



**Factors associated with Covid-19 vaccine hesitancy amongst students at a university in  
the Western Cape, Cape Town, South Africa.**

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UWC, South Africa.

## ABSTRACT

**Background:** Vaccine hesitancy is deemed to be a major challenge in the fight against the Covid-19 pandemic. The challenge of vaccine hesitancy poses a greater threat to global health as the world is currently faced with Covid-19 which has claimed approximately 4,627,540 and 84 877 lives globally and in South Africa respectively. Moreover, vaccine hesitancy threatens the success of the vaccine roll-out efforts and may lead to the inability of communities to reach the necessary coverage required for herd immunity against Covid-19.

The aim of this study is to determine factors associated with Covid-19 vaccine hesitancy amongst Community and Health Sciences (CHS) students at the University of the Western Cape (UWC).

**Methods:** A quantitative observational descriptive cross-sectional web-based survey study was conducted. Random proportionate to size sampling was used to select students from 11 departments. Ethics approval to conduct this study was sought from the University of the Western Cape Biomedical Research Ethics Committee (BMREC). Anonymity and confidentiality were assured by not using participants' names. A consent form was given to participants and only consenting participants were enrolled into the study.

**Results:** Overall, most of the participants perceived themselves to be at a lower risk of being infected with Covid-19 virus. Only 10.6% (n=17) of the participants reported to be at more than 80.0% risk of being infected with Covid-19. A sizable proportion of the participants 69.4% (n=111) reported to have received all the required Covid-19 vaccine doses while 15.0% (n=24) reported to have been partially vaccinated. Four percent (n=7) of the participants reported to be not vaccinated and 11.3% (n=18) reported that they will never get vaccinated.

**Conclusion:** Majority of the students were not hesitant of the Covid-19 vaccine and most of them had a positive attitude towards immunization. However, a significant proportion of the

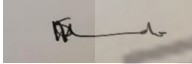
students were hesitant towards the Covid-19 vaccine booster. Factors that were identified to be associated with vaccine hesitancy from this study were perceived risk, previous infection with Covid-19, concerns with the time it took to develop the vaccine and concerns with the unknown side effects of the Covid-19 vaccine.



## DECLARATION

I declare that ‘**Factors associated with Covid-19 vaccine hesitancy amongst students at a university in the Western Cape, Cape Town, South Africa**’ is my own work. This work has not been submitted for any degree or examination in any other university and that all the sources and references I have used or quoted have been indicated and acknowledged by complete references.

Full name: Phindile Simphiwe Gift Khumalo      Date: 16 March 2023

Signed: 



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## LIST OF ABBREVIATION

Covid-19	Coronavirus Disease 2019
EPI	Expanded Program on Immunization
CI	Confidence Interval
DTP	Diphtheria, Tetanus toxoid and pertussis
MMR	Measles, Mumps and Rubella
OR	Odds Ratio
PCV	Pneumococcal Conjugate Vaccine
WHO	World Health Organization
SPSS	Statistical Package for the Social Sciences
CHS	Community and Health Sciences
UWC	University of the Western Cape





## CHAPTER 1: INTRODUCTION

### 1.1 Background

Vaccination is an effective, safe and simple way of protecting individuals against dangerous diseases, it builds resistance by using the body's natural defence against infections and makes the immune system stronger (WHO, 2020). Vaccines contain weakened or dead germs and they do not put individuals at risk of having complications of the disease nor cause the disease (WHO, 2021). However, they train the body's immune system to build antibodies (WHO, 2020).

Vaccines have cumulative effects on the entire population's well-being as the global immunization efforts achieved elimination of measles, polio and rubella as well as eradicating smallpox (Schuchat, 2011). Vaccines are given routinely across the lifespan owing to their rewarding impact, for instance, the expanded programme on immunization (EPI) which includes but not limited to DTP, MMR, polio, hepatitis B, Hib and varicella vaccines has prevented approximately 14 million infections, avoided 33,000 premature deaths and saved billions in medical costs (Lombard et al., 2007). Furthermore, the collective effect of vaccines has yielded an extended life expectancy, vanishing of disruptive epidemics in communities and protection against numerous acute infectious diseases with their long-term complications (Lombard et al., 2007).

Moreover, new vaccines like pneumococcal conjugate (PCV), hepatitis A and rotavirus have significantly reduced infections and hospitalisation amongst target populations, these benefits have been coupled with less transmission of infection from the immunized population to other groups (Schuchat, 2011).

History reveals that before vaccines were developed only a few people survived childhood without suffering from diseases like mumps, measles, rubella, whooping cough, chickenpox and rotavirus diarrhoea (Lombard et al., 2007). It is evident that vaccines have played a significant role in saving lives, however, to date there are various challenges that threaten the achieved immunization progress. These challenges include concerns with vaccine safety and hesitancy which is defined as “delay in acceptance or refusal of vaccination despite the availability of vaccination services”(Barello et al., 2020). Furthermore, public complacency regarding protection provided by vaccines has been associated with the recent outbreaks that could have been prevented by vaccines like measles (Schuchat, 2011).

It is regrettable that the challenges mentioned above still remain as there is mounting evidence of vaccine hesitancy during this current Covid-19 pandemic. Vaccine hesitancy is demonstrated by the unwillingness to be vaccinated when the vaccine is accessible and available to the population (Burger et al., 2021; Coustasse et al., 2021). This is a complex phenomenon, and it represents a multifaceted web of influence (Raw et al., 2020; Robertson et al., 2021). Moreover, vaccine hesitancy is said to be generally misinformed, pervasive and contagious in nature as it results in deaths and untold suffering (Edwards et al., 2021).

Vaccine hesitancy presents an obstacle to the campaign to control Covid-19. It has previously been found to be associated with youth, female gender, low income, low education, low medical trust, minority ethnic group membership, low perceived risk from Covid-19, use of certain social media platforms and conspiracy beliefs. However, it is unclear which of these predictors might explain variation associated with others (Burger et al., 2021).

Therefore, this study seeks to find the contributing factors towards the Covid-19 vaccine hesitancy amongst the youth, specifically university students.

## 1.2 Problem statement

Vaccine hesitancy is deemed to be a major challenge in the fight against the Covid-19 pandemic (Edwards et al., 2021). The challenge of vaccine hesitancy poses a greater threat to global health as the world is currently faced with Covid-19 which has claimed 4,627,540 and 84 877 lives globally and in South Africa respectively (WHO, 2021). Moreover, vaccine hesitancy threatens the success of the vaccine roll-out efforts and may lead to the inability of communities to reach the necessary coverage required for herd immunity against Covid-19 (Lenzer, 2020).

It is reported that the South African department of health had targeted to vaccinate 70% of its population by the end of December 2021 (Burger et al., 2021). As of August 2021, there were approximately over 20.93% people who had received either the Johnson and Johnson or at least the first dose of the Pfizer vaccine. However, many people are still hesitant to take the vaccine which may jeopardize the department of health's efforts (Burger et al., 2021).

On the other hand, the fight against Covid-19 has focused mostly on older adults as they are said to be at high risk for severe outcomes of Covid-19, which results in the youth being neglected as it was alleged that most youth posed no risk for severe Covid-19 complications and dying from it (DeLong et al., 2020). Nevertheless, some youth became sick from Covid-19 and died from it (DeLong et al., 2020).

There has not been as much emphasis on getting the youth to vaccinate as it was with the old population, the lack of effort still reveals some form of neglect. Late in 2021, the department of higher education and training proposed the Covid-19 vaccine mandate to be adopted by the South African Universities (van de Merwe, 2021). This call was said to close the gap and serve as an emphasis to get the youth to vaccinate as universities are mostly occupied by the youth. However, this marginalised those that are not in universities and part of the working class.

The neglect of the youth and the narrative that they pose no risk has contributed to seeing no need to vaccinate. This challenge is exacerbated by “infodemic” which is described as information overload as communities have been inundated with misinformation to a point where they cannot tell what is right from wrong (Hernandez et al., 2021).

Vaccine hesitancy may be driven by health information obtained from a variety of sources, including new media such as social media platforms and the Internet (Puri et al., 2020). At most it is the youth that use and have access to multiple social media platforms which enables them to quickly receive, create or share content universally without editorial oversight (Basch et al., 2021). Such an exposure results in ideological isolation (Puri et al., 2020).

In order to address or eradicate the issue of Covid-19 vaccine hesitancy amongst the youth, it is imperative to know the factors associated with Covid-19 vaccine hesitancy so that these issues can be addressed accordingly to improve vaccine uptake.

### **1.3 Research question**

What are the factors that are associated with Covid-19 vaccine hesitancy among students at the Western Cape University in Cape Town, South Africa?

### **1.4 Purpose of the study**

The purpose of this quantitative study is to advance understanding of the factors associated with Covid-19 vaccine hesitancy amongst the youth at the University of the Western Cape in Cape Town, South Africa. The study will benefit the South African department of Health in South Africa by contributing towards development of effective strategies to improve vaccine uptake and reduce transmission of Covid-19.

## **CHAPTER 2: LITERATURE REVIEW**

### **2.1 Introduction**

The Covid-19 virus was declared a public health emergency by WHO on the 30<sup>th</sup> of January 2020 (WHO, 2020). South Africa had its first confirmed case on the 5<sup>th</sup> of March 2020, ever since then, there has been a continuous rise in the number of infections (WHO, 2020). The rise in infections has brought multifaceted issues with it, which include but not limited to premature loss of lives and jobs (Dror et al., 2020). This has been coupled with issues of equitable access to healthcare services and the lack of confidence in the Covid-19 vaccine (Coustasse et al., 2021). Moreover, the rise of the Covid-19 infections has brought mandatory vaccination in different spaces that include but not limited to workplaces and academic institutions.

