



INSTITUTE OF HEALTH

FACULTY OF PUBLIC HEALTH

DEPARTMENT OF HEALTH BEHAVIOR AND SOCIETY

INTENTION TO VACCINATE COVID-19 VACCINE AND ASSOCIATED
FACTORS AMONG JIMMA UNIVERSITY UNDER GRADUATE STUDENTS

A RESEARCH THESIS TO BE SUBMITTED TO JIMMA UNIVERSITY INSTITUTE
OF HEALTH DEPARTMENT OF HEALTH BEHAVIOR AND SOCIETY IN
PARTIAL FULFILLMENT FOR THE REQUIREMENT DEGREE IN MASTERS OF
PUBLIC HEALTH IN HEALTH BEHAVIOR AND SOCIETY

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January, 2023
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January, 2023

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ABSTRACT

Background: COVID-19 had been a severe public health hazard globally. To tackle the pandemic many preventive measures were applied. Vaccination is regarded as an effective intervention for combating pandemics and the majority of infectious diseases that are preventable through vaccine. Low acceptance of vaccine rate and high hesitant to COVID-19 vaccine were still the major challenge to achieve the goal of herd immunity in the community.

Objective: This study aimed to assess the level of intention to vaccinate COVID-19 vaccine and associated factor among Jimma University under graduate student.

Method: A cross sectional study design was employed by supplementing qualitative method among Jimma University under graduate students with a sample of 362 from selected departments. Data was collected from April to May 2022. Data was entered into EPI data version 3.1 and exported to SPSS version 23 for statistical analysis. Multiple Linear regression models were used to identify the predictors of intention to vaccinate COVID-19 vaccine score. With 95% CI and p-value was used to interpret the association between the predictors and dependent variable at p-value <0.05 were used to declare statistically significant. Qualitative data were collected by using 12 in-depth interviews and analysed manually to supplement the findings of quantitative study.

Result: the response rate of this study was 99.1%. The percentile mean score of intention to vaccinate COVID-19 Vaccine in Jimma University under graduate students was 57.6% (SD=25.7) and the raw mean score of this scale was 30.4 ± 5.33 with a total rotated variance explained 72.58%. COVID-19 vaccine literacy with (B=.155, 95%CI, .090 .217, $p < 0.001$), Descriptive norm with (B=.089, 95%CI, .047 .123, $p < 0.05$), perceived severity with (B=.035, 95%CI .006, .055, $p < 0.05$) and attitude with (B=.322, 95%CI, .293, .353, $p < 0.05$) were found to be factors associated with intention to vaccinate COVID-19 vaccine.

Conclusion: In this study the percentages mean score of intention to vaccinate COVID-19 vaccine among Jimma University under graduate students was 57.6%. Intention to vaccinate COVID-19 vaccine was affected by COVID-19 vaccine literacy, descriptive norm, perceived severity and attitude. Awareness creations regarding the vaccine are important to increase the intention to uptake the vaccine.

AKNOWLEDGMENT

First, I would like to thank Jimma University, faculty of Public health, and department of Health Behavior and Society for giving me this opportunity to conduct paper on this research title.

Secondly, my heartfelt thanks go to my advisors **Dr. Fira Abamecha and Mr. Chali Endalew** for their valuable advice and comments they have provided me during the research work.

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ACROYMS AND ABBREVIATIONS

WHO	World Health Organization
COVID-19	Corona Virus Disease (2019)
HL	Health Literacy
SARS	Severe acute respiratory syndrome
VH	Vaccine hesitancy
SS	Sub-Saharan
PT	Perceived threat
PI	Principal Investigator
DN	Descriptive norm
MOH	Ministry of Health
HCW	Health Care workers
FDA	Food and drug administration
VL	Vaccine literacy

CHAPTER ONE: INTRODUCTION

1.1 Background

Coronavirus disease (COVID-19) is an infectious disease caused by the SARS-CoV-2 virus(1). Following the epidemic, which was declared as a pandemic in early 2020, the world health organization (WHO) launched a global campaign for prevention, early detection, and medical treatment of coronavirus illness 2019 (COVID-19) (2). The COVID-19 disease has challenged and placed some burden on the African people with scarce resources, poor infrastructure, and unstable governments among other factors(3). More than 220 countries/territories have been affected by the virus, with over 270 million people infected and over 5 million deaths reported as of December 24, 2021. Ethiopia is ranked 76th in terms of COVID-19 infection, with over 385,000 people infected and 6,885 people died (December 24, 2021). Unfortunately, Ethiopia was discovered to be one of the five African countries with the highest COVID-19 case burden(4). However, the government of Ethiopia has been striving to spread information on COVID-19 preventive measures via television, radio or social-media outlets and declared a state of emergency(5).

