

# COVID-19 Immunisation: Perception, Acceptance and Attitude of Ghanaian Students

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**Abstract** One of the sectors that have been greatly affected by the 2019 pandemic coronavirus disease (COVID-19) was the various universities in Ghana. Universities were closed down for several months until strategically academic work resumed normalcy. COVID-19 immunisation is one of the best approaches to mitigate the spread of the novel disease. This process will increase the immunity of the students due to the extremely congested environments. For that matter, this study utilised a cross-sectional survey to assess the knowledge and attitudes of students toward vaccines in several Ghanaian universities. Reasons behind the refusal and acceptance of the COVID-19 vaccines were also ascertained. Descriptive, one-sample t-test and multinomial logistics regression statistics were used to analyse the data. Seven hundred and eighty-five (785) students from various universities in Ghana participated in this study. Respectively, 78.5% and 73.8% of the students were well informed about COVID-19 disease and COVID-19 vaccines. It can be concluded that information on social media significantly discouraged students from the COVID-19 immunisation process. The majority of students representing 63.1% were willing to receive the COVID-19 immunisation, compared to 36.3% of the students that exhibited negative attitudes toward the immunisation. The primary cause of non-compliance with the government-recommended immunisation schedule was the safety and side effects of the vaccines. It is recommended that additional advocacy initiatives be implemented at various universities to help address the numerous safety concerns students have regarding the COVID-19 immunisation and its side effects.

**Keywords:** COVID-19, Ghana, education, public health, immunisation, perception and acceptance and attitude

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## 1. Introduction

The public health and economy of the world continue to suffer from the challenges posed by the coronavirus disease (COVID-19) after the detection in Wuhan province, China in the latter part of 2019 [1]. According to the World Health Organization (WHO) as of 18<sup>th</sup> June 2022, the world has recorded more than 540 million and 6 million cases and death respectively [2]. There have been more than 160,000 cases in Ghana with 1445 deaths [2].

Ghana is a multi-ethnic and multi-religious country with the majority being Christian (about 71%) and Muslim (about 18%) [3]. Other religions include traditional African religions and Hinduism. The cultural diversity in Ghana is reflected in the various ethnic groups present in the country. The largest ethnic group is the Akan, which includes the Ashanti and Fante subgroups, making up about 47% of the population [3]. The Ewe, Ga-Adangbe, and Mole-Dagbon are among the other ethnic groups present, each with its unique language, customs, and beliefs. University students in Ghana come from

diverse ethnic and religious backgrounds, with many of them coming from the major ethnic groups mentioned above. In terms of religion, a significant number of university students are Christian, followed by Muslims and a small percentage who practice traditional African religions. In Ghana, like in many other parts of the world, the COVID-19 pandemic has affected every aspect of life, including education. With the rollout of COVID-19 vaccines in many countries, including Ghana, the issue of vaccination has become a topic of great interest and discussion among university students. The perception, acceptance, and attitude towards COVID-19 immunization among Ghanaian university students vary across different groups. Some students have shown eagerness to get vaccinated, while others have expressed skepticism and reservations about the vaccines. There have been concerns about the safety and efficacy of the vaccines, as well as issues related to vaccine accessibility and distribution. Additionally, cultural and religious beliefs have played a significant role in shaping the attitudes of Ghanaian students towards COVID-19 immunization. For instance, some religious groups have expressed concerns about the use of vaccines that contain animal-derived products,

while others have raised issues related to the moral acceptability of vaccines that have been developed using fetal cell lines [4]. Furthermore, there have been concerns about the lack of trust in the government and public health officials, which has resulted in some students being hesitant to take the vaccines. Some students have expressed doubts about the effectiveness of the vaccines and have suggested that they prefer to rely on traditional medicine and natural remedies to protect themselves against COVID-19. The perceptions, acceptance, and attitudes towards COVID-19 immunization among Ghanaian university students are influenced by a range of factors, including ethnicity, religion, culture, and individual beliefs. To improve vaccine uptake among university students, it is crucial to address the concerns and reservations that some students have about the vaccines and provide accurate information about their safety and efficacy.

