers of contagion and thus face a double problem. First, they cannot de facto protect the population at risk, and second, they cannot fully restart their economic activities since they would require NPIs to mitigate the spread of COVID-19, given the low immunity levels across the population. Therefore, differences between vaccination programs will make countries that are already at economic antipodes drift further apart.

Since mid-2021, vaccine availability does not pose a problem in high-income countries. Instead, these countries face the challenge that vaccine-hesitant and vaccine-denial individuals pose to the timely completion of vaccination programmes.'(13).

A paper from neighboring Oman concluded that 'The history of chronic disease, source of vaccine knowledge, and education level were factors that affected the willingness to accept the vaccine.' (14). The same article illustrates the following:

‘Oman is globally acknowledged for its well-structured immunization program with high vaccination coverage. The massive spread of misinformation brought on by the COVID-19 pandemic, as well as the easy access to various media channels, may affect acceptance of a vaccine, despite the inherent trust in the local system. This cross-sectional study evaluated the knowledge, attitudes, and practice (KAP) in Oman toward COVID-19 vaccines. It included 3000 randomly selected adults answering a structured questionnaire via telephone. Participants were ....83.7% without comorbidities. Their mean age was 38.27 years.....

#### Knowledge of

COVID-19 symptoms, mode of transmission, and attitudes toward the disease was adequate; 88.4% had heard of the vaccine, 59.3% would advise others to take it, 56.8% would take it themselves, and 47.5% would take a second dose. Males..... and Omani .... were more willing to be vaccinated. The history of chronic disease, source of vaccine knowledge, and education level were factors that affected the willingness to accept the vaccine. The Omani community’s willingness to take the COVID-19 vaccine can be enhanced by utilizing social media and community influencers to spread awareness about the vaccine’s safety and efficacy.’ (14).

Oman is an Arab country and is highly similar to Sudan in so far as language and culture are concerned, which is why we thought it important to carefully look into the results reported in the study.

A report from mainland China illustrated high willingness to participate in vaccination efforts (15). Given these rather contradicting findings from across the world, it is of the utmost importance that we collect data in our nations and use these to influence public health policies.

A study out of Tunisia reported some rather intriguing data, ‘28.3% (n = 93) reported to definitely refuse the vaccine and 21.2% (n = 70) did not make their decision yet. High educational level, history of comorbidities, history of influenza vaccination in the current season, and patient’s opinion about the severity of COVID-19 did not predict vaccine resistance.’ (16)

A study conducted in New York reported the following ‘Vaccine preferences in this New York State disability community sample align with national data. Identified concerns suggest the need for community education that addresses misperceptions. Age and race differences in perspectives highlight the need for tailored education, delivered by trusted messengers.’ (17).

A notable limitation is the fact that Sudan is a Lower-income nation, one of many which have issues of distribution of vaccines (18).

As per the authors of a Nature Medicine article:

‘The world shares a collective responsibility in fighting this pandemic; therefore, continued research on COVID-19 vaccine acceptance and hesitancy should be a priority. Such research should then be used to inform contextualized campaigns and information-sharing that will ultimately result in increased confidence in and uptake of available vaccines.’ (19)

A study conducted amongst US medical students reported rather positive attitudes towards vaccines (20). This raises concern as there may be a socio-economic factor at play indicating the need for immediate intervention in this regard.

A study out of Norway and Ethiopia concluded the following ‘Addressing problems related with risk degree,

educational status, and socio-demographic factors will help to increase the overall knowledge and attitude towards second COVID-19 vaccine doses.’(21).

A study took place in the United States of America (USA), in Texas Tech University Health Science Center in Lubbock, TX to be exact (5). The study found that the vast majority of students at the institute (91.8%) were vaccinated against COVID-19. Furthermore, the same study illustrated that the participants were showed ‘pro-vaccine’ attitudes (5). This is important as it illustrates a positive trend towards bringing an end to the pandemic that has taken the world by storm.

As per a multi-centered French study, ‘The crude willingness to get vaccinated against COVID-19 (including already vaccinated respondents) was 53.2% overall’ (22). This is rather alarming as it indicates that a considerable percentage of healthcare workers are unwilling to receive the vaccination.

A Wuhan-based study reported some rather frightening results such as a 58.2% hesitancy rate amongst medical students regarding the COVID-19 vaccination (23).

A study out of Uganda reported a 30.7% hesitancy rate amongst medical students in the area, the study took place shortly after nation-wide availability of the AstraZeneca vaccine (24).

In neighboring Ethiopia, at least one study shows that nearly 30% of university students (was not specific to medical students) were at least hesitant towards COVID-19 vaccines (25).

According to a study out of the US:

‘In this global assessment including 19 studies across 39 countries, the overall rate of COVID-19 vaccination hesitancy among 19,991 students/ trainees of healthcare professions was 18.9%. This rate of COVID-19 vaccination hesitancy (almost one fifth) in students and trainees almost mirrors the rate in practicing healthcare professionals’ (26)

### **Research Methodology:**

a- Type / design of Study:

Descriptive cross-sectional KAP study

b- Study area\setting:

Napata College, Bahri, Khartoum, Sudan. Napata College was first established in 2015, it is primarily medical in nature. Napata College offers the following programs to applicants:

- i) Medicine
- ii) Dentistry
- iii) Medical Laboratory Sciences (MLS)
- iv) Nursing
- v) Pharmacy
- vi) Information Technology (IT)

The college has 2 campuses, both situated in the state of Khartoum, one in Khartoum city (this is house to the schools of pharmacy and information technology), and one in Bahri city (this campus is larger in size and is house to the remaining programs). The Khartoum city campus is located in Al-Riyadh, Block 10, property

no. 151, while the Bahri city campus is located in Kafouri, northwest of Al-Qantara traffic light. In addition to housing the majority of the College's programs, the Bahri campus is also home to the Dean's office and serves as the headquarters for the college's research and innovation center.

The total number of medical students attending Napata College is ~600, while the entirety of the college is home to approximately 1,000 students. The college's administration has recently revealed plans regarding the initiation of a school of business administration. It seems as if that will be situated in the Khartoum city campus.

**c- Study Population:**

All students enrolled in Napata College's School of Medicine

**Inclusion criteria:**

- i) All students enrolled in Napata College's School of Medicine

**Exclusion criteria:**

- i) Participants who chose 'no' on the 'I consent to participation in this research' element of the questionnaire
- ii) Participants who are not students of Napata College

**d- Sampling Methods / Techniques:**

This was a multi-stage systematic sampling targeting Napata College's medical students. The systematic sampling took place in the following manner:

- i) We gave the participants numbers (so as to assure confidentiality) (on basis of 2)
- ii) These numbers were placed into an online random number generator
- iii) The numbers picked by the generator were sampled
- iv) The sample size was calculated based on the equation below.

For example, the numbers 8, 17, 22, 25, 60, 99, 77, and 32 were inserted into the generator; the generator will pick one half of them (e.g.: 8, 25, 77, 32); following this, participants with these numbers were sampled.

$$\text{Equation: } n = \frac{N}{1+N} (D)^2$$

n = Sample size

D = Degree of Precision

N = Sample

**e- Sample size:**

107

**f- Study variables:**

Age, Gender, Vaccinated or not

**g- Data Collection Tools:**

A questionnaire was created using Google Form to see to it that no data is missing. Following this, the data was analyzed using SPSS v.26 and the results were reported.

This sample size was chosen based on the number of Napata's students who met our inclusion criteria.

### **Data Analysis**

The collected data was organized, tabulated and analyzed by using descriptive and inferential statistical methods wherever required. The descriptive statistics like percentage, mean, SD and inferential statistics like correlation and coefficient were used. Furthermore, the analyzed data was presented in the form of tables, figures and diagrams.

### **Ethical Consideration:**

The author hereby declares no conflict of interest. The proposal to this research was run by Napata College's ethical committee prior to the commence of the research.

### **Results:**

A total of 107 participants answered our questionnaire.

Most of our respondents (69.2%) were female and were in their 1<sup>st</sup> year of medical school (39.3%)

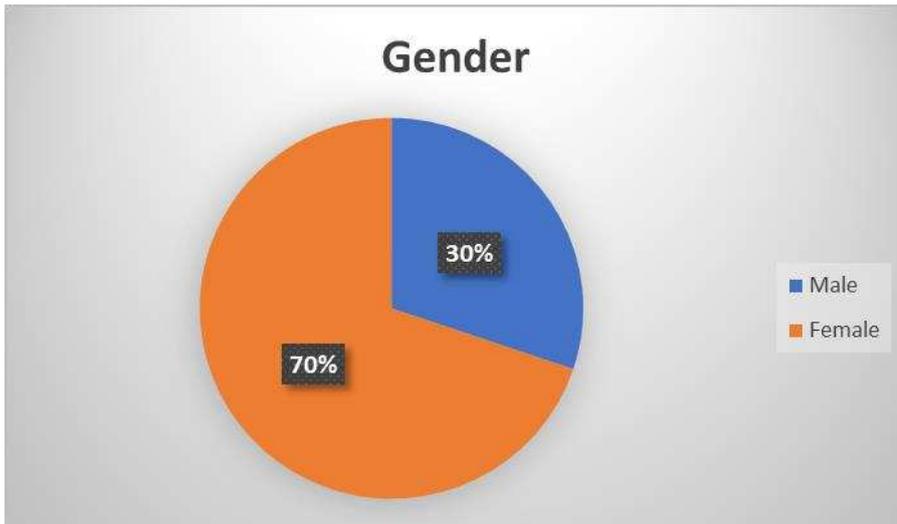


Figure 4.1

Table 4.1

	Sex			Cumulative Percent
	Frequency	Percent	Valid Percent	
Male	33	30.8	30.8	30.8
Female	74	69.2	69.2	100.0
Total	107	100.0	100.0	

Table 4.2

**Which year of Med school is the participant in?**

	Which year of Med school is the participant in?			Cumulative Percent
	Frequency	Percent	Valid Percent	
1st	42	39.3	39.3	39.3
2nd	29	27.1	27.1	66.4
3rd	36	33.6	33.6	100.0
Total	107	100.0	100.0	

Table 4.3

**Does the participant have any chronic illness?**

	Frequency	Percent	Valid Percent	Cumulative Percent
No	97	90.7	90.7	90.7
Yes	10	9.3	9.3	100.0
Total	107	100.0	100.0	

In total, 88% of our participants had no history of any chronic illness.

Table 4.4

**Did the participant previously get infected by COVID-19**

	Frequency	Percent	Valid Percent	Cumulative Percent
No	88	81.3	81.3	81.3
Yes	20	18.7	18.7	100.0
Total	107	100.0	100.0	

18.7% of our participants had previously been infected with COVID-19, while 79.4% had never been infected with COVID-19.

Table 4.5

Model	Coefficients <sup>a</sup>					95.0% Confidence Interval for B	
	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Lower Bound	Upper Bound
	B	Std. Error	Beta				
1 (Constant)	1.236	.449		2.753	.007	.344	2.129
Sex	.134	.106	.136	1.267	.208	-.076	.345
Year of Med school	-.014	.057	-.028	-.254	.800	-.128	.099
Any chronic illness?	-.090	.181	-.056	-.494	.623	-.450	.271
Previous infection with COVID-19	.009	.122	.009	.077	.939	-.233	.252

a. Dependent Variable: Would the participant recommend someone else get vaccinated?

Table 4.6

**Case Processing Summary**

		N	Marginal Percentage
Is the participant vaccinated?	Yes	26	25.0%
	No	78	75.0%
Sex	Male	31	29.8%
	Female	73	70.2%
Which year of Med school is the participant in?	1st	40	38.5%
	2nd	28	26.9%
	3rd	36	34.6%
Does the participant have any chronic illness?	Yes	10	9.6%
	No	94	90.4%
Did the participant	Yes	20	19.2%

previously get infected by COVID-19	No	84	80.8%
Valid		104	100.0%
Missing		3	
Total		107	
Subpopulation		16 <sup>a</sup>	

a. The dependent variable has only one value observed in 7 (43.8%) subpopulations.

Table 4.7

Effect	Likelihood Ratio Tests			
	Model Fitting Criteria -2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	38.055 <sup>a</sup>	.000	0	.
Sex	40.794	2.739	1	.098
Which year of Med school is the participant in?	39.251	1.196	2	.550
Does the participant have any chronic illness?	39.021	.966	1	.326
Did the participant previously get infected by COVID-19	46.978	8.923	1	.003

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

Table 4.8

### Parameter Estimates

Is the participant vaccinated? <sup>a</sup>		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
Yes	Intercept	-1.569	.487	10.395	1	.001			
	Male	.879	.531	2.739	1	.098	2.408	.850	6.821
	Female	0 <sup>b</sup>	.	.	0	.	.	.	.
	1 <sup>st</sup> Year	-.457	.565	.655	1	.418	.633	.209	1.916
	2 <sup>nd</sup> Year	-.660	.652	1.023	1	.312	.517	.144	1.857
	3 <sup>rd</sup> Year	0 <sup>b</sup>	.	.	0	.	.	.	.
	Chronic Illness	.801	.802	.997	1	.318	2.228	.462	10.739
	No Chronic Illness	0 <sup>b</sup>	.	.	0	.	.	.	.
	Previous infection with COVID-19	1.717	.576	8.887	1	.003	5.567	1.800	17.210
	No previous COVID-19 infection	0 <sup>b</sup>	.	.	0	.	.	.	.

a. The reference category is: No.

b. This parameter is set to zero because it is redundant.

The most common reported fear regarding the COVID-19 vaccine is side effects, followed by government spying software (figure 4.2).

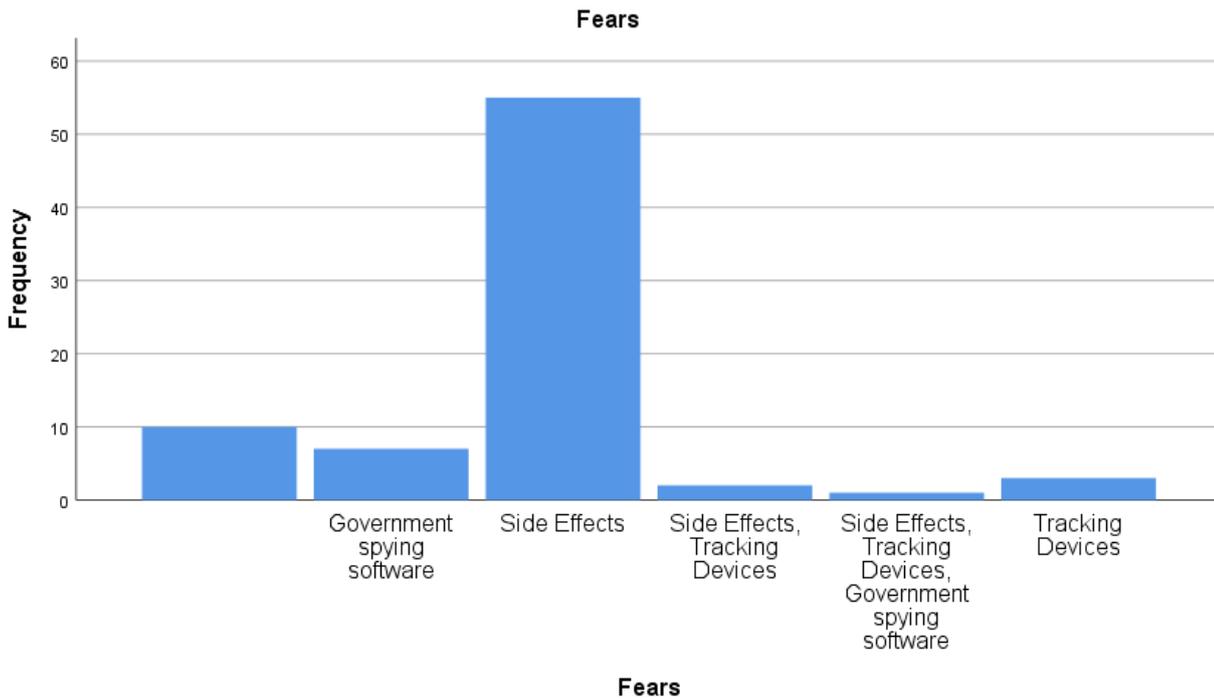


Figure 4.2

The vast majority of our participants were not vaccinated (i.e. received at least 1 dose of any authorized vaccine). Nearly 30% of our participants did not answer this question.

Table 4.9

	Vaccinated			Cumulative Percent
	Frequency	Percent	Valid Percent	
No	55	70.5	70.5	78.2
Yes	23	29.5	29.5	100.0
Total	78	100.0	100.0	

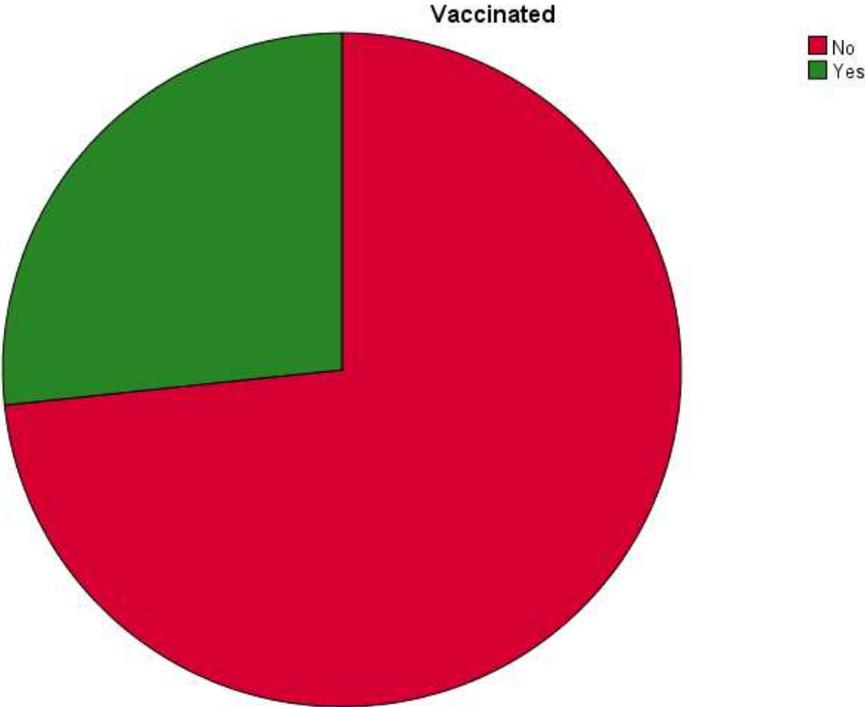


Figure 4.3

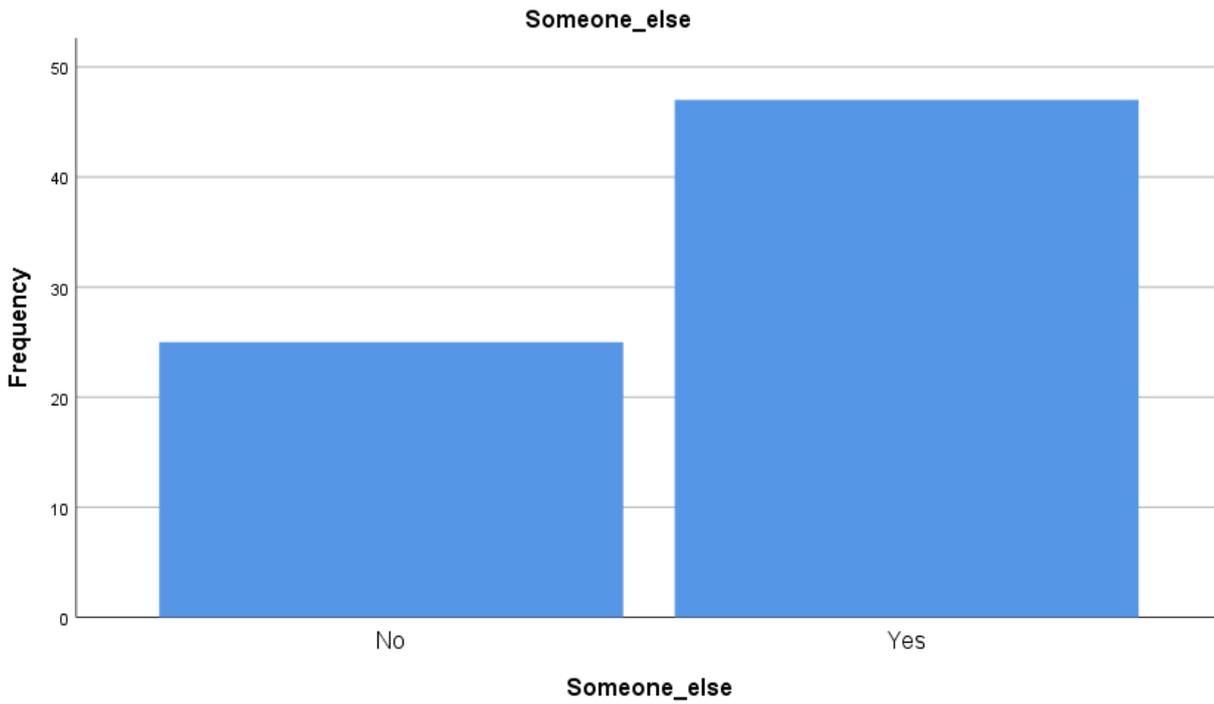


Figure 4.4

Table 4.10

	Someone_else			Cumulative Percent
	Frequency	Percent	Valid Percent	
No	28	35.8	35.8	47.4
Yes	50	64.2	64.2	100.0
Total	78	100.0	100.0	

An overall good attitude (60.3% responded positively) was reported by our participants (this was assessed by asking the participant whether or not they would recommend someone else get vaccinated). Most of our participants who were vaccinated received the AstraZeneca vaccine.