Aside from efficient public health measures like as social distance, wearing facemasks, hand washing, and avoiding crowded indoor areas, educating the general community and successful vaccination is emerging as critical to minimizing disease and mortality in this pandemic(6). With approval of FDA the COVID-19 vaccines were eligible based on the dose and age classification, from 6month -5 years, 5-11 years and greater than 12 years(7)

There are many different types of COVID-19 vaccines in development using different technologies and their safety requirements are the same as for any other vaccine and will not be lowered in the context of the pandemic. In an emergency, like a pandemic, vaccines may be temporarily approved for use under an emergency use authorization as it may not be possible to have all the evidence that regulators would usually have before full approval(8) . The first shipment of the AstraZeneca vaccines arrived in Ethiopia on 6 March. Currently four types of vaccines are used in Ethiopia Following this, the

government of Ethiopia have been also deployed four types of COVID-19 vaccines by the Ministry, namely Sino pharm, AstraZeneca, Janssen, and Pfizer-BioNTech and this vaccines are being used in the country (9)

Vaccines has an undeniable impact on public health, resulting in a dramatic reduction in infectious disease morbidity and mortality, saving millions of lives each year(10). Vaccination is regarded as an effective intervention for combating pandemics and the majority of infectious diseases that are preventable through vaccine. Furthermore, approaches to promote vaccination acceptance and sufficient health system capacity are greatly desired for the distribution and equal access of safe and effective vaccines(2).

COVID-19 vaccine acceptance it is defined as “the willingness to take COVID-19 vaccine” and it’s a reflection of the general public's overall understanding of disease risk, vaccine attitudes, and demand, all of which are critical for immunizations to attain high vaccination coverage rates, particularly for newly developing infectious diseases(11). Understanding the community's readiness to receive a COVID-19 vaccination, as well as the primary factors influencing their acceptance of the vaccine, will help to plan and implement effective COVID-19 vaccination promotion programs(12).

Vaccinations are an example of collective action, where herd immunity is produced through widespread enrolment in immunization programs, which is the greatest way to lessen the severity of the illness and stop it from spreading (13). Recognizing the acceptance rate regarding COVID-19 vaccine will support for the development and application of effective approaches to enhance the vaccination for the pandemic, also minimizing the vaccine hesitancy for COVID-19 vaccine. hesitancy is defined as the “delay in acceptance or refusal of vaccination despite availability of vaccination services(14,15).

College students are a significant population of young adults to target for COVID-19 immunization. A variety reasons make college students vulnerable to COVID-19 infection, including communal living in on-campus and off-campus accommodation, the reopening of college campuses and activities and the need to travel between home and university(16).

1.2. Statement of the problem

COVID-19 had been a severe public health hazard globally since 2020, many countries were affected by the COVID-19 situation(17). There were around 609 million confirmed cases and just over 6 million deaths have been reported worldwide and in Africa more than 9 million confirmed cases and with greater than hundred seventy thousand deaths in the continent, as well as Ethiopia reported around 493,682 confirmed cases of COVID-19 with 7,527 deaths in September 2022(18,19). Low vaccine acceptance rate and high hesitancy to COVID-19 vaccine were still the major challenge to achieve the goal of herd immunity in the community(13,20). Vaccine hesitancy has become a serious and growing worry worldwide; this has a significant impact on the immunization rate that was anticipated and is one of the top ten threats to global health, according to the World Health Organization reports (21,22).

World Health Organization planned to vaccinate 10%, 40% and 70% by the end of Sept 2021, Dec 2021 and Jun 2022 respectively. Based on this strategy the first strategy for the end of 2021 was not achieved by 56 countries. This underachievement needs a quick strategic plan to achieve the Jun 2022 plan(23). Only approximately of 22.4% Africa's people have received a complete COVID-19 vaccination. According to the findings from a systematic review and meta-analysis done in Africa, the estimate of the pooled prevalence of intent to acceptance toward COVID-19 vaccine among adults in Africa is less than 50%, which indicates there are critical issues to manage and control this pandemic in Africa (15).

Ethiopia has received 2.2 million doses of COVID-19 vaccine from the COVID-19 vaccines Global Access (COVAX) facility and planned to vaccinate 20% of its population by the end of 2021. But the country vaccinated only 3.11% of the target population. Ethiopia introduced COVID-19 vaccine in a national launching ceremony in March 14/2021 GC. Aiming to improve vaccine uptake, the MOH has launched a communication campaign with support from WHO Ethiopia. Through this campaign, the ministry is transmitting information and calls to get vaccinated through short messaging system (SMS), different radio stations, and national television(24).