Ghana is located in West Africa with a population of over 30 million people [5], the country has a diverse ethnic and cultural makeup, with over 100 distinct ethnic groups, each with their own customs and traditions, Ghana has a well-established healthcare system, but there are still significant disparities in healthcare access and outcomes between different regions and socioeconomic groups, since the first COVID-19 virus was recorded, the country has implemented various measures to control the spread of the virus, including lockdowns, travel restriction, and a vaccination campaign, however, vaccine hesitancy remains a significant issue in Ghana, with many peoples expressing scepticism about the safety and efficacy of the vaccines. In general Ghanaians place a high value on community and social connections, which can influence their attitudes towards healthcare interventions such as vaccinations. Additionally, religious and cultural beliefs can also play a role in vaccine acceptance, with some groups expressing concerns about the use of certain vaccines ingredient or the perceived interference with divine will. Given these factors, it is important for health officer and authorities to understand the specific beliefs and concerns of the Ghanaian population regarding COVID-19 vaccine in order to develop effective communication strategies and interventions, by addressing these concerns and tailoring messaging to the cultural context, it may be possible to improve vaccine acceptance and increases vaccination rates in Ghana.

Apart from the immediate measures taken to mitigate the adverse effect of the virus, one of the long-lasting solutions that will help reduce the impact of the virus is the use of the COVID-19 vaccines. Generally, vaccines are manufactured from small weakened or dead pathogens, such as viruses, bacteria, and toxins that cause a specific disease. The little dose of germs triggers the body's immune system to begin producing and replicating antibodies for an immunological response to the disease [6]. For COVID-19 vaccine development, a lot of modern techniques are adopted, and some pharmaceutical companies use the whole virus which is inactive to trigger the immune system. Examples include Covaxin, Turkovac, Fakhravac, Kconvac and Coronavac. Other companies also used the component viral vaccines, which can be a protein subunit, virus-like particles (VLP), DNA and RNA

base, or Non-replicated and replicating viral vectors such as Zifivax, Noora vaccine, Moderna Spike Vax and Astra Zeneca [7].

Ghana was the first in West Africa to receive over 600,000 Astra Zeneca COVID-19 vaccines on the 24<sup>th</sup> of February 2021 from the international COVAX Facility through the United Nations Children's Fund. The immunisation in Ghana started on the 1st of March 2021, led by the President taking the first COVID-19 vaccine live on television. This action was followed by the vice president and other government officials to assure Ghanaians of how safe the vaccines are and encourage them to have immunisation. Thereafter, more than 16 million Ghanaians have been immunised, out of which about 9,786,631 have been immunised with at least one dose and the other 6,410,470 fully immunised [7]. According to the COVID-19 vaccine tracker, Ghana has approved only six vaccines for use with only Wantai Deisi-2019-nCoV-RBD-OPTI in clinical trials, the other approved vaccines in Ghana include Moderna Spikevax, Serum Institute of India Covishield (Oxford/AstraZeneca formulation), Janssen (Johnson & Johnson) Ad26.COV2.S, Pfizer/BioNTech Comirnaty, and Oxford/AstraZeneca Vaxzevria [2,7].

During the COVID-19 pandemic, the education sector particularly tertiary education in Ghana was greatly affected. Universities in Ghana were forced to go down for several months which significantly abrupted the academic calendar. Strategic planning brought forward modalities before schools formally resumed. Most universities first employed the online system in the interim before the incorporation of the face-to-face mode. However, it is important to note that university students were not provided with psychological services about the mental health effects of the disease in Ghana after the resumption.

Despite, the development of the COVID-19 vaccines, the disease continues to impede the face-to-face teaching and learning mode in Ghanaian universities since the virus spreads through touch and saliva. Due to the poor infrastructural state of the universities, social distancing among students could not be maintained during the face-to-face mode. This in effect put immunisation against the virus as the optimal approach to curtail the spread of COVID-19, however, the number of immunised students remains low in Ghanaian Universities. Thus, this study attempts to reveal the perception of Ghanaian university students about COVID-19 immunisation and their attitude and acceptance towards COVID-19 vaccines in Ghana.

## 2. Materials and Methods

### 2.1. Study Area and Design

Ghana is located in West Africa with an estimated population of 30.8 million [3]. Presently, Ghana has fifteen (15) public universities, ten (10) technical universities and more than eighty-one (81) private universities with a total population of about 154,000 students. The sample size for this study was 665 students which were determined using the Cochran [8] relation as:

$$n = \frac{p(1-p)z^2}{e^2}$$

Where  $n$  = sample size,  $p$  = population proportion (50%), and  $e$  = acceptable sampling error (5%).

In this study, we utilized 785 respondents, but for our sample size calculation we determined that we only needed 665. The computation of the sample size was done using a 99% confidence level, an error margin of 5%, and a population proportion or response distribution of 50%. Snowballing and the convenience sampling technique was adopted to carry out this study among university students in Ghana. Only students at various Ghana universities were in this study's inclusion criteria.

The questionnaires were developed with guidance from similar works. This study adopted the face or content validity approach where the questionnaires were carefully assessed by public health experts with wide experience in designing such research surveys. Cronbach's alpha coefficient of 0.728 was reached indicating the high reliability of the questionnaires for the study [9].

The questionnaires were distributed online (student platforms) using Google forms and printed versions. For the inclusion criteria, the questionnaire was administered to only students from Ghana's various universities. Consent was sought from every individual who filled the questionnaires and was assured of anonymity and confidentiality. The data collection started on the 27<sup>th</sup> of May 2022 and ended on the 17<sup>th</sup> of June 2022. Descriptive analyses were done to show the variations in the data and also help in the data interpretation. Multinomial regression analysis was employed to ascertain the relationship between attitude and acceptability of the vaccine.

### 3. Results

#### 3.1. Descriptive Statistics On Demographic And Socio-Cultural Information

The total respondents for this study were 785 students, out of this number 503 (64.1%) were female while 282 (36%) were male. The age was an opened ended question, after which the various ages were grouped from 15-20, 21-25, 26-30, 31-35, 36-40 and above 40. It was observed that most of the students' ages ranged from 21-25 (49.9%), followed by 15-20 (21.4%) with the least above 41 years which was 0.3% as indicated in Table 1. Also with religious affiliation, 690 (87.9%) students were Christians, 81 (10.3%) were Muslims, 11 (1.4%) were affiliated with African traditional religion while 3 (0.4%) had no affiliation to any religion as indicated in Table 1. One-sample t-test analysis was performed on gender, age and religious affiliation. A p-value of 0.000\*\* indicating that the variation in them was statistically significant.

#### 3.2. Perceptions Of Covid-19 And Vaccines

Open-ended questions that required responses from the students were used to determine the students' general knowledge of COVID-19 and the available vaccines. Their responses were grouped under various themes and

later categorised into two major sections which are *correct* and *wrong*. The various themes are indicated in Table 2. For the general knowledge of COVID-19, 619 (78.9%) students were able to answer the question correctly while the remaining 166 (21.1%) answered wrongly. Again, 579 (73.8%) answered correctly questions on COVID-19 vaccines while 206 (26.2%) answered wrongly as shown in Table 2.

**Table 1. Descriptive statistics of demographic and socio-cultural information**

VARIABLE	FREQUENCY(n)	PERCENTAGE (%)	P-VALUE
<b>GENDER</b>			
Female	503	64.1	0.000**
Male	282	35.9	
<b>AGE</b>			
15-20	168	21.4	
21-25	392	49.9	
26-30	128	16.3	0.000**
31-35	85	10.8	
36-40	10	1.3	
> 41	2	0.3	
<b>RELIGIOUS AFFILIATION</b>			
Christianity	690	87.9	
Islam	81	10.3	
African Tradition	11	1.4	0.000**
None	3	0.4	