### **2.2 South African universities' response to the Covid-19 pandemic**

On 15 March 2020, South African President Cyril Ramaphosa declared a national state of disaster, along with measures such as instantaneous travel restrictions and school closures from 18 March (Republic of South Africa 2020). This was coupled with the establishment of the National Coronavirus Command Council on 17 March 'to guide the nation's plan to hinder the spread and alleviate the negative impact of the coronavirus (South African Government 2020). Furthermore, a national lockdown was announced on 23 March 2020 to commence on 26 March 2020 (South African Government 2020). Five alert levels were introduced to direct the extent of the restrictions imposed through lockdown; expectation was made to gradually ease the restrictions following the peak of the epidemic (van Schalkwyk, 2020).

On the other hand, South African universities' response to the covid-19 pandemic have been varied with the responsibilities of the national department, affording universities freedom to

regulate their own strategies subject to the submission of covid-19 strategic response plans to the Department (van Schalkwyk, 2020).

Amongst the 26 South African public universities some universities selected to append all academic activities during the week of 16 March after the declaration of the national state of disaster, even though other universities did so later (May 2020). Moreover, all South African campuses were shut to both staff and students when the national lockdown came into effect (van Schalkwyk, 2020).

Under Alert Level 4 only final year students in courses requiring clinical practical training were allowed to return to campuses, beginning with medicine (MBChB) followed by the phasing-in of other permitted courses within the faculty of Health Sciences (South African Government 2020). At Alert Level 3 announced on 1 June 2020 Universities were permitted to reopen, only 33% of students were permitted to return, and this included final year students and students with courses requiring practical training (Makhoali, 2022). This was subject to universities submitting and being granted approval of phase-in plans to the Department of Higher Education and Training (DHET), the phase-in plan had to include a range of protocols which included screening, wearing of face masks and sanitisation. Additionally, universities were required to create Covid-19 Response Task Teams (Makhoaloi, 2022). Furthermore, guidance was sought from the national agency of promoting South African student's and Higher Health (van der Merwe, 2022).

### **2.3 Mandatory vaccination policy**

On December 9, 2021, a bill to impose mandatory Covid-19 vaccination requirement by all Austrian citizens was laid before the parliament by the Austrian Government (Edwards et al., 2021). This move was followed by the Greek Prime Minister's declaration to enforce fines on

residents aged 60 years and older who do not take up the Covid-19 vaccination (Van Aardt, 2021). On the other hand, many other countries began considering similar mandates or had implemented Covid-19 mandates in certain workplace settings, for instance countries such as Australia, Brazil, Canada, France, Indonesia, Italy, and the United Kingdom (Gur-Arie et al., 2021; Lenzer, 2020).

Unfortunately, most countries are still faced with the difficulty of reaching the vaccination rates usually obtained for diseases such as polio and measles, which are regularly above 95%. In France, the French authorities implemented a health pass instructing all citizens aged 12 years and above to present a negative test for SARS-CoV-2 or vaccination proof to access a wide array of public spaces, including restaurants, and libraries (Kates et al., 2022). The introduction of the health pass markedly increased the number of vaccinated people against Covid-19, the eligible vaccinated population increased from 49% to 89% (Kates et al., 2022). Moreover, in 2021 countries like Chile, Germany, Israel, Mexico, Norway, Serbia and Spain successfully put pre-pandemic regulations that mandated legal authorities to impose vaccination mandates against Covid-19 (Kelly et al., 2021).

Subsequently, numerous universities and colleges in the United States (US) have declared plans to mandate vaccinations for students, and other mandates include staff and faculties (Lenzer, 2020). Moreover, the vaccine mandate posed by the higher education institutions have not yet faced successful legal challenges, and it is possible the courts would be in favour of the mandatory SARS-CoV-2 vaccines (Gostin et al., 2021).

Gostin and colleagues further mentioned that international students may not have access to vaccines authorized by the FDA, so it will be key to determine which products to include in the mandate. Furthermore, WHO gave a list of vaccines for emergency use, this included Sinopharm, Sinovac, and Oxford University/AstraZeneca which are authorized by the FDA

(Gostin et al., 2021). Therefore, the United States educational institutions could potentially accept all the WHO emergency listed vaccines (Gur-Arie et al., 2021). However, the universities will have to determine safety protocols for those with religious and medical exemptions, this can include learning remotely, symptom testing and use of masks (Gostin et al., 2021).

In Africa there have not been many studies exploring mandatory Covid-19 vaccination as Africa is challenged with the supply, equitable access, and distribution of the Covid-19 vaccines. However, certain industries and institutions in South Africa have implemented mandatory vaccination mandates. These include the department of health and basic education which successfully managed to vaccinate most of its staff (van der Merwe, 2021).

Moreover, the department of higher education and training has posed Covid-19 vaccination mandate to be implemented by institutions of higher education and training. This mandate requires that all students and staff be fully vaccinated to gain access to facilities and campuses (Makhoali, 2022).

As of 01 December 2021, the universities of Cape Town, Free State, Western Cape, Witwatersrand and Stellenbosch agreed to enforce the Covid-19 mandate in academic year 2022 (van der Merwe, 2021). Whereas numerous other universities indicated that they were either drafting the Covid-19 mandatory vaccination policies or still consulting on the issue (van der Merwe, 2021).

The UWC mandate includes a soft and hard mandates, where the soft mandate requires students and staff to be fully vaccinated to attend university events and have access to campuses, this further state that unvaccinated students can register for their degrees, but they cannot be permitted to access campus and student residences (UWC, 2022).



The alluded soft mandate applies to students and staff under the faculty of Health Sciences. Under the hard mandate, students are prohibited to register for degrees incorporating hospital and medical facilities unless a vaccination certificate is provided or exemption has been granted (UWC, 2022). Additionally, partially vaccinated students will be allowed to register given they provide proof of first vaccination and provide their vaccination certification no later than 1 March 2022, failing which may result in the students being deregistered (UWC, 2022). While unvaccinated students are expected to produce weekly negative Covid-19 tests at their cost (van der Merwe, 2021).

The vaccination mandate which has been adopted by most of South African universities has received criticism from several structures such as the universities Alliance South Africa and Union Solidarity (van der Merwe, 2021). There has been evident resistance against the mandate which has been exercised by these structures by preparing lawsuits against numerous public universities which include the University of Free State over their Covid-19 vaccination policy (van der Merwe, 2021).

The alliance and two South Africa's two largest political opposition parties, the Democratic Alliance, and Economic Freedom Fighters indicated that the mandate is irrational, unlawful, medically unjustified and violates individual's right to bodily autonomy (van der Merwe, 2021). This has been supported by some scholars who have mentioned that though mandatory vaccination has a potential to yield positive results, it violates human rights, and it is unethical (van der Merwe, 2022).

Regardless of the critics, there are those who believe that mandatory vaccination is not an immediate response to Covid-19 as more than 100 countries already have an existing version of mandatory vaccination of school children for a variety of diseases, which include but not limited to measles, mumps, rubella, polio, and tetanus (Mtolo et al., 2021).

Scholars have concluded that in principle, there is compatibility between mandatory vaccination and human rights law and that there is a compelling right-based case for a government to consider implementing mandatory vaccination (Gur-Arie et al., 2021).

#### **2.4 Factors associated with Covid-19 vaccine hesitancy and the related impact.**

Scholars have reported that the lack of confidence in the Covid-19 vaccines is one of the causes that leads to hesitancy, and this has taken a toll on the immunisation programmes in the world at large (Coustasse et al., 2021). Globally vaccine hesitancy has been reported to be a huge contributor towards stagnating and reducing immunisation rates, this subsequently surges diseases that can be prevented through vaccines like measles (Raw et al., 2020).

On the other hand, global surveys conducted across 149 countries between 2015 to 2019 alluded to the fact that there is mounting evidence of vaccine hesitancy due to lack of safety, trust in the importance and effectiveness of vaccines (de Figueiredo et al., 2020). Such results pose a great threat to global health as the world is faced with COVID-19 pandemic, it is estimated that the effects of vaccine hesitancy will be more noticeable during the Covid-19 pandemic compared to the past pandemics (Kelly et al., 2021).

#### **2.5 The role of social media to vaccine hesitancy**

Numerous mechanisms contribute to the spread of vaccine hesitancy, amongst which online forums play a significant role in influencing people's opinion (Jarrett et al., 2015). Researchers have observed that social media and internet users are directly influenced from a web experience that is algorithmically directed to address user's interests and psychological vulnerabilities (Baumgaertner et al., 2020). Moreover, online influencers and trusted offline sources still play a vital role in forming user's opinions (Baumgaertner et al., 2020).

Online magnification of vaccine hesitancy is still continuous in light of the Covid-19 vaccine roll-out (Puri et al., 2020). Studies reviewed by Puri and colleagues expressed how the content on anti-vaccine frequently produces larger user engagement compared to its pro-vaccine equals on Facebook. Furthermore, it was found that poor quality sources of misinformation on Covid-19 were commonly retweeted compared to those with high quality information (Sharma et al., 2021). This phenomenon has been expressed in a comparative analysis of the spread of misinformation on five social media platforms namely; Gab, Instagram, Twitter, YouTube and Reddit which revealed that over a period of 45 days these platforms receive more than 8 million comments and posts which demonstrates that social media platforms can serve as amplifiers of misinformation (Barrios & Hochberg, 2021). Regrettably, as little as limited exposure to anti-vaccine internet sites increases people's perceptions of vaccine risks (Buguzi, 2021).

This shows that social media is a primary communication channel through which misinformation and disinformation about Covid-19 rapidly spreads. Although strident efforts have been made by social media channels, misinformation related to Covid-19 continues to persist online (Buguzi, 2021). It has been reported that repeated exposure to the memes posted on social media may present false information which may be intended to shed some sense of humour which in turn reinforce false information (Puri et al., 2020).

Recent data suggests that people aged 18 to 29 years old usually hold a positive attitude towards Covid-19 vaccination compared to older adults. However, it appears that young adults are vulnerable to misinformation about Covid-19 vaccine that is spread on social media as they rely on social media for health information and as they possess low levels of health literacy (Barello et al., 2020). Moreover, this limits the ability to critically evaluate the social media content hence the youth have been reported to be gullible to conspiracy theories, about Covid-19 as well as the seriousness of the disease found on the internet and social media (Laurencin, 2021).

The above is exacerbated by the fact that a huge number of posts posted on TikTok had discouraging content about Covid-19 vaccine, the content displayed adverse events that appeared prior to the distribution of the vaccines to the public (Jarrett et al., 2015). This reflects a deliberate threat to communicate anti-vaccination opinions (Basch et al., 2021). This is coupled with the negative impact on preventative behaviour as the displayed videos are conveying sentiments of anti-vaccinations (Khan et al., 2021). It is regrettable that the dominant set of communication networks that can be used to reach vaccine hesitant populations and the youth with up-to-date scientific data is used to discourage millions of young people from being vaccinated (Basch et al., 2021).

## **2.6 Covid-19 Misinformation and disinformation**

Misinformation about Covid-19 has been greatly seen amongst the black communities, where there has been conviction that the Covid-19 vaccine has been deliberately withheld and that the origin of SARS-CoV2 is human made (Rutten et al., 2021). While misinformation and inequality driven mistrust may lead to shared deceptive beliefs, understanding the different sources of these beliefs is imperative to sending effective public health messaging (Uscinski et al., 2020).

The inequality driven mistrust and misinformation surrounding Covid-19 may discourage or stop people from seeking Covid-19- related medical care or observing the evidence- based Covid-19 prevention guidelines, such as wearing masks and physical distancing (Sharma et al., 2021). In addition, there has been a disparity in Covid-19 infection, mortality and morbidity amongst the Natives, Black and Latino, this needs to be critically considered as the disparity is pinned to violation of physical distancing, and seem to be less likely to agree to take Covid-19 testing (Jaiswal et al., 2020). Therefore, there is an urgent need to have effective public health messaging to address these disparities (Dror et al., 2020; Sallam et al., 2021).

Disinformation has been identified as a strategy to deliberately spread incorrect information, while misinformation is identified as incorrect information with no intent to mislead (Puri et al., 2020). So, disinformation and misinformation are complex phenomena, with heterogeneous underlying stirring factors (Puri et al., 2020). The latter suggests that understanding the origins of disinformation, medical mistrust and misinformation must be an imperative component of the public health response to Covid-19 (Basch et al., 2021; Jaiswal et al., 2020).

## **2.7 Covid-19 conspiracy theories**

Conspiracy beliefs are characterized as “attempts to explain the ultimate cause of an event as a secret plot by a covert alliance of powerful individuals or organizations, rather than as an overt activity or natural occurrence” (Jennings et al., 2021). Several studies have shown that conspiracy theories often lead to mistrust, misinformation and disinformation, this is often perpetuated by health experts being part of the conspiracies which makes it difficult to credibly present evidence to contest such ideas (Jaiswal et al., 2020).

A study conducted in March 2020 revealed that 29% of Americans were of the mind that Covid-19 was intentionally developed in a lab (Sharma et al., 2021; Uscinski et al., 2020). Another study showed that almost 75% of the American public was aware of the conspiracy theories surrounding the coronavirus while 25% of the respondents thought the theories were at least partially true (Basch et al., 2021).

During the HIV pandemic medical mistrust was well documented amongst the black community and other communities placed at risk of such disparity. For instance, the black community suffered tremendous HIV-related outcomes for embracing HIV-related conspiracy theories (Lockyer et al., 2021; Sharma et al., 2021). The manifestation of mistrust related to HIV was linked to the belief that the United States federal government was part of creating and distributing HIV as a form of genocide against the black community, this was coupled with

belief that anti-retroviral therapy was unsafe and that the cure is available but is withheld secretly by pharmaceutical companies and the government (Puri et al., 2020; Sharma et al., 2021).

To date, none has changed since the HIV pandemic, the Covid-19 pandemic shares similar beliefs that include but not limited to that Covid-19 is human made, the cure is withheld on purpose by pharmaceutical companies, Covid-19 is disseminated as a form of genocide against black people and that Covid-19 vaccine is harmful (Allington et al., 2021; Rutjens et al., 2021). Additionally, medical mistrust continues to arise from the black communities as it was during the HIV pandemic (Jaiswal et al., 2020).

A classic example of a pandemic denialism was seen in South Africa during President Thabo Mbeki's tenure where AIDS denialism was institutionalized at the government's highest level (Basch et al., 2021; Jaiswal et al., 2020). South Africa suffered tremendous deaths that could have been prevented, however, lives were lost due to government's disinformation, delay to recognise HIV as an aetiology of AIDS and roll-out of the life-saving antiretroviral therapy (Basch et al., 2021). It is worth noting that the Covid-19 pandemic received a prompt response which led President Cyril Ramaphosa to declare a state of disaster in accordance with the disaster management act (WHO, 2020). This was accompanied by the risk-adjusted level strategy where a countrywide lockdown was imposed to curb the spread of Covid-19 (WHO, 2020).

Regardless of the immediate response by South Africa, the spread of rumours and unfounded theories continues to be a precipitator of vaccine hesitancy. This falsehood has seen people declining immunization due to incorrect claims that vaccines can lead to infertility and that they contain infectious pathogens that can spread HIV (Khan et al., 2021; Khan et al., 2020). Historically, vaccine uptake has been immensely affected by the negative claims made against

vaccines. For instance, it was believed that the polio vaccine caused infertility and those claims led to high numbers of polio cases in Afghanistan, Nigeria and Pakistan. Unfounded theories pose a great challenge to health policies and government and non-governmental interventions (Islam et al., 2021). Moreover, it is regrettable that it is dependent on an individual's level of risk perception and health literacy to believe misinformation spread about vaccinations (Uscinski et al., 2020). On another hand, constant exposure to social media and online anti-vaccine movements exacerbates the sharing and the urge to communicate conspiracy theories and misinformation (Muric et al., 2021; Rutjens et al., 2021).

All the listed theories are worth finding and understanding their origins as it is important to deliver public health messages effectively.

## **2.8 Covid-19 vaccine adverse reactions**

The Covid-19 virus has an unstable genome, causing several and rapid mutations which could mean the reports on the currently used Covid-19 vaccines efficacy might not be constant in every country in the world (Mtolo et al., 2021). This is due to the fact that the Covid-19 vaccine efficacy may vary depending on the country of production and strain. Possibly, there might be a necessity for annual vaccination to boost the immunity against the virus (Mtolo et al., 2021).

Likewise, several Covid-19 vaccine candidates have been shown to be safe and efficacious in clinical trials. It was reported that recipients of the Covid-19 vaccine experienced variable side effects, depending on the used vaccines. The side-effects reported based on the phase III clinical trial data were mild in terms of severity such as pain from the injection site, headache, fatigue, joint and muscle aches, fever and chills which resolves rapidly (Alghamdi et al., 2021; Mtolo et al., 2021).

Contrary, there were serious adverse events reported in the Covid-19 vaccine clinical trials which include paralysis, anaphylaxis and lymphadenopathy. Moreover, several countries in Europe withdrew the use of the AstraZeneca vaccine over its suspected link to blood clots (Alghamdi et al., 2021).

The latter exacerbates the lack of trust in vaccine safety and concerns about Adverse Events Following Immunization (AEFI), this plays an important role in vaccine-hesitancy on two levels which include; specific Covid-19 vaccine hesitancy or general vaccine hesitancy which are both associated with lower uptake of vaccines (Hernandez et al., 2021).

Moreover, two systematic reviews revealed that an individual's perception of safety and AEFI have been strongly associated with vaccine uptake and the seasonal-influenza-vaccine uptake (Alghamdi et al., 2021). This has been the same concern for the Covid-19 vaccine as people do not trust its safety similar to other vaccines in general

and at the Covid-19 vaccine level (Azarpanah et al., 2021; Finney Rutten et al., 2021). The systematic review further showed that most of the respondents indicated that they might accept the Covid-19 vaccine if there was credible information about the Covid-19 vaccine effectiveness and safety (Azarpanah et al., 2021).

The distrust in safety and AEFI of vaccines and inadequate effective communication demands reconstructing the vaccine communication. Harrison and Wu propose that to increase public trust in vaccines requires reshaping medicine's cultural environment to better communicate the benefits and risks of vaccines (Azarpanah et al., 2021).

The lack of confidence in the Covid-19 vaccine jeopardises the importance and effectiveness of vaccines, this further jeopardises the reliability and trustworthiness of the vaccine information sources (Azarpanah et al., 2021).



## 2.9 Medical mistrust and Covid-19 clinical trials

There have been concerns about the roll-out of Covid-19 vaccinations and these concerns include but are not limited to the timeframe it took for mass vaccine production, the clinical trials start and end period. Furthermore, the companies and countries which are involved in the Covid-19 vaccine development process have been questionable, this has been coupled by the claims that the laboratories in China lacked monkeys and there was a clinical trial that was conducted in Indonesia testing the vaccines produced by China. That claim resulted in people questioning the credibility of the vaccine. (Lockyer et al., 2021; Sharma et al., 2021).

Research revealed that there have been rumours which stated that crucial phases of the Covid-19 vaccine clinical trials were not conducted as pharmaceutical companies had no compensation for participants who would experience adverse side effects during the trial (Islam et al., 2021). Additionally, it was mentioned that the Russian Covid-19 vaccine company skipped Phase 3 clinical trials (Dinga et al., 2021; Islam et al., 2021; Jennings et al., 2021).

There was a post on Facebook which warned the public not to partake in clinical trials conducted in India (Islam et al., 2021; Jennings et al., 2021; Lockyer et al., 2021). This was followed by another circulating post on social media platforms which discouraged Bangladesh citizens to participate in the Covid-19 vaccine clinical trial as there was a belief that China wanted to use them as guinea pigs (Islam et al., 2021; Lockyer et al., 2021). The aforementioned claims provoked criticism and a lot of concern from the scientific community that the vaccines were not tested for safety or effectiveness in several humans which has a potential to lead to vaccine hesitancy and global concern (Lockyer et al., 2021).

Also, there were concerns about the participation of high-profile people in the Covid-19 vaccination trial if it was legit or it was done to lure the public into vaccinating (Dror et al., 2020).

## **2.10 Impact of Covid-19 on the youth**

The youth are a source of change and resilience, and they are needed in our societies as they function as a backbone of many social networks - schools, families, communities, and the workplace. Therefore, it is worth noting that some of the youth may acquire and transmit Covid-19 through these networks (Buguzi, 2021; DeLong et al., 2020). Which is why the youth have been targeted as they carry a greater risk of transmitting Covid-19 since they are deemed to be asymptomatic carriers, which puts their communities at risk of contracting the infection (Allington et al., 2021; Gur-Arie et al., 2021).

History has revealed that youth engagement in communities and schools has immensely contributed to the outbreak of influenza. A study conducted in the United States revealed a much lower vaccine uptake amongst the youth (DeLong et al., 2020). Furthermore, recently conducted surveys revealed a high level of vaccine hesitancy amongst black community, people without medical aid and from low socioeconomic (de Figueiredo et al., 2020; Lockyer et al., 2021).

However, these surveys have been addressed to older adults which calls for a greater need to conduct studies which will generate age specific data, as lack of such data can result in limited prevention approaches tailored for the youth (Laurencin, 2021). Understanding factors that contribute to Covid-19 vaccine hesitancy amongst the youth is important for both health system planning and awareness.

Additionally, this is substantial in statistical modelling to predict further progression of the Covid-19 pandemic at different levels (Khan et al., 2021). Studies have analysed the knowledge and attitudes of the general population towards Covid-19. However, there is paucity of literature on factors associated with Covid-19 vaccine hesitancy amongst the youth, particularly in South Africa

## CHAPTER 3: METHODOLOGY

### 3.1 Introduction

This chapter outlines the research methods that were followed during the conduct of this study. It provides information on who the participants were and how they were sampled. Furthermore, the researcher describes the chosen research design and the reason for choosing that design. The data collection instrument, methods used for data analysis and the ethical issues are also outlined in this chapter.

### 3.2 Aim

The aim of this study is to determine factors associated with Covid-19 vaccine hesitancy amongst Community and Health Sciences students at the University of the Western Cape.

### 3.3 Objectives

- 1) To determine the general knowledge, attitudes and vaccine perceptions
- 2) To determine previous immunization behaviour
- 3) To determine Covid-19 personal experiences
- 4) To describe perceived possibility of Covid-19 infection

### 3.4 Research setting

The study was conducted at the University of the Western Cape (UWC), Cape Town, South Africa. The study primarily focused on the faculty of Community and Health Science (CHS) which is located across two campuses, one is at the UWC main campus at Robert Sobukwe Road and the CHS Bellville campus is located at 14 Blanckenberg Street in Bellville central business district (UWC, 2021).

The faculty of CHS is internationally recognised in the fraternity of research in well-being, health, and social justice. It is also involved in community-based and interdisciplinary education (UWC, 2021). CHS has a rich background of training professionals and offering educational programmes that promote community development and equity. Moreover, the CHS works hand in hand with service providers and communities in both urban and rural areas within South Africa and Africa at large (UWC, 2021).

The faculty offers an array of courses across the two campuses, for both under and postgraduates' students. These courses include Complementary health sciences, Dietetics and Nutrition, Nursing, Occupational therapy, Pharmacy, Physiotherapy, Psychology, Public Health, Social Work, Sport, recreation, and exercise science (UWC, 2021).

### **3.5 Study design**

The study will be an observational descriptive cross-sectional study in which data on factors associated with Covid-19 vaccine hesitancy among CHS students in UWC, South Africa will be analysed. Cross-sectional studies are often used to describe the population features, measure the health outcome prevalence and understand health determinants (Wang & Cheng, 2020). Cross-sectional studies are observational studies that analyse the data from a population at a single time point (Stockemer, 2019). In an observational study, the researcher does not intervene nor manipulate the exposures but observes and assesses the strength of the relationship between an exposure and outcome variable (Setia, 2016). A cross sectional design will be suitable because it is a survey of a population at a single time point (Connelly, 2016). This design does not have a prospective or retrospective follow-up, data on exposure and outcome is collected at the same time (Wang & Cheng, 2020). Once the subjects were selected, the researcher collected data and assessed the association between the outcomes and exposures.

### **3.6 Study population**

The sample population consisted of students from the University of the Western Cape who were registered for any of the programmes offered by the faculty of Community and Health Sciences. The study included student participants who were aged 18 years and above. Furthermore, students from this faculty hail from all walks of life, this includes but not limited to students from in and outside South Africa, healthcare workers and those coming from disadvantageous backgrounds.

### **3.7 Sampling procedure**

Sample size was determined by using the single population proportion formula considering the following assumptions: 95% confidence interval, 5% margin of error, 12% proportion of the sample. A 10% nonresponse rate was used to yield the final sample size of 162 CHS students using the formula  $n = N * X / (X + N - 1)$  where  $X = Z_{\alpha/2} * p * (1-p) / MOE^2$  (Select Statistics Services, 2021). Each letter from the formula is indicated as follows; N is the population size, n is the sample size,  $Z_{\alpha/2}$  is the critical value of the normal distribution, MOE is the margin of error and p is the sample proportion (Stockemer, 2019).

Before conducting the pilot study and data collection for the main study, participation of students from the department of psychology was excluded from the study since these students do not only register under the faculty of Community and Health Sciences but across the faculties of arts and law. Due to the Protection of Personal Information (POPI) Act, the researcher could not request information of the undergraduate psychology students who are registered under the faculty of Community and Health Sciences as per the protocol, hence the exclusion.

### **3.8 Data collection tool and procedure**

An English language version of a pretested and structured self-administered web-based questionnaire was used to collect data from participants. The questionnaire (appendix 1) was adopted from previously published articles on behaviours and attitudes with regards to vaccination (Barello et al., 2020; Lucia et al., 2020; Saied et al., 2021). The questionnaire assessed 1) general attitudes, knowledge and vaccine perceptions; 2) previous immunization behaviour; 3) Covid-19 personal experience; 4) perceived possibility of Covid-19 infection.

The questionnaire was structured into segments to enhance flow and to ask clear questions without leading participants. The questionnaire was sent to respondents via the student email address, and it was proposed to take approximately 20 minutes. Before sending out the questionnaire, it was piloted amongst 8 students from the School of Public Health (SOPH). The 8 SOPH students received the questionnaire via a WhatsApp link, and they were not included in the main study. The questionnaire was set to only allow for a single response through the UWC email address, therefore, students could only respond once.

For the main study, the researcher sent the questionnaire and an email explaining the study to students to the UWC Communications department. The UWC Communications department distributed the questionnaire to students in a form of Google forms link on 12 May 2022. All students from the faculty of CHS had a chance to participate in the study.

Following the first call, the researcher received 144 responses from 12 to 25 May 2022. The researcher sent a second communication to the UWC Communications department which was distributed to students on 30 May 2022. From the second call, the researcher finally reached the sample by 31 May 2022 and the survey was closed.

### **3.9 Data analysis**

The completed questionnaires were collected and transferred to a Microsoft Excel 2020 spreadsheet for cleaning. The collected data was entered into the Statistical Package for Social Sciences (SPSS) (version 27.0) and analysed by the researcher. For descriptive analysis, categorical variables were summarised by using percentages, frequencies and proportions whereas continuous variables were summarised using mean and standard deviation, or median and interquartile ranges (Larson, 2006). The Chi-square test was used to determine bivariate associations between the dependent variable and selected socio-demographic features such as age, gender, marital status, and degree of respondents. The dependent variable is binary in this case (hesitance vs no hesitancy). The association between independent and dependent variables was determined by odds ratios (OR) with 95% Confidence Interval (CI) around the ORs and  $p < 0.05$  to determine the statistical significance (Saied et al., 2021).

### **3.10 Validity and reliability of the study**

The questionnaire was designed in a user-friendly manner and pretested with 5% of the sample size before data collection (Chiwariidzo et al., 2017). Pretesting was conducted at the UWC, faculty of CHS. Study participants who took part in pre-test the data collection tool was not included in the analysis of the main study. Students were informed on how to complete and send the questionnaire. To improve completeness and avoid missing data, all questions were mandatory and did not allow respondents to continue to the next question without responding. (Thwaites Bee & Murdoch-Eaton, 2016).

### **3.11 Ethics statement**

Ethical clearance for academic research and data analysis was obtained from the University of the Western Cape BMREC (appendix 6). Permission to conduct the research at the university of the Western Cape was obtained from the Registrar. An additional permission to conduct the research was obtained from Heads of Departments under the faculty of CHS (appendix 4).

Minimal harm was expected as the study was web-based, and questionnaires were unidentified as the questionnaire did not require the participant's names. Participants were given a consent form before participating in this study (Appendix 2). The researcher went over the consent form with the participants who needed assistance and made sure that they understood the consenting process before signing the consent form. The study aimed to benefit students and the youth in general as Covid -19 is still ongoing. The study findings are hoped to change attitudes and behaviours of students, the youth and others who may have access to the findings. Fair selection of participants through random sampling techniques was ensured in this study. There was no specific ethnicity, race, social class, or group that was targeted. Additionally, the collected data was saved in a password-protected file and stored on a secure password-protected laptop and will be destroyed after five years.