Several factors are raised with related to acceptance of the COVID-19 vaccine which are mainly with fear of the side effect, the short duration of time for production of the vaccine, lack of trust in manufacturing companies and other beliefs with the effectiveness of the vaccines, those factor can contribute to COVID-19 vaccine hesitancy(10).Vaccine hesitancy poses a challenge to combating the COVID-19 pandemic because herd immunity is dependent on availability of the vaccine and peoples willingness to receive the vaccine. Therefore it is important to understand the different attitudes of the community towards the vaccine to develop strategy for controlling vaccine hesitancy(25). It was revealed that University students had a poor level of intention to uptake for the COVID-19 immunization in China, Uganda and DRC accounting only 34.6%, 37.3% and 25.3% respectively(20,26,27).

Obviously there are no enough studies conducted in Ethiopia to assess the intention to uptake the COVID-19 vaccine. the vaccine acceptance rate in developing country like Ethiopian were low as few studies implies, study conducted in colleges of Addis Ababa, Wolkite and Jimma university about COVID-19 vaccine acceptance was 39.8%, 58.8% and 27.1% respectively (11,22,28). Generally vaccine acceptance rate were inadequate to attain the desire goal to develop herd immunity(11). Vaccinating such a population is very important. Additionally, studies that focus on students outside of their home area are limited. Perceptions and behaviours regarding vaccination could differ considering the diversity of nationalities and cultural backgrounds of various students enrolled in different programs. Therefore, the current study was assessing the level of intention to vaccinate COVID-19 vaccine in Jimma University students. Understanding students' intention toward the COVID-19 vaccine will be critical for effective immunization planning, response, and management strategies in the event of a COVID-19 pandemic.

1.3. Significance of the Study

A better understanding of COVID-19 vaccine will provide new insight in solving the problem related to intention to vaccinate COVID-19 vaccine. So, this study will have high importance to identify the factors of intention to vaccinate COVID-19 vaccine in Jimma university students.

This Study provides the base line information about intention to vaccinate COVID-19 vaccine at student level for policy and decision maker at different level and concerned organization. Investing on this critical issue is beneficial for stakeholders in the area and for the country as whole.

Information generated from the study was an input for local planners and decision makers for evidence based intervention. Generally, the study provide information to be used at different level including researchers and it is intended to improve limitations and gaps of previous studies.

This study also will contribute to the scientific community through better understanding of the relationship between intention to vaccinate COVID-19 vaccine and its predictor. Furthermore, the study will contribute as a new literature's and may serve, as source for reference and it will also serve as a spring board for other researchers who want to conduct detailed research on the issue.

CHAPTER TWO: LITERATURE REVIEW

2.1. Intention to vaccinate COVID-19 vaccine

As COVID-19 vaccines become available, vaccination intentions have been declining across countries, and there is an urgent need to address social inequalities in vaccine hesitancy and encourage widespread uptake of vaccines(29). A studies conducted from a samples 1247 of the HCWS only around 36% of participants were ready to take the COVID-19 vaccine, but most of the participants, around 56%, confirmed the safety of the data prior to vaccination, so the participants wanted to wait for at least 6 months, and at 279, 8% of the participants were not ready to take the vaccine at all. Therefore the reason raised for not taking the vaccine was related to the safety of the vaccine and no full information was delivered about the vaccine. (30,31)

A study conducted in china among international student's shows that 34.6% intended to accept the COVID-19 vaccine, but the left of 66.4% of the participants were not willing to accept the COVID-19 vaccine. Therefore as educational level the higher institution students were expected to be high acceptance rate as compared to the community but they had poor level of acceptance for the COVID-19 immunization (20). Another study conducted in democratic republic of Congo states that from out of 439 students around 25.3% of the participants were shows readiness to accept the COVID-19 vaccines, as well as more than 70% of the students were refusing the vaccine due to many reason related with conspiracy believe and vaccine side effect after vaccination.(27). With extension to that the same studies conducted in Egypt among medical students shows that only 34.9% of the students were accepting COVID-19 vaccine, the left of 66.1% was reluctant to the vaccine(32).

A systematic review and meta-analysis done on as ample of 22 studies reports that the overall acceptance rate of the COVID-19 vaccine among African adults was 48.93 percent, this implies that the COVID-19 vaccine acceptance in Africa, were not enough in achieving the goal of world health organization in Africa(15). An analytical cross-sectional study was conducted on 613 participants of HCