

# Undergraduate Students' Knowledge, Attitudes and Willingness to Receive COVID-19 Vaccines: A Survey of Convenience Sample in Namibia

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Nestor Tomas, RN, RM, RCN, RT, MPH , Takaedza Munangatire, RN, BN Sc (Hons), MPhil, PhD and Stefanus Nampila, BN Sc (Clinical)

## Abstract

**Introduction:** The global consequences of the COVID-19 pandemic cannot be overstated. Vaccinations are one of the leading strategies to protect against the virus, and it is likely that students' understanding and desire to be vaccinated can be major factors in helping contain the pandemic. Nonetheless, no studies looked into the vaccine attitude, knowledge and willingness in Namibia.

**Objectives:** To assess and describe the association between knowledge, attitudes, and willingness of undergraduate students to receive COVID-19 vaccines in the school of education, nursing and economics and management science at the university campus in Namibia.

**Methods:** The study employed a cross-sectional descriptive study from 200 undergraduate university students using a convenience sampling. Data analysis was done using SPSSv28 and descriptive statistics were used to depict trends in data while a Pearson's correlation determined the relationship between the study variables.

**Results:** The data showed that 54.2% ( $1.54 \pm 0.49$ ) of the participants had adequate knowledge concerning the vaccine, while 57.1% and 58.6% had a negative outlook and were unwilling to get vaccinated. A moderate positive correlation was observed between attitudes and willingness to take COVID-19 vaccines ( $r = .546, P = <.001$ ), while a negative relation existed between knowledge and attitudes ( $r = -.017, P = >.001$ ).

**Conclusions:** This study has provided valuable insight into the knowledge, attitudes, and willingness of undergraduate students to receive COVID-19 vaccines. Despite more than half of the participants having appropriate knowledge, they had an unfavourable outlook toward COVID-19 vaccination. It is recommended that further studies focus on how factors such as incentives, religion and cultural values affect their desires to be vaccinated.

## Keywords

COVID-19 vaccines, university students, attitudes, knowledge and willingness

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## Introduction and Background

The World Health Organization (WHO) declared the global coronavirus disease (COVID-19) pandemic a threat to public health in 2020 (WHO, 2020). Being contagious, it is responsible for severe acute respiratory syndrome (SARS-CoV) in humans (WHO, 2020). Although the development of a COVID-19 vaccine is a remarkable achievement, it will only be effective if people are willing to receive it. Unfortunately, there is an abundance of false information about vaccines on different platforms, leading to some reluctance to take them. To guarantee as many

individuals as possible accept a COVID-19 vaccine when it is available, it is essential to comprehend why people may be hesitant and address these worries directly. Studies have

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Department of General Nursing Science, School of Nursing and Public Health, Faculty of Health Sciences and Veterinary Medicine, University of Namibia (UNAM), Rundu, Namibia

### Corresponding Author:

Tomas Nestor, Department of General Nursing Science, School of Nursing and Public Health, Faculty of Health Sciences and Veterinary Medicine, University of Namibia (UNAM), PO Box 88, Kaisosi Road, Rundu, Namibia. Email: [ntomas@unam.na](mailto:ntomas@unam.na)



demonstrated mixed attitudes and levels of willingness among university students toward COVID-19 vaccinations (Deplanque & Launay, 2021; Kregar Velikonja et al., 2021). Research has indicated that students who are willing to receive the vaccine often possess significantly higher levels of knowledge about the vaccine and its efficacy (Samanta et al., 2022). However, some studies have revealed that college students find COVID-19 vaccines less important and are less likely to be vaccinated than other groups (Manning et al., 2021; Tam et al., 2022). Early research suggested that university students may have varied views on the matter when compared to the general public (Bai et al., 2021). Given this, it is critical to carry out research in Namibia that reveals undergraduate students' knowledge, attitudes, and readiness toward receiving the COVID-19 vaccines in the school of education, nursing and economics and management science at the university campus in Namibia.

## Literature Review

The reluctance to receive vaccines is a significant global health concern and is listed among the top 10 threats to world health. Despite this, COVID-19 vaccine hesitancy continues to be underreported in various regions due to widespread misinformation and disinformation, inadequate understanding, and unwavering attitudes (Berdida et al., 2023). Globally, there has been reports of vaccine hesitancy owed to a number of factors, including conspiracy theories and concerns over vaccine safety (Islam et al., 2021; Karoui & Khemakhem, 2019; Oyekan, 2021; Ullah et al., 2021). Some conspiracy theories circulating among the public claim that vaccines are designed to sterilize young people or contain microchips that alter Deoxyribonucleic acid (DNA), making it easier to control individuals through technology (Islam et al., 2021; Ullah et al., 2021). These unfounded claims have contributed to vaccine hesitancy, with some young people in African countries fearing sterilization (Wonodi et al., 2022). While initiatives such as cash incentives, free meals or gift vouchers have been effective in increasing vaccination rates, reports of banning unvaccinated individuals from public places such as shops and restaurants have also emerged (Berdida et al., 2022). Other factors contributing to COVID-19 vaccination hesitancy identified by Wonodi et al. (2022) and Olatunji et al. (2020) include beliefs that the vaccine is a tool of the Illuminati and that the pandemic is a result of God's anger as prophesied in religious texts.

In Namibia, the number of COVID-19 infections rose dramatically from 1,031 to 2,574 weekly cases between December 21, 2020, and June 21, 2021 (Ashipala et al., 2023). In response, Namibia rolled out a free but voluntary COVID-19 vaccination in line with WHO recommendations (Ashipala et al., 2023). A range of vaccines are in development and the most promising are based on mRNA technology, which encodes a genetic code that prompts cells to

produce a protein analogous to the SARS-CoV-2 virus's spike protein. About seven vaccines have been distributed worldwide, namely Oxford, AstraZeneca, Sinopharm BBIBP, Pfizer/BioNtech, Sinovac, Janssen/Ad26 and Moderna. As of December 2022, only five of the vaccines have been approved for use in Namibia: Pfizer/BioNtech, AstraZeneca, Sinopharm, Sputnik V and Johnson & Johnson (COVID-19 Vaccine Tracker, 2022). Studies indicate that these vaccines are secure and effective, with minor to mild side effects such as fever, fatigue, headache, muscle pain, chills and diarrhea, as well as localized injection site pain (Mannan & Farhana, 2020; Rabail et al., 2022). Effective measures to combat the COVID-19 pandemic in the country were contingent upon collaborative efforts, which included higher education institutions. Universities are responsible for ensuring the safety of their staff and students, who are their key stakeholders. Consequently, universities played a crucial role not only in vaccine development (Chakraborty & Agoramoorthy, 2020), but also in disseminating accurate information through their faculty and students to the community (Ghaddar et al., 2022). University students hold a significant role in all societies, as they are recognized as knowledgeable, influential and well-informed to respond to public health challenges (Hossian et al., 2022). Thus students' knowledge of the COVID-19 vaccine is central to their willingness to receive it. It is critical that students comprehend the vaccine's efficacy and potential side effects. Their positive attitude toward the vaccine is highly correlated with their readiness to take it (Barello et al., 2020). Consequently, the success of vaccine programs hinges on both knowledge and attitude. University students' attitudes, knowledge of the vaccine's efficacy and safety, and willingness to receive it could be instrumental in curbing the pandemic and disseminating accurate information about the vaccines to their local communities (Kregar Velikonja et al., 2021). Nevertheless, Kamacooko et al. (2021) recently highlighted the value of assessing university students' knowledge and attitudes regarding COVID-19 vaccines, since this can help identify gaps in pandemic control efforts that need to be addressed through education. A similar study also pointed out that students' attitudes and knowledge are crucial for policy makers to successfully overcome any obstacles to vaccine uptake (Sandler et al., 2020). However, many students have raised questions about the efficacy of these vaccines (Deplanque & Launay, 2021). University students have an important role to play in preparing our society for the future, and the current COVID-19 pandemic provides a unique chance for them to demonstrate their knowledge, attitudes and willingness to contribute to the effort against the virus (Attia et al., 2020).

Despite the far-reaching effects of the COVID-19 pandemic, only a small number of university students have committed to receiving the vaccine, with many feeling uncertain (Zhang et al., 2022; Zychlinsky et al., 2021). This study identified the association between knowledge, attitudes, and

willingness of undergraduate students to receive COVID-19 vaccines.