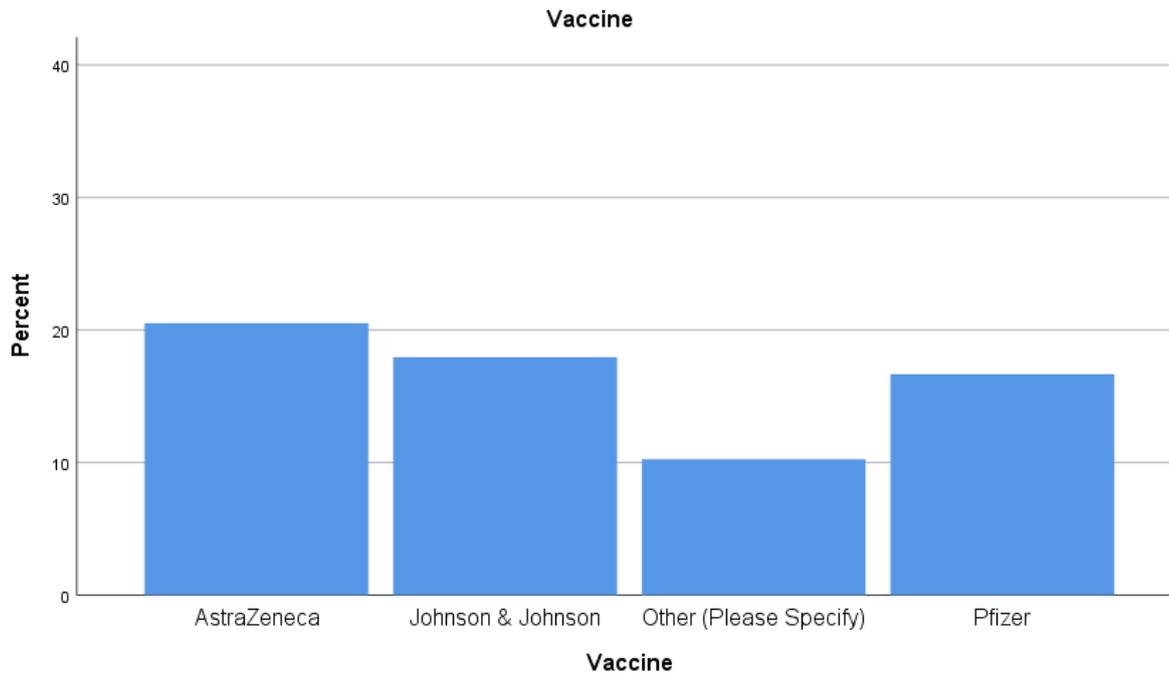


Figure 4.5

### Discussion

These results are in line with results reported from studies that took place prior to the authorization of vaccines for COVID-19. For example, a US-based study, by Lucia and colleagues reported a 23% disapproval rating amongst medical students (20)

As aforementioned, this study showed some rather alarming findings, such as the rather low percentage of vaccinated medical students. These findings are not in line when compared to the results reported regarding medical students in the US (20).

However, it is not the only study that reported 'less-than-favorable' results regarding the topic. For example, a study based in Wuhan, China reported a nearly 60% hesitancy rate amongst medical students (23).

Another study with rather familiar results is the one mentioned earlier from Uganda (24).

### Conclusion:

In conclusion, this research project has found that the majority of Napata College junior medical students (defined as those who have yet to initiate their clerkships) were not vaccinated. We have also found that a considerable percentage have been previously infected with COVID-19.

If this is an indicator, it is an indicator of a disaster to come especially given the recent high-spreading Omicron variant of the illness. This illustrates the need for immediate, well-thought out interventions with the

end-goal of putting an end to the pandemic that has taken the world by storm.

### **Recommendations:**

- 1) The conduction of introductory lectures on the importance of COVID-19 vaccination
- 2) The immediate implication of safety guidelines regarding COVID-19 (social distancing, hand sanitizing, etc...)
- 3) The conduction of community projects targeting the public and their awareness of COVID-19 and its available vaccines
- 4) The mandating of masks wherever possible
- 5) The introduction of virtual (online) systems of work wherever needed.

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