**Table 2. Responses of students on the general knowledge of COVID-19 and Vaccines**

RESPONSE	FREQUENCY(n)	PERCENTAGE (%)
It is a deadly disease	260	33.1
It is a communicable disease	138	17.6
It is caused by a virus	53	6.8
It is a hoax not real	115	14.6
It is caused by SARS COVID-19	51	6.5
It is a respiratory disease that affects the immune system	60	7.6
It is an infectious disease	56	7.1
It is given for protection against coronavirus.	179	22.8
To boost the immune system.	176	22.4
To reduce the infection rate.	114	14.4
It is very effective and good for the body to fight the COVID-19 virus.	79	10.1
Have side effects since it was made in a haste.	58	7.4
The citizens should be well and properly informed about the importance of vaccines.	32	4.1
It introduces the virus into the body.	55	7.0
It is dangerous.	46	5.9
Not reliable.	35	4.5
No response.	12	1.5
<b>GENERAL KNOWLEDGE OF COVID-19.</b>		
Correct	619	78.9
Wrong	166	21.1
<b>GENERAL KNOWLEDGE OF COVID-19 VACCINES.</b>		
Correct	579	73.8
Wrong	206	26.2

### 3.3. Factors That Discourage Students From Taking Covid-19 Vaccines

This study evaluates the major factors (*family, religion, culture and social media*) that discourage the students from immunisation. From [Table 3](#), 374 (47.6%) students of the total population indicated that information on social media discouraged them. Furthermore, 161 (20.5%) and 78 (9.9%) students were also discouraged by family and religious beliefs from the immunisation respectively. Lastly, 68 (8.7%) students which were also discouraged due to their culture. The statistical changes in the result were analysed using a one-sample t-test, and for each of the factors, a p-value of 0.00\*\*\* was obtained, showing that the differences in their responses were statistically significant.

**Table 3. Factors that influence students from taking COVID-19 vaccines**

	FREQUENCY (n)	PERCENTAGE (%)	p-value
<i>Does your family discourage you from taking the COVID-19 vaccine?</i>			
Yes	161	20.5	0.000***
No	623	79.4	
<i>Do your religious beliefs discourage you from taking the COVID-19 vaccine?</i>			
Yes	78	9.9	0.000***
No	707	90.1	
<i>Does your culture discourage you from taking the COVID-19 vaccine?</i>			
Yes	68	8.7	0.000***
No	717	91.3	
<i>Does the information on social media discourage you from taking the COVID-19 vaccine?</i>			
Yes	374	47.6	0.000***
No	411	52.4	

### 3.4. Attitude And Acceptability Of The Covid-19 Vaccines

The attitudes of the students and their acceptance of the COVID-19 immunisation were evaluated using six questions. The first question was to describe their attitude toward receiving approved COVID-19 vaccines. Out of the 785 students 269 (34.3%) students responded with having a positive attitude toward immunisation, 231 (29.4%) students indicated they have a negative attitude while 285 (36.3%) students were neutral as displayed in [Table 4](#). Another question to assess attitude was whether they would describe themselves as eager to get the approved COVID-19 vaccines, neutral or anti-immunisation for COVID-19 vaccines. It was observed

that 413 (52.6%) students were eager to get the approved vaccines while 149 (19%) students are anti-immunisation for COVID-19, 223 (28.4%) students were also neutral.

Again, [Table 4](#) displays the results of the evaluation of the student's acceptance of the COVID-19 immunisation using 4 questions. The first question was to assess whether they would take the COVID-19 vaccine (approved for use in Ghana) if offered and out of 785 students 495 (63.1%) indicated they will definitely accept it, 122 (15.5%) students hesitated and responded with definitely not while 168 (21.4%) were undecided (may or may not accept it). Students were also asked if they would take an approved COVID-19 vaccine that is available on campus, 391 (49.8%) students gladly responded they will take it when offered while 196 (25%) said they will refuse to take them. Moreover, 198 (25.2%) students were undecided on whether they will take it or not. Students were also asked if they will encourage family or friends to take the approved COVID-19 vaccines and 443 (56.4%) students responded they will encourage them while 165 (21%) students suggested that they will not, and 177 (22.5%) students chose neutral. Finally, students were asked how they felt about them taking the COVID-19 vaccines, 457 (58.2%) students responded it is important, 99 (12.6%) indicated it is unimportant and 229 (29.2%) responded that they do not know.

### 3.5. Reasons For Non-Compliance With The Immunisation Schedule

Finally, this study investigated the basic reasons why most students are not complying with the immunisation schedule proposed by the government of Ghana through the Ministry of Health. [Table 4](#) shows that 303(38.6%) students were found to be worried about the vaccine's safety, 371(47.3%) students had fears of side effects. In addition, 97(12.4%) students had social engagement preventing them from getting immunised while 14(1.7 %) gave no reason for their non-compliance with the immunisation schedule.

### 3.6. Predictors Of The Acceptance Of Covid-19 Vaccines

Multinomial logistics regression was adopted to determine the predictors of acceptance of COVID-19 vaccines among various students. The acceptance of the COVID-19 vaccine was the dependent variable while the independent variables comprised demographic and socio-cultural information, knowledge of COVID-19 and vaccines, attitude towards receiving COVID-19 vaccines and reason for non-compliance with the immunisation schedule. The independent variables were both dichotomous and continuous. The results of the multinomial logistics regression show that the attitude toward receiving approved COVID-19 vaccines was the main predictor of the acceptance of the vaccines as shown in [Table 5](#).

**Table 4. Students' opinions on the COVID-19 vaccine's acceptance and attitude and reason for non-compliance with the immunisation schedule**

	FREQUENCY(n)	PERCENTAGE (%)
<i>My attitude towards receiving an approved COVID-19 vaccine is:</i>		
Positive	269	34.3
Neutral	285	36.3
Against it	231	29.4
<i>If my family or friends were thinking of getting an approved COVID-19 vaccine, I would:</i>		
Encourage them	443	56.4
Neutral	177	22.5
Suggest that they do not get the vaccine	165	21.0
<i>Would you take COVID-19 vaccines (approved for use in Ghana)</i>		
Definitely	495	63.1
Neutral	168	21.4
Definitely not	122	15.5
<i>If an approved COVID-19 vaccine is available on campus:</i>		
I will take it when offered	391	49.8
I am not sure what I will do	198	25.2
I will refuse to get it	196	25.0
<i>I would describe myself as:</i>		
Eager to get the approved COVID-19 vaccine	413	52.6
Neutral	223	28.4
Anti-immunisation for COVID-19	149	19.0
<i>Taking COVID-19 vaccines is:</i>		
Important	457	58.2
Don't know	229	29.2
Unimportant	99	12.6
<i>Reason for non-compliance</i>		
Concern about vaccine safety	303	38.6
Social engagement (too busy)	97	12.4
Fear of side effects	371	47.3
No reason	14	1.7

**Table 5. Multinomial logistic regression for the covid-19 vaccine acceptability**

	ODDS RATIO(OR)	p-value	95% CONFIDENCE INTERVAL
<i>I would describe my attitude towards receiving an approved COVID-19 vaccine as:</i>			
I will take it when offered	5.906	0.29	1.202-29.025
I am not sure what I will do	3.504	0.002	1.577-7.785
I will refuse to get it		(REF)	

## 4. Discussion

Using a multinomial regression logistics model, students' attitudes toward the COVID-19 immunisation served as the primary predictor of COVID-19 acceptance in this study, as shown in Table 5. The results show that students are more likely to embrace the COVID-19 vaccine if they have a good attitude regarding it. One of the main strategies to stop the spread of COVID-19 is immunisation, in addition to adhering to all the guidelines recommended by the WHO. Since the 20<sup>th</sup>-century immunisation has been the key way of controlling a lot of deadly diseases in the world, there has been a great reduction in the spreading of diseases such as yellow fever, hepatitis B, mumps, tetanus measles, poliomyelitis and

many more, in the case of smallpox it has been fully eradicated from the world by immunisation [10]. The importance of vaccines can never be undermined in the modern way of fighting diseases. Regarding the above, the general public needs to have a positive attitude toward immunisation to get immunised. In this study, the perception, attitude, acceptance, factors that discourage students from getting immunised and reasons for the non-compliance to the immunisation schedule among Ghanaian university students were investigated.

Perceptions about COVID-19 disease and vaccines are very important in the acceptance of the vaccines, according to this study, 78.9% and 73.8% had correct information on COVID-19 and vaccines respectively, and this is in line with the findings of Gallè et al [11]. Using the multinomial logistic regression, it was discovered that

there was a positive relationship between knowledge of COVID-19 and acceptance of vaccination, even though the variation was not statistically significant with a p-value of 0.122.

This study also investigated the factors that discourage students from taking COVID-19 vaccines; social media is one of the biggest platforms that is discouraging students from taking the COVID-19 vaccines, 47.6% of the students revealed that social media have discouraged them from not taking the vaccines. This is in agreement with Jennings et al. where the regression model predicted social media use had a direct relation to vaccine hesitancy [12]. Additionally, 20.5% of the student were discouraged by family, this is followed by religion with 9.9%, and the least factor that discourages people was a culture with a percentage of 8.7%.

Surprisingly, 36.3 % had a negative attitude toward the COVID-19 immunisation compared to 34.3 % who had a positive attitude, which shows that the majority of students do not prefer to be immunised.

In contrast to what was found in this study, Jiang et al. reported a scoring rate of 69.8% of Chinese students who had a favourable attitude toward the COVID-19 immunisation [13].

According to the findings of the study, 63.1% of the students were open to receiving the COVID-19 immunisation, which is a similar acceptance rate to that reported by Paul et al. in the United Kingdom and Al-Mohaithef in Saudi Arabia [14, 15] with 63.5% and 68.8% respectively. The acceptance was also higher than that of Agyekum et al, El-Elimat et al, Verger et al and Wang et al which were 39, 40, 40, 37.4% respectively [16,17,18,19].

Notably, it was clear that several factors contributed to students' non-compliance with the immunisation schedule. Two major factors stood out: 47.3% of students were afraid of the side effects of the COVID-19 vaccine, and 38.6% were concerned about the safety of the vaccines. These results are in line with other studies [16,17,20,21,22,23,24,25,26,27]. Barry et al in a cross-sectional survey in Saudi Arabia had a similar result with 71.8% of students concerned about the safety of the vaccines while 49.2% had concerns about the side effects of the vaccines. Agyekum et al also had 65.5% of the respondents having concerns about the safety of the vaccines while 14.8% had concerns about the side effects of the vaccines [16]. The non-compliance of the COVID-19 immunization schedule among universities students in Ghana could be due to the various factors, such as concerns about vaccine safety, fear of side effects, social engagement and many more., These factors could affect the vaccination rate among students, which is why it is essential to address them through awareness campaigns, education, and other interventions. This can help increase vaccines uptake and encourage more student to get vaccinated, which is crucial in controlling the spread of the virus and protecting public health. It is important for healthcare authorities and institutions to prioritize vaccine education an awareness to ensure that students receive accurate information about the vaccines and their benefits. By doing so, students can make informed decision about getting vaccinated, and the country can achieve higher levels of immunity against COVID-19.

It is obvious from the findings of this study and other related studies that side effects and safety are the major reasons for the non-compliance with the immunisation schedule. To enhance immunisation rates, officials should identify ways to reassure the public about the COVID-19 vaccines' reliability and safety.

## 5. Conclusion

Generally, students were more informed about COVID-19 and vaccines. Most of them were very much influenced by the information on social media; therefore, there should be proper structures to sensitise the information out there. The findings of this study suggest that additional advocacy initiatives at universities in Ghana are needed to help address the numerous safety concerns that students have regarding immunisation and their potential negative effects.

**Author Contributions:** Conceptualization, Isaac Kwesi Acquah; Methodology, Victor Antwi and Michael Gyan; Software, Cynthia Jebuni-Adanu; Formal analysis, Desmond Appiah and Fortune Addo-Wuwer; Data curation, Michael Gyan and Fortune Addo-Wuwer; Writing – original draft, Isaac Kwesi Acquah; Writing – review & editing, Desmond Appiah; Supervision, Victor Antwi; Project administration, Cynthia Jebuni-Adanu.

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