## CHAPTER 4: RESULTS

### 4.1 Introduction

This chapter outlines the results of the study. It describes the sociodemographic characteristics of the participants, perceived risk of Covid-19 infection and knowledge, attitudes and perceptions of Covid-19 vaccine. It includes Chi-square test analysis to assess Covid-19 vaccine hesitancy for each variable. Furthermore, univariate logistic regression analysis to identify individual associations between predictor variables and hesitancy.

### 4.2 Sociodemographic characteristics of participants

A total number of 162 faculty of CHS students participated in this study. Two participants (one whose age was below 18 years and the other did not consent) were excluded from the analysis. Out of 160 participants 77.5% (n=124) were females, 20.0% (n=32) were male, 2.5% (n=4) were others. Fifty seven percent (n=91) were between the ages of 18-25, 23.1% (n= 37) between the ages of 26-34 and 20.0% (n=32) were 35 years and above. Categorizing by department the students are enrolled in, a sizeable proportion of the students 41.9% (n=67) were from the school of public health, 20.0% (n=32) from the department of social work while the other proportion of students were distributed across the other departments in the faculty of Community and Health Sciences. Regarding the participant's employment status 35.7% (n= 57) of the participants reported to be employed. Forty-nine percent (n=79) participants reported to be receiving a salary or family income of more than 10 000 per month. Table 1 is a summary of the sociodemographic results of the participants.

**Table 1: Sociodemographic characteristics of students**

Variable	Frequency, n (%)
<b>Age</b>	
18-25	91(56.9)
26-34	37(23.1)
35 and above	32(20.0)
<b>Gender</b>	
Male	32(20.0)
Female	124(77.5)
Other	4(2.5)
<b>Marital status</b>	
Single	116(72.5)
Married	34(21.5)
Separated	1(0.6)
Cohabiting	7(4.4)
Divorced	2(1.3)
<b>Professional qualification</b>	
None	38(23.8)
Diploma	4(2.5)
Bachelors	62(38.8)
Honors	22(13.8)
Masters	26(16.3)
PhD	8(5.0)

Variable	Frequency, n (%)
<b>Personal/family income</b>	
1000 or less	26(16.3)
3500- 5000	29(18.1)
6000-10000	26(16.3)
>10000	79(49.4)
<b>Employment status</b>	
Employed	57(35.7)
Unemployed	103(64.4)
<b>Socio-economic status</b>	
Low	27(16.9)
Average	106(66.3)
High	13(8.1)
Prefer not to say	14(8.8)

#### 4.3 Perceived risk of Covid-19 infection among students

Overall, most of the participants perceived themselves to be at a lower risk of being infected with Covid-19 virus. Only 10.6% (n=17) of the participants reported to be at more than 80% risk of being infected with Covid-19. Two percent (n=3) reported their perceived health status to be bad and 0.6% (n=1) reported a very bad perceived health status while a greater proportion of the students reported a good perceived health status. A sizable proportion of the participants, 69.4% (n=111) reported to have received all the required Covid-19 vaccine doses while 15.0% (n=24) reported to have been partially vaccinated. Four percent (n=7) of the participants reported being unvaccinated and 11.3% (n=18) reported that they will never get vaccinated. Amongst those who received the Covid-19 vaccine, 20.6% (n=33) received the Covid-19

vaccine booster dose. On the other hand, 49.4% (n=79) reported to have not yet received their booster dose and 30.0% (n=48) reported that they will never receive the Covid-19 booster. The dominant reported reason for refusing or delaying Covid-19 vaccine was religion, 44.0% (n=11). Amongst those who received the Covid-19 vaccine, 36.3% (n=58) reported to have been forced to take the Covid-19 while 63.8% (n=102) took the Covid-19 vaccine voluntarily. Table 2 summarizes the perceived risk of Covid-19 infection.

**Table: 2: Perceived risk of Covid-19 infection among students**

<b>Variable</b>	<b>Frequency, n (%)</b>
<b>Perceived health status</b>	
Good	65 (40.6)
Average	48(30.0)
Very good	43(26.9)
Bad	3(1.9)
Very bad	1(0.6)
<b>Perceived risk percentage of being infected with Covid-19</b>	
0-20%	88(55.0)
40-60%	55(34.4)
>80%	17(10.6)
<b>Previous infection with Covid-19</b>	
Yes and confirmed	36(22.5)
Yes, but not confirmed	32(20.0)
Never infected	61(41.9)
I do not know	25(15.6)

Table 2 Continued

<b>Variable</b>	<b>Frequency n (%)</b>
<b>Covid-19 infection in close social network</b>	
Yes and confirmed	77(48.1)
Yes, but not confirmed	16(10.0)
Never infected	32(20.0)
I do not know	35(21.9)
<b>Knowledge of Covid-19 as a preventative measure</b>	
Not knowledgeable	2(01.3)
Somewhat knowledgeable	53(33.1)
Knowledgeable	61(38.1)
Very knowledgeable	22(27.5)
<b>Last flu vaccine dose</b>	
Annually	9(05.6)
Current flu season	13(08.1)
Never had	105(65.6)
Last year	33(20.6)
<b>Have you received Covid-19 vaccine</b>	
Yes (all required doses)	111(69.4)
Partially (half required dose)	24(15.0)
Not yet	7(4.4)
No, I will never	18(11.3)
<b>Reason for refusing/delaying Covid-19 vaccine</b>	
I do not think I need a Covid-19 vaccine	5(20.0)
Religious reasons	11(44.0)
I do not think Covid-19 vaccines are effective	3(12.0)
I do not think Covid-19 vaccines are safe	5(20.0)
I feel that vaccination is unnecessary or dangerous	1(04.0)

Table 2 Continued

<b>Variable</b>	<b>Frequency n (%)</b>
Reason for taking the Covid-19 vaccine	
Voluntary	102(63.8)
Forced	58(36.3)
Have you received Covid-19 vaccine booster	
Yes	33(20.6)
Not yet	79(49.4)
I will never	48(30.0)

#### **4.4 Knowledge, attitudes and perceptions of Covid-19 amongst students**

A significant proportion of the participants 36.3% (n=58) indicated that they learnt about Covid-19 on TV. Amongst other sources of Covid-19, participants reported to have learnt about Covid-19 from the World Health Organization website and the South African Department of Health 16.9% (n=27) and 12.5% (n=20) respectively. Additionally, dependence on TV showed higher intent to vaccinate 86.2% (n=50) compared to dependence on other sources. This shows that the students had good knowledge and understanding about the Covid-19 vaccine, hence, the higher intent to vaccinate.

With regards to attitudes most participants perceived the Covid-19 vaccine to be important (agree [35.6%; n=57] and (strongly agree [26.3%; n=42]). This shows a good attitude and perception towards being vaccinated with the Covid-19 vaccine. A sizable proportion of participants 34.4% (n=55) strongly disagreed that Covid-19 vaccine should be compulsory to people of all ages. Moreover, participants strongly disagreed 34.4% (n=55) that the Covid-19 vaccine should only be compulsory to health care workers. A great concern regarding the Covid-19 vaccine effectiveness was reported by 56.3% (n= 90) (strongly agree [25.6%; n= 41],

agree [30.6%; n= 49]) of the participants. Furthermore, a significant number of the participants were concerned about the unknown adverse effects of the Covid-19 vaccine (strongly agree [31.3%; N=50], agree [38.1%; n=61]). Fifty eight percent of the participants (n=92) (strongly agree [29.4%; n=47], agree [28.1%, n=45]) felt there was not enough time to test the Covid-19 vaccine. The concerns may result to negative attitude towards the Covid-19 vaccine. Table 3 is the summary of knowledge, attitudes and perceptions of Covid-19 amongst students at the faculty of community and health sciences at the University of the Western Cape, Cape Town.

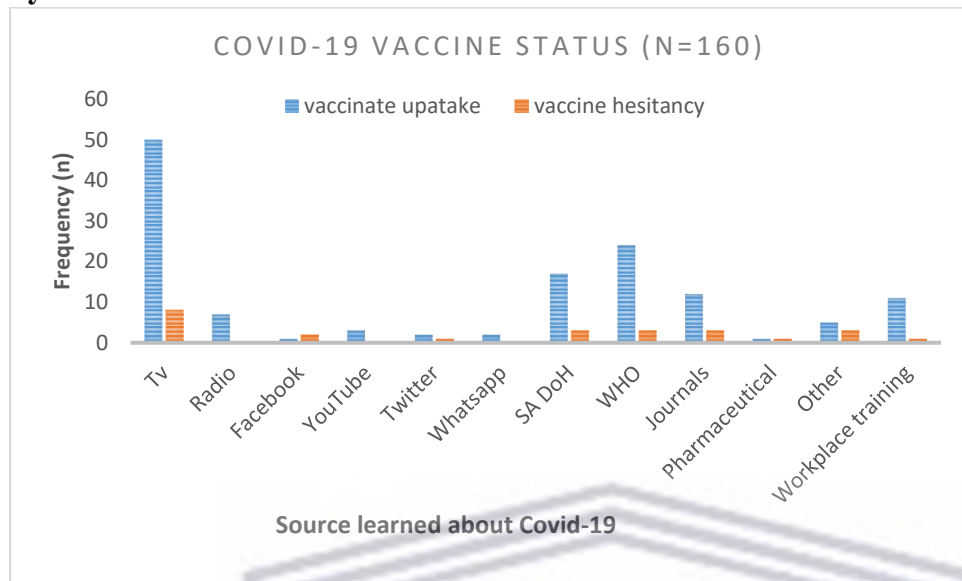
**Table 3: Knowledge, attitude and perception of Covid-19 amongst students**

Variable	strongly agree	Agree	Neutral	Disagree	Strongly disagree
	n (%)	n (%)	n (%)	n (%)	n (%)
I perceive the Covid-19 vaccine to be important	42(26.3)	57(35.6)	28(17.5)	14(8.8)	19(11.9)
I think it is important for Everyone in the community to get the Covid-19 vaccine	33(20.6)	51(31.9)	30(18.8)	23(14.4)	23(14.4)
Covid-19 vaccine should be compulsory to every one of all ages	17(10.6)	20(12.5)	23(14.4)	45(28.1)	55(34.4)
Covid-19 vaccine should only be compulsory for health workers	14(8.8)	14(8.8)	25(15.6)	52(32.5)	55(34.4)
I think approval of the vaccine guarantees safety	22(13.8)	46(28.8)	35(21.9)	27(16.9)	30(18.8)

Variable	strongly agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly disagree n (%)
The way to overcome the Covid-19 pandemic is through mass vaccination.	32(20.0)	39(24.4)	33(20.6)	26(16.3)	30(18.8)
The best preventative measure for Covid-19 is getting vaccinated	25(15.6)	47(29.4)	32(20.0)	29(18.1)	27(16.9)
I think the vaccine boosters are not necessary	32(20.0)	35(21.9)	51(31.9)	27(16.9)	15(09.4)
I think there was not enough time to test the vaccine	47(29.4)	45(28.1)	30(18.8)	30(18.8)	08(05.0)
I am concerned regarding the unknown adverse effects of the vaccine	50(31.3)	61(38.1)	17(10.6)	24(15.0)	08(05.0)
I am concerned about the effectiveness of the vaccine	41(25.6)	49(30.6)	28(17.5)	35(21.9)	07(04.4)
I have prior bad experience with any vaccine and their adverse reactions	10(06.3)	15(09.4)	29(18.1)	60(37.5)	46(28.8)
I am against vaccines in General	11(06.88)	12(07.5)	17(10.6)	58(36.3)	62(38.8)



**Figure 1 is a graphical presentation of difference in vaccine hesitancy/uptake stratified by source.**



#### 4.4 Chi-square test to assess Covid-19 vaccine hesitancy for each variable

Additional analyses were performed to check the proportion of Covid-19 vaccine hesitancy for each of the variables. Stratified by previous Covid-19 infection there was a statistically significant difference in Covid-19 vaccine hesitancy of the four group's stratified by their previous Covid-19 infection. Those who never had Covid-19 infection were more hesitant compared to those who previously had Covid-19 infection (Chi-square= 8.6; p=0.03). Table 4 is a summary of these findings together with the associated p -values.

**Table 4: Covid-19 vaccine hesitancy proportion for different variables among students.**

Variable	vaccine uptake (%)	vaccine hesitancy (%)	Chi-square	p-value
Age (years)				
18 - 25	83.5	16.5	0.2	0.9
26 – 34	86.5	13.5		
≥ 35	84.4	15.6		

Variable	vaccine uptake (%)	vaccine hesitancy (%)	Chi-square	p-value
<b>Gender</b>				
Male	75.0	25.0	3.1	0.2
Female	87.1	12.9		
Other	75.0	25.0		
<b>Marital status</b>				
Single	83.6	16.8	8.9	0.1
Married	88.2	11.8		
Separated	0.0	100.0		
Cohabiting	100.0	0.0		
Divorced	50.0	50.0		
<b>Employment status</b>				
Employed	80.7	19.3	0.9	0.3
Unemployed	89.0	13.6		
<b>Income</b>				
1000 or less	92.3	7.69	1.6	0.7
3500 – 5000	82.8	17.2		
6000- 10000	80.8	19.2		
≥ 1000	83.5	16.5		
<b>Education qualification</b>				
Diploma	75.0	25.0	1.9	0.9
None	86.8	13.2		
Bachelors	83.9	16.1		
Honors	90.9	09.1		
Masters	80.8	19.2		
PhD	75.0	25.0		
<b>Socio-economic status</b>				
Low	77.8	22.2	1.7	0.6
Average	86.8	13.2		
High	84.6	15.4		

Variable	vaccine uptake (%)	vaccine hesitancy (%)	Chi-square	p-value
<b>Covid-19 knowledge</b>				
Not knowledgeable	50.0	50.0	1.7	0.6
Somewhat knowledgeable	90.6	9.4		
Knowledgeable	85.3	14.8		
Very knowledgeable	77.3	22.7		
<b>Perceived risk</b>				
0-21%	78.4	21.6	5	0.1
40-60%	90.9	9.1		
≥ 80%	94.1	5.9		
<b>Previous Covid-19 infection</b>				
Yes and confirmed	88.9	11.1	8.6	0.0
Yes but not confirmed	84.4	15.6		
Never infected	76.1	23.9		
I do not know	100.0	0.0		
<b>Covid-19 infection in close network</b>				
Yes and confirmed	79.2	20.8	4.3	0.2
Yes but not confirmed	87.5	12.5		
Never infected	84.4	15.6		
I do not know	94.3	5.7		

#### **4.5 Univariate analysis for the association between variables and Covid-19 vaccine hesitancy.**

A univariate logistic regression analysis was conducted to ascertain individual associations between predictor variables and Covid-19 vaccine hesitancy. The analysis revealed that those with low perceived risk percentage of Covid-19 were more likely to be hesitant to the Covid-19 vaccine compared to those with medium to high-risk percentage (OR= 0.33; 95%CI= 0.12-0.88; p= 0.0) and this was statistically significant. In addition, those who received the Covid-

19 vaccine were more likely to be hesitant to the Covid-19 vaccine booster dose. The association was statistically significant (p=0.0). Table 5 summarizes the results from the univariate logistic regression.

**Table:5 Factors associated with Covid-19 vaccine hesitancy among students**

Variable	OR	95% CL	p-value
Age	1.0	0.34; 2.91	1.0
Gender	0.4	0.17; 1.16	0.1
Marital status	0.9	0.30; 2.53	0.8
Employment status	0.5	0.19; 1.55	0.3
Personal/family income	1.4	0.55; 3.64	0.5
Education qualification	1.1	0.4; 2.57	0.9
Socioeconomic status	1.0	0.21; 4.99	1.0
Covid-19 knowledge	0.2	0.01; 2.96	0.2
Perceived risk	0.3	0.12; 0.88	0.0
PreviousCovi-19 infection	1.4	0.57; 3.34	0.5
Covid-19 infection in close network	0.5	0.19; 1.24	0.1
Covid-19 booster dose	-	-	0.0



## CHAPTER 5: DISCUSSION

### 5.1 Introduction

This chapter focuses on the discussion of the study results and limitations. The analysis assisted in determining the magnitude of Covid-19 vaccine hesitancy and the actual factors associated with Covid-19 vaccine hesitancy among the students in the faculty of CHS.

The aim of this study was to determine factors associated with Covid-19 vaccine hesitancy amongst CHS students at the University of the Western Cape. Results from this study showed that a sizable proportion of the participants 69.4% reported to have received all the required Covid-19 vaccine doses while 15.0% reported to have been partially vaccinated.

### 5.2 Knowledge, attitudes and perceptions among university students about Covid-19 vaccines

Vaccination to prevent Covid-19 arose as a promising tool to overcome the negative effects of the Covid-19 pandemic. However, the efforts to fight the pandemic are being challenged by the issue of vaccine hesitancy which is particularly seen in young individuals. Additionally, young people have been deemed to be carriers and pose a greater threat of spreading the infection to vulnerable populations (Olalekan & Clement; Robertson et al., 2021).

It is presumed that university students are an aware and knowledgeable group in society. Hence, it is believed that students in the faculty of health could possibly have a leading role in public service. Recent studies have shown that students in schools of public health could promote clear helpful scientific-based messages (Sallam, 2021). Furthermore, previous studies revealed that university students have a potential to address vaccine hesitancy by promoting a positive attitude concerning vaccination (Sallam et al., 2021). However, results from this study revealed that 56% of the participants had a great concern regarding the Covid-19 vaccine effectiveness. This concern may threaten positive promotion of the Covid-19 vaccine.

Furthermore, a significant number of the participants showed concern regarding the unknown adverse effect of the Covid-19 vaccine (strongly agree [31.3%; N=50], agree [38.1%; n=61]). Such results depict a vaccine knowledge-gap amongst the students at the University of the Western Cape. Moreover, the reported vaccines concerns suggest that there is still more work needed to educate health sciences students as advocates of positive attitudes towards vaccines. This may beg the question about the extent to which the public may be concerned about vaccines in general if CHS students have expressed the concerns described in this study.

Further analysis of Covid-19 vaccine hesitancy in this study presented a relatively higher vaccine acceptance rate among the students in the faculty of Community and Health Sciences (84.4%). This can be associated with their higher knowledge about the disease (Saied et al., 2021). Additionally, a similar study conducted among university students in Jordan and Italy displayed higher acceptance and that health sciences students have a better capability to fathom the results of clinical trials on Covid-19 vaccines; hence, having a greater trust and acceptance of such novel vaccines (Barello et al., 2020; Sallam et al., 2021). However, this study showed that 58% of the participants had concerns regarding the time it took to test the Covid-19 vaccine, which led to concerns about the vaccine effectiveness and unknown adverse events. In contrast, a study conducted by Lucia and team revealed that students in the health faculty were willing to immediately take the Covid-19 vaccine and were more likely to have trust in public health experts (Lucia et al., 2020). Furthermore, the students had fewer concerns regarding the unknown side effects as opposed to the findings from this study (Lucia et al., 2020). Concerns about unknown side effects may be suggestive of vaccine hesitancy as this phenomenon is triggered by lack of confidence in effectiveness and safety of vaccination (Allington et al., 2021).

Despite the study reporting a high number of vaccine acceptance, the refusal of vaccine and delay in acceptance regardless of the availability of vaccine services is still an issue that poses

a complex phenomenon that varies across, place, time and vaccines (Baumgaertner et al., 2020; Raw et al., 2020). This complexity has been well displayed by this study which revealed that amongst the 135 (84, 4%) students who vaccinated only 33 (20.6%) students had their Covid-19 vaccine booster. These results serve as evidence of the existence of high levels of vaccine hesitancy amongst the students. A recent study conducted in Michigan revealed that approximately one-quarter of medical students demonstrated Covid-19 vaccine hesitancy (Edwards et al., 2021). Consequently, this study result might be an indication of a negative attitude towards Covid-19 vaccine especially the booster dose which has not been well accepted.

To put the previous findings into a broader perspective, couple of studies that explored Covid-19 vaccine hesitancy among university students displayed favourable results for instance, the study conducted in Malta among Health Sciences students demonstrated Covid-19 vaccine acceptance (57.3%) (Biswas et al., 2021; Lucia et al., 2020). Results from previous studies coupled with this study findings can be used to advocate for the imperative role university students in health sciences can play in distributing useful and correct information concerning vaccination (Sallam, 2021). Moreover, this useful information can be used to rectify misinformation regarding different aspects of the Covid-19 vaccine among the student's colleagues and the public at large (Cooper et al., 2021).

Low perceived risk to be infected with Covid-19 was another factor associated with vaccine hesitancy, findings from this study showed that those who perceived themselves to be at lower risk of being infected with Covid-19 were more likely to be hesitant to the Covid-19 vaccine. Research on public risk perception suggests that complacency towards the Covid-19 vaccine has mostly been displayed by young individuals with lower intent to get vaccinated and this has been associated with lower case fatality rates reported amongst young people (Lucia et al., 2020).

Although the youth experience lower complications from Covid-19 infection, it has been revealed that they may present a risk of being carriers of the virus to vulnerable populations (Robertson et al., 2021). Therefore, the low perceived risk towards Covid-19 infection is key to improve adherence to public health measures to decrease the infection rate. Moreover, results from this study suggest that lower perceived risk is directly proportional to vaccine hesitancy. For that reason, promotion of preventative measures focusing on increasing young people's knowledge and encouraging positive attitude towards Covid-19 vaccine is needed.

Previous infection with Covid-19 is another factor that was shown to incite Covid-19 vaccine hesitancy, as those who never got infected were more likely to be hesitant to take the vaccine while some studies have shown that those who were previously infected by the Covid-19 virus were more likely to accept the vaccine (Bhopal & Nielsen, 2021). Considering the attitudes and behaviour that previous infection with Covid-19 is linked to getting vaccinated is encouraging, as such a phenomenon served as a wakeup call for some students who might have been hesitant to take the vaccine or those who had perceived themselves to be less likely to get infected with Covid-19.

### **5.3 Limitations of the study**

Limitations of this study include data collection in a single university and within one faculty which may impact generalizability of the results. Participants may also have been primarily influenced by exposure to Covid-19 vaccine topics through media, since Covid-19 was not a topic formally covered in the curriculum.

Furthermore, the cause and effect between variables could not be established owing to the cross-sectional nature of the study design. Reporting bias could have been a challenge since the data was collected using a self-administered online form.



## CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

### 6.1 Introduction

This section presents the study conclusion and recommendations. It highlights key factors that were noted to be contributing to the issue of vaccine hesitancy. Moreover, areas of improvement are highlighted following challenges that include but not limited to the knowledge gap which was one noted.

### 6.2 Conclusion

Majority of the students were in acceptance of the Covid-19 vaccine and most of them did not have negative attitudes with regards to immunization. However, a significant proportion of the students were hesitant towards the Covid-19 booster vaccine.

It is worth noting that students in the faculty of Community and Health Sciences are amongst the group of frontline healthcare providers who are likely to be exposed to patients with Covid-19. Therefore, it is imperative to achieve great Covid-19 vaccination coverage rates in this group.

Factors that were identified to be associated with vaccine hesitancy from this study were perceived risk, previous infection with Covid-19, concerns with the time it took to develop the vaccine and concerns with the unknown side effects of the Covid-19 vaccine. Despite the limitations and the identified factors, this study sheds light and demonstrates the need for an educational programme intended to improve students' knowledge about the Covid-19 vaccine and vaccines in general.

Furthermore, while there are opportunities and risks in vaccine hesitancy, vaccine hesitancy poses a significant obstacle towards attaining the Immunization Agenda 2030 (IA2030) immunization targets. Therefore, necessary action is needed to prioritize the realization of the

goals and vision to guarantee that immunization entirely contributes towards stronger primary health care and achieving universal health coverage(Afolabi & Ilesanmi, 2021; Baumgaertner et al., 2020)

### **6.3 Recommendations**

The herd immunity is of paramount importance to achieve the protection for the population at large. Since a vaccine knowledge gap was identified to be an issue, we recommend that there be robust forms of disseminating and teaching health science students on vaccines in general. As students in health faculties are future health providers who will be entrusted to give vaccine counselling and recommendation to hesitant patients, they need to be well knowledgeable to be able to provide advice to patients around vaccines. Additionally, the students may function as role models and have an important influence within the health system on peers.

Having health sciences students who are well knowledgeable on issues that are of a public health concern has a potential to encourage positive attitudes towards vaccination amongst their peers.

### **6.4 Areas of further research**

Since this study focused on students from the faculty of Community and Health Sciences, we recommend that further research is conducted on students from other faculties in different universities to get a broader view and magnitude of vaccine hesitancy and acceptance among students in South Africa. This will enable effective and tailor-made strategies for all South African universities.

Furthermore, results from this study showed that most of the students from the faculty of Community and Health Science did not receive their booster vaccine. Therefore, we highly

recommend further research which will explore factors that influence refusal or delaying the Covid-19 vaccine booster.



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## APPENDICES

### Appendix 1: Questionnaire

**Study Title:** Factors associated with Covid-19 vaccine hesitancy amongst students at a university in the Western Cape, Cape Town, South Africa.

**Section I: Focuses on demographic and professional characteristics of the students. Please encircle the number or your appropriate choice in the space provided.**

Variables	Options	Response
1. What is your sex?	<ol style="list-style-type: none"> <li>1. Male</li> <li>2. Female</li> </ol>	
2. How old are you?	<ol style="list-style-type: none"> <li>1. 18- 25</li> <li>2. 26- 34</li> </ol>	
3. What is your marital status	<ol style="list-style-type: none"> <li>1. Married</li> <li>2. Single</li> <li>3. Widowed/divorced</li> </ol>	
4. What is your employment status?	<ol style="list-style-type: none"> <li>1. Employed</li> <li>2. unemployed</li> </ol>	
4. Which department are you enrolled in?	<ol style="list-style-type: none"> <li>1. Public Health</li> <li>2. Dietetics and Nutrition</li> <li>3. Physiotherapy</li> <li>4. Occupational therapy</li> <li>5. Sport Science</li> <li>6. Psychology</li> <li>7. Social work</li> <li>8. Complementary     medicine</li> <li>9. Nursing</li> <li>10. Pharmacy</li> </ol>	

5. What is your academic year?	1. First 2. Second 3. Third 4. Fourth 5. Postgraduate	
6. Which is your professional qualification level if you previously completed a degree before?	1. PhD 2. Masters 3. Honours 4. Bachelors 5. Diploma 6. None	
7. What is the status of your family/ personal income?	1. R1000 or less 2. R3500 - R5000 3. R6000 -R10 000 4. > R10 000	
8. How would you describe your socioeconomic status?	1. Low 2. Average 3. High 4. Prefer not to disclose	

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**Section II: Focusses on assessing perceived risk of Covid-19 infection.**  
**Answer the following questions by encircling the number or your appropriate choice in the space provided.**

	Option	Response
1. How do you perceive your health status	1. Very bad 2. Bad 3. Average Good 4. Good 5. Very good	

2. Risk perception percentage of being infected with COVID-19	1.0% -20% 2.40% - 60% 3.> 80%	
3. Previous infection with COVID-19	1.I do not know 2.Yes & confirmed 3.Yes, but not confirmed 4.Not infected	
4. COVID-19 infection in close social network	1.Do not know 2.Yes & confirmed 3.Yes, but not confirmed 4.Not infected	
5. How would you rate your knowledge of COVID-19 vaccine as a preventative measure	1.Not Knowledgeable 2.Somewhat knowledgeable 3.Knowledgeable 4.Very knowledgeable	
6. When did you have your last flu vaccine	1.Never 2.Last year 3.Current flu season (2020–2021) 4. Annually	
7. Have you had your COVID-19 vaccine	1. Yes 2. Not yet 3. No, I will never	



**Section III: Answer the following questions by marking (X) in the corresponding column according to your Knowledge, attitude and perception regarding Covid-19 vaccine. The options for responses column starts from strongly agree (SA) to strongly disagree (SDA) as shown below. NB: SA= strongly agree, A= Agree, US= Unsure, DA=Disagree & SDA= strongly disagree.**

Factors that contributes to vaccine update or hesitancy	SA	A	US	DA	SD A
1. I perceive the Covid-19 vaccine to be important					
2. I think it is important for everyone in the community to get the Covid-19 vaccine once available to them					
3. Covid-19 vaccine should be compulsory to everyone					
4. Covid-19 vaccine should only be compulsory for health workers					
5. I think that approval of the vaccine guarantees it safety					
6. The way to overcome the Covid-19 pandemic is through mass vaccination					
7. The best preventative measure for Covid-19 is getting vaccinated					
8. I think that there was no enough time to test the vaccine					
9. I am concerned regarding the unknown adverse effects of the vaccine					
10. I am concerned about the effectiveness of the vaccine					
11. I have a prior bad experience with any vaccines and their adverse reactions					
12. I am against vaccines in general					
13. I am concerned about the origin of the Covid-19 vaccine					
14. I think that I am not at a considerable risk of developing complications if I have been infected with Covid-19					

15. I perceive myself not at elevated risk to acquire Covid-19					
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**Appendix 2: Consent form**



**UNIVERSITY OF THE WESTERN CAPE**

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2809, Fax: 27 21-959 2872 **E-mail: [soph-comm@uwc.ac.za](mailto:soph-comm@uwc.ac.za)**

**CONSENT FORM**

**Title of Research Project: Factors associated with Covid-19 vaccine hesitancy amongst students at a university in the Western Cape, Cape Town, South Africa.**

The study has been described to me in a language that I understand. My questions about the study have been answered. I understand what my participation will involve, and I agree to participate of my own choice and free will. I understand that my identity will not be disclosed to anyone. I understand that I may withdraw from the study at any time without giving a reason and without fear of negative consequences or loss of benefits.

**Participant's name:** .....

**Participant's signature:** .....

**Date:** .....





Appendix 3: Permission letter

UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2911

E: [info@uwc.ac.za](mailto:info@uwc.ac.za)

To HODs: Faculty of Community and Health Sciences  
University of the Western Cape  
Private Bag X17  
Bellville  
Cape Town  
7535

19 September 2021

Dear Sir/ Madam

Re: **REQUEST TO CONDUCT A STUDY ON FACTORS ASSOCIATED WITH COVID 19 VACCINE HESITANCY AMONGST STUDENTS AT A UNIVERSITY IN THE WESTERN CAPE, CAPE TOWN, SOUTH AFRICA.**

My name is Phindile Simphiwe Gift Khumalo, a Master of Public Health student from the School of Public Health, University of the Western Cape in Cape Town, South Africa. I am requesting to conduct a web-based study using a closed-ended questionnaire on students enrolled at the Faculty of Community and Health Sciences on factors associated to Covid-19 vaccine hesitancy under which your department falls. The information will be collected anonymously using the questionnaire designed for the study.

The study will be submitted to the University of the Western Cape Senate Research Committee for review and approval before the study commences.

I would be grateful if my request could meet your most

favourable consideration. Yours Faithfully,

Phindile Simphiwe Gift Khumalo (Dr)

## Appendix 4: Information sheet



### UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21 959 2809 Fax: 27 21 959 2872 **E-mail:**

[sopcomm@uwc.ac.za](mailto:sopcomm@uwc.ac.za)

### INFORMATION SHEET

**Project Title:** Factors associated with Covid-19 vaccine hesitancy amongst students at a university in the Western Cape, Cape Town, South Africa.

#### **What is this study about?**

This is a research project being conducted by **Phindile Simphiwe Gift Khumalo** at the University of the Western Cape. We are inviting you to participate in this research project because you are a student registered at University of the Western Cape under the faculty of Community and Health Sciences. The purpose of this research project is to find factors contributing to COVID-19 vaccine hesitancy in order to develop effective strategies to improve COVID-19 vaccine uptake and reduce its transmission.

#### **What will I be asked to do if I agree to participate?**

You will be asked to complete and sign a consent form. After this you will be asked to complete and submit the attached web-based questionnaire which is divided into 3 sections. Completing the questionnaire is expected to last for at least 20 minutes. No further information nor follow up interview will be required of you after completing the questionnaire.

#### **Would my participation in this study be kept confidential?**

The researchers undertake to protect your identity and the nature of your contribution. To ensure your anonymity, this survey is anonymous and will not contain information that may personally identify you. To ensure your confidentiality, the completed questionnaires will be kept in a password protected computer only accessible to the researcher. If the researcher writes

a report or article about this research project, your identity will be protected.

### **What are the risks of this research?**

There may be some risks from participating in this research study. All human interactions and talking about self or others carry some amount of risks. We will nevertheless minimize such risks and act promptly to assist you if you experience any discomfort, psychological or otherwise during the process of your participation in this study. Where necessary, an appropriate referral will be made to a suitable professional for further assistance or intervention.

### **What are the benefits of this research?**

The benefits to you include change in behaviours and attitudes towards Covid-19 to protect yourself, colleagues and the community from this pandemic. Other students, youth and general people who may come across the findings may also benefit similarly. The findings of this study will be used to make recommendations to increase Covid-19 vaccine uptake amongst the youth and improve health outcomes amongst the general population by reducing Covid-19 morbidity and mortality rates.

### **Do I have to be in this research and may I stop participating at any time?**

Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify.

### **What if I have questions?**

This research is being conducted by **Phindile Simphiwe Gift Khumalo and School of Public health** at the University of the Western Cape. If you have any questions about the research study itself, please contact **Phindile Simphiwe Gift Khumalo** at [4002044@myuwc.ca.za](mailto:4002044@myuwc.ca.za), or WhatsApp on +27785054713 or +27836006610.

Should you have any questions regarding this study and your rights as a

research participant or if you wish to report any problems you have experienced related to the study, please contact:

Prof U Lehmann

Head of Department: School of Public Health

University of the Western Cape

Private Bag X17

Bellville 7535

[ulehmann@uwc.ac.za](mailto:ulehmann@uwc.ac.za)

Prof Anthea Rhoda

Dean: Faculty of Community and Health Sciences

University of the Western Cape

Private Bag X17

Bellville 7535

[chs-deansoffice@uwc.ac.za](mailto:chs-deansoffice@uwc.ac.za)

This research has been approved by the University of the Western Cape's Biomedical Research Ethics Committee.

Biomedical Research Ethics Committee

University of the Western Cape

Private Bag X17

Bellville

7535

Tel: 021 959 4111

e-mail: [research-ethics@uwc.ac.za](mailto:research-ethics@uwc.ac.za)

**REFERENCE NUMBER: BM21/10/34**

**Appendix 5: Permission letter to the registrar (Online application)**



UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South  
Africa

Tel: +27 21-959 2911

E: [info@uwc.ac.za](mailto:info@uwc.ac.za)

Dr Nita Lawton-Misra  
Registrar: University of the Western Cape  
Private Bag X17  
Bellville  
Cape Town  
7535

23 September 2021

Dear Dr Nita Lawton-Misra

Re: **REQUEST TO CONDUCT A STUDY ON FACTORS ASSOCIATED WITH COVID 19 VACCINE HESITANCY AMONGST STUDENTS AT A UNIVERSITY IN THE WESTERN CAPE, CAPE TOWN, SOUTH AFRICA.**

My name is Phindile Simphiwe Gift Khumalo, a Master of Public Health student from the School of Public Health, University of the Western Cape in Cape Town, South Africa. I am requesting to conduct a web-based study using a closed-ended questionnaire on students enrolled at the Faculty of Community and Health Sciences on factors associated to COVID-19 vaccine hesitancy. The following information will be collected anonymously using the questionnaire designed for the study.

The study will be submitted to the University of the Western Cape Senate Research Committee for review and approval before the study commences.

I would be grateful if my request could meet your most

favorable consideration. Yours Faithfully,

Phindile Simphiwe Gift Khumalo (Dr)

## Appendix 6: Ethics clearance



UNIVERSITY of the  
WESTERN CAPE



06 December 2021

Dr P Khumalo  
School of Public Health  
Faculty of Community and Health Sciences

**Ethics Reference Number:** BM21/10/34

**Project Title:** Factors associated with Covid-19 vaccine hesitancy amongst students at a university in the Western Cape, Cape Town, South Africa.

**Approval Period:** 06 December 2021 – 06 December 2024

I hereby certify that the Biomedical Science Research Ethics Committee of the University of the Western Cape approved the scientific methodology and ethics of the above mentioned research project and the requested amendment to the project.

Any further amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.

**Please remember to submit a progress report annually by 30 November for the duration of the project.**

For permission to conduct research using student and/or staff data or to distribute research surveys/questionnaires please apply via:  
<https://sites.google.com/uwc.ac.za/permissionsresearch/home>

*The permission letter must then be submitted to BMREC for record keeping purposes.*

The Committee must be informed of any serious adverse event and/or termination of the study.

Ms Patricia Jostias  
Research Ethics Committee Officer  
University of the Western Cape

BMREC Registration Number: BMREC-120416-850

FROM HOPE TO ACTION THROUGH KNOWLEDGE.



## Appendix 7: Permission to conduct research at the University of the Western Cape



### UNIVERSITY OF THE WESTERN CAPE PERMISSION TO CONDUCT RESEARCH

DEAR **Phindile Simphiwe Gift Khumalo**

This serves as acknowledgement that you have obtained and presented the necessary ethical clearance and your institutional permission required to proceed with the project referenced below:

#### RESEARCH TOPIC

Factors associated with Covid-19 vaccine hesitancy amongst students at a university in the Western Cape, Cape Town, South Africa.

Name of researcher : Phindile Simphiwe Gift Khumalo  
Permission valid till : 6 December 2024  
Institution : University of the Western Cape  
Ethics reference : BM21/10/34  
Permission reference : UWC 5178931218429690323

You are required to engage this office ([researchperm@uwc.ac.za](mailto:researchperm@uwc.ac.za)) in advance if there is a need to continue with research outside of the stipulated period. The manner in which you conduct your research must be guided by the conditions set out in the annexed agreement. Conditions to guide research conducted at the University of the Western Cape.

Please be at liberty to contact this office should you require any assistance to conduct your research or require access to either staff or student contact information.

Regards  
Dr Ahmed Shaikjee  
Deputy Registrar Academic Administration

Approval status: **APPROVED** 11 January 2022

To verify or confirm the authenticity of this document please contact the University at [researchperm@uwc.ac.za](mailto:researchperm@uwc.ac.za).



UNIVERSITY OF THE WESTERN CAPE  
Robert Sobukwe Road, Bellville, 7535, Republic of South Africa