## Methods

### *Design and Setting*

A quantitative online survey was administered to undergraduate students in Nursing, Education, and Economic and Management Science. This design has been utilized in multiple studies exploring university students' knowledge, attitudes, and willingness due to its speed and convenience in collecting data at one point in time (Evrpidou et al., 2019; Jairoun et al., 2019). The study was conducted at the single campus of the twelve University of Namibia campuses located in Kavango East region, in the eastern part of the country. This campus provides both undergraduate qualifications in Nursing, Education, and Economics and Management Science. As part of the university's overall mission to battle COVID-19, this campus has a part to play in ensuring that its student population is informed about COVID-19 and vaccines.

### Results

1. What is the level of university students' knowledge, attitudes and willingness to receive COVID-19 vaccines at the University of Namibia?
2. What are the variables associated with the students' knowledge, attitudes and willingness to receive COVID-19 vaccines at the University of Namibia?

### *Participants and Sample*

The population of this study consisted of 415 undergraduate students from the Schools of Nursing and Public Health, Education, and Economics and Management Science. We employed a convenience sampling technique to select readily accessible undergraduates on the chosen campus to gather data online. This approach has gained traction during the pandemic as it allows researchers to target populations that may be hard to access through other means due to the COVID-19 regulations (Güzel et al., 2020). This strategy was implemented as researchers were unable to physically approach the students. Stratified sampling or randomization could not be used in line with the COVID-19 guidelines. Sample size calculation was calculated using the formula by Sekaran and Bougie (2016). This formula follows the equation:  $sample\ size = N / (1 + N \times a^2)$ , where  $n$  = sample size,  $N$  = total population and  $a$  = total confidence limit at 5% ( $P = .05$ ). This method yielded a sample size of around 203 students.

### *Inclusion/Exclusion Criteria*

In order to be eligible for inclusion in the study, participants must have been undergraduate students in the school of Education, Nursing and Economic and Management Sciences at the selected university campus in Namibia, enrolled in their first through fourth year of study, and willing to take part. All prospective participants who lacked access to smartphones or the internet, as well as those who declined to take part, were deemed ineligible and consequently excluded from the study.

### *Data Collection*

The researcher implemented an online self-administered questionnaire that was created based on existing literature (Jiang, Gu, et al., 2021; Jiang, Wei, et al., 2021; WHO, 2019). The tool's validity was evaluated by testing it with two expert nursing researchers before subjecting it to a validity test. The content validity index was deemed acceptable at 0.90, along with the Kaiser–Meyer–Olkin Measure of Sampling Adequacy (KMO) and Bartlett's Test of Sphericity (Chi-Square = 2685.156;  $df = 435$ ;  $P = .000$ ), which exceeded the acceptable values reported in previous studies (Heale & Twycross, 2015; Williams et al., 2010). The knowledge, attitudes, and willingness (KAP) scales produced a Cronbach's Alpha coefficient of  $\alpha = .76$ , which was higher than the acceptable score of 0.70 in literature (Taber, 2018; Tomas et al., 2022). The questionnaire consisted of ten (10) knowledge-based items (yes/no questions), thirteen (13) attitude-based items on a 5-point Likert scale, and ten (10) willingness-based items (yes/no questions). The scores ranged from 10 to 65 points, with higher scores indicating sufficient knowledge and willingness to be vaccinated (80%–100%, or mean score of 1.5–2) and positive attitudes (80%–100%, or mean score of 4–5), and vice versa. The survey was distributed through the university WhatsApp groups via a Google document link to willing participants who were informed about the purpose of the study by the principal investigator. Obtaining informed consent was facilitated by including an agree button on the link. During the data collection period in October 2021, we sent out a maximum of two reminders to participants. The reminders were intended to encourage participation and ensure that we collected comprehensive data within the 3-week timeframe.

### *Institutional Review Board Approval and Informed Consent*

The School of Nursing and Public Health Ethical Committee for the University of Namibia (SoN 81/2022) approved the study, to which all participants provided written informed consent after the principal researcher thoroughly explained the study's purpose. To demonstrate participant's willingness

to participate, they were required to click on an “agree button” on a Google form before proceeding to research questions. The participants were able to conveniently complete the questionnaires through an online platform from the comfort of their own homes. In order to maintain a high level of privacy and confidentiality, no personally identifiable information was requested during the data collection process. Participants were advised that they could discontinue their participation at any time, in compliance with the Declaration of Helsinki.

### Data Analysis

The data was analyzed using SPSS version 28. Descriptive statistics were utilized to depict the trends of the data and were conveyed as percentages, mean scores, and standard deviations (SD). A Pearson’s correlation was performed to evaluate the relationship between the study variables while controlling the effects of other variables at 0.05 level of significance.

## Results

### Sample Characteristics

The distribution of gender among the respondents was equal, comprising 103 females (50.7%) and 100 males (49.3%) – an encouraging gender response rate. Nursing students had the highest level of participation (43.8%), followed by faculty of education (42.4%) and faculty of commerce (13.8%). In terms of year of study, second years had the most participants (28.1%), followed by fourth years (27.1%), third years (22.7%) and first years (22.2%). Results showed that most students had not been tested for COVID-19: 96 participants (47.3%) had never been tested, 54 (26.6%) tested positive, and 53 (26.1%) tested negative. The majority of participants did not have any chronic diseases (82.3%), while 34 (16.7%) reported having chronic illnesses. With regards to COVID-19 testing among participants’ family and friends, most had tested positive (52.7%), 61 tested negative (30%), and 35 (17.2%) had not been tested at all. Additionally, the majority of participants had not received any education about vaccines (108) (Table 1).

### Research Questions Results

**Level of Knowledge, Attitude and Willingness.** Table 2 shows that 54.2% ( $1.54 \pm 0.49$ ) of the respondents had adequate knowledge about the vaccine, while 57.1% ( $1.57 \pm 0.49$ ) and 58.6% ( $1.59 \pm 0.49$ ) had a negative attitude and were not willing to take the vaccine.

Table 3 shows the partial correlations between the study variables. Our correlation analysis results indicate a positive significant correlation between attitudes and willingness ( $r = .546, P = < .001$ ). However, attitudes and willingness to be vaccinated were negatively correlated to taking COVID-19 vaccines ( $r = -.017, P = < .001$ ). Simply put, respondents

**Table 1.** Demographic Characteristics.

Variables	Frequency n (%)
Gender	
Female	(103) 50.7%
Male	(100) 49.3%
Program	
Nursing	(89) 43.8%
Education	(86) 42.4%
Commerce	(28) 13.8%
Year of study	
First year	(45) 22.2%
Second year	(57) 28.1%
Third year	(46) 22.7%
Fourth year	(55) 27.1%
COVID-19 vaccination status	
Never tested	(96) 47.3%
Tested negative	(53) 26.1%
Tested positive	(54) 26.6%
Chronic disease	
No	(167) 82.3%
Yes	(34) 16.7%
COVID-19 test for family/friends	
Never tested	(35) 17.2%
Tested negative	(61) 30.0%
Tested positive	(107) 52.7%
Education on vaccine	
No	(108) 53.2%
Yes	(95) 46.8%
Main source of information	
Ministry of Health and Social Services	(68) 33.5%
Social media	(111) 54.7%
WHO	(24) 11.8%

with a positive attitude toward COVID-19 vaccination were in actual fact would be willing to receive COVID-19 vaccines. Despite a positive correlation between knowledge and willingness to take COVID-19 vaccines no statistical significance was found between the two variables ( $r = .109, P = > .05$ ). A negative correlation existed between students’ knowledge and attitudes toward COVID-19 vaccines.

## Discussion

This research seeks to investigate the level of knowledge, attitudes, and willingness of undergraduate students in Namibia to receive COVID-19 vaccines in the school of education, nursing, and economics and management science at the selected university campus in Namibia. The success of a vaccine depends significantly on the understanding and perception of those receiving it.

### Knowledge Toward COVID-19 Vaccines

The study assessed knowledge, attitudes and willingness of university students toward receiving COVID-19 vaccines.

**Table 2.** Respondent's Knowledge, Attitudes and Willingness Toward COVID-19 Vaccination.

	Minimum	Maximum	Frequencies n (%)	Average mean scores (SD)
Student's knowledge on COVID-19 vaccines				
Good knowledge	1	2	110 (54.2)	1.54 (0.49)
Poor knowledge	1	2	93 (45.8)	
Student's attitudes toward COVID-19 vaccines				
Positive	1	2	87 (42.9)	1.57 (0.49)
Negative	1	2	116 (57.1)	
Student's willingness toward COVID-19 vaccines				
Willing	1	2	84 (41.4)	1.59 (0.49)
Not willing	1	2	119 (58.6)	

The survey revealed that 54.2% of the respondents had an adequate knowledge base regarding the vaccine. Our results suggested the majority of the respondents had a fundamental comprehension of the vaccine and its advantages; however, a comparatively low percentage necessitates more education to ensure everyone has a suitable understanding. However, other similar studies have recorded higher knowledge scores than ours (Hossain et al., 2021; Mohamed et al., 2021; Pogue et al., 2020), while others have recorded lower scores (Jairoun et al., 2022; Lataifeh et al., 2022). To explain this, factors such as vaccination intension, and disease severity significantly influence an individual's knowledge of COVID-19 (Zheng et al., 2022). Research found that, despite the widespread knowledge regarding the negative effects of COVID-19, there are several factors that affect the ability of individuals to receive the vaccine. One of the key factors include misinformation (Bai et al., 2021; Berdida et al., 2023). Research suggests that in order to maximize knowledge levels, it is important to provide accurate and up-to-date information about the vaccine and to ensure people have access to reliable sources of information, such as healthcare professionals and trusted websites (Mathieu et al., 2021; Shaw et al., 2021). Although half of the participants in the study demonstrated a satisfactory comprehension of the vaccine, there was no substantial correlation found between their knowledge and their willingness to receive the vaccination. The results point to a need for further efforts to enhance students' knowledge related to the COVID-19 vaccine. This could be achieved through public health campaigns, education materials, and other forms of media.

### Attitudes Toward COVID-19 Vaccines

Attitudes play a pivotal role in influencing an individual's decision to receive a COVID-19 test or vaccine. In our study, the majority of students had negative sentiments toward the vaccine, implying the presence of skepticism and fear, which can be credited to misinformation and an inadequate comprehension of the matter. Conversely, other studies found that students had a positive attitude toward

the vaccine (Bai et al., 2021; Guidry et al., 2021; Jiang, Gu, et al., 2021; Jiang, Wei, et al., 2021; Yılmaz & Sahin, 2021). Similarly, an individual's intention of getting vaccinated is linked with positive attitudes (Sherman et al., 2021). Nevertheless, our research concluded that attitudes were negative correlated to knowledge on COVID-19. It is evident that there are various factors that can lead to negative perceptions of the vaccines. One of these factors is the use of credible individuals, such as academicians and public health officials, by television networks to influence knowledge and behavior toward vaccination. The success of vaccination campaigns will heavily rely on the effectiveness and safety of vaccines, the reliability and competence of the institutions responsible for their distribution, as well as the guiding principles underlying government decisions and actions (Berdida et al., 2022). Other factors influencing the individual attitudes include fear of contracting COVID-19, trust in the accuracy of government measures, flu vaccination during the previous season, previous recommendations regarding vaccination, and symptoms of depression experienced within the past week (Hajure et al., 2021).

According to recent research conducted by Qiao et al. (2022) and Adane et al. (2022), it has been observed that individuals who do not perceive the virus as a significant threat and display indifference toward testing and vaccination tend to avoid engaging in these preventive measures. This implies that students have a reduced tendency to take the essential measures to safeguard themselves and those around them. The discrepancies between our study results and other studies (Bai et al., 2021; Guidry et al., 2021; Jiang, Gu, et al., 2021; Jiang, Wei, et al., 2021; Yılmaz & Sahin, 2021) may be attributed to differences in study settings, disease severity (Bai et al., 2021), and religious or cultural considerations (Ashipala et al., 2023). The majority of these research projects were launched from 2020 until the early months of 2021 when the cases of COVID-19 were at their highest. In contrast, our study was conducted in late October 2021. To tackle this problem, it is essential to center on confronting the root causes of this pessimistic outlook. This can be achieved through public health initiatives that are intended

**Table 3.** Relationship Between Knowledge, Attitude and Willingness to Take COVID-19.

Control variables			Knowledge	Attitudes	Willingness
Age & Gender & Program of study & Year of study & Chronic disease & COVID-19 for family/friends & Education on vaccines	Knowledge	Correlation	1.000	-.017	.109
		Significance (2-tailed)	.	.820	.132
		df	0	190	190
	Attitudes	Correlation	-.017	1.000	.546
		Significance (2-tailed)	.820	.	<.001
		df	190	0	190
	Willingness	Correlation	.109	.546	1.000
		Significance (2-tailed)	.132	<.001	.
		df	190	190	0

to dispel misconceptions and provide precise data about the vaccine.

A negative correlation was observed between attitudes and knowledge concerning COVID-19 vaccines. This finding may explain why almost 50% of the participants in our study did not undergo COVID-19 testing, which deviates from the results of other studies. Several factors contribute to an individual's attitude toward COVID-19 vaccination, such as their profession, apprehension about vaccine safety, familiarity with comorbid chronic illnesses, and low vaccine acceptance rates (Hajure et al., 2021; Qiao et al., 2022).

### Willingness Toward COVID-19 Vaccines

The 203 students in this study showed that more than half were willing to be vaccinated for COVID-19. This is noticeably lower than the level of willingness observed in similar studies conducted in Ethiopia and Japan (Adane et al., 2022; Kelly et al., 2021; Yoda & Katsuyama, 2021), with figures ranging from 64% to 75%. Our study indicated a moderate positive correlation between attitudes and willingness to receive COVID-19 vaccination; with a partial correlation coefficient of 0.546 ( $P < .001$ ). This correlation is consistent with Guidry et al. (2021) who found that willingness to be vaccinated was significantly linked to the attitudes toward COVID-19 vaccines. The level of willingness to take the COVID-19 vaccine varies significantly across different demographics. Other studies associated political interest or involvement (Cooper et al., 2021; Islam et al., 2021), and disease severity (Zheng et al., 2022) with willingness to be vaccinated, which implies the effect politics may have on people's acceptance of the COVID-19 vaccine. Other possible factors influencing individual willingness to be vaccinated include age, gender, study program, educational level, and vaccination status, which is in contrast to previous research (Ashipala et al., 2023; Kelly et al., 2021; Zheng et al., 2022). According to Berdida et al. (2022), various measures have been implemented to boost vaccination rates, including cash incentives, complimentary meals, and gift vouchers. In addition, there have been reports of prohibiting unvaccinated individuals from accessing public spaces like

shops and restaurants as a means of increasing vaccination rates. Other factors influencing individual willingness for vaccination include the believe that vaccine would serve as a mode of introducing the 666 mark of the anti-Christ or the concern over the mark of the beast a result of God's anger (Olatunji et al., 2020; Wonodi et al., 2022). To this end, further exploration in Namibia could probe the effect of politics, religion and incentives on willingness to be vaccinated.

### Strengths and Limitations

This study has provided important insights into knowledge, attitudes, and willingness to receive the COVID-19 vaccine. However, it is limited by the cross-sectional survey design, which does not permit robust conclusions about the relationships between variables. The outcomes of this research are subject to certain constraints, primarily the convenient sampling method and the small sample size, which prevent them from being applied to a broader population.

### Implications for Nursing Practise

This study is pioneering in its examination of Namibian students' knowledge, attitudes and willingness regarding COVID-19 vaccination, offering crucial implications for health policy makers and planners in their efforts to increase vaccination rate and to bring an end to the pandemic. The findings demonstrate a need for increased instruction and understanding concerning the safety and effectiveness of the COVID-19 vaccine among undergraduate students in Namibia. Furthermore, there is a need for additional knowledge regarding the availability of the vaccine in Namibia to enable students to make a well-informed decision regarding whether or not to receive it.

### Conclusions

The results of this survey indicate that half of the undergraduate students at the university campus in Namibia had

sufficient knowledge of the vaccine, while the other half had a negative outlook and were unwilling to receive it. Despite this, a portion of the students still lacked knowledge about the vaccine, prompting a need for further education. These findings add to existing literature, suggesting that interventions are necessary to increase students' knowledge and reduce negative attitudes toward the vaccine. It is suggested that to increase the uptake of the vaccine and reduce negative attitudes, interventions must be implemented to increase student knowledge and provide access to reliable sources of information. When devising plans concerning the COVID-19 vaccine, policymakers should consider multiple factors. It is crucial to conduct additional research that centers on how incentives, religion and cultural values influence people's willingness to receive the vaccine.

### Authors' Contributions

Study conception and design: S.N. & T.M. Data collection: S.N. Supervision: T.M. Formal analysis and data interpretation: T.M. & N.T. Writing original draft: N.T. Writing review and editing: N.T. & T.M. All authors have read and approved the manuscript.


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### ORCID iD

Nestor Tomas  <https://orcid.org/0000-0002-4769-2724>

### Supplemental Material

Supplemental material for this article is available online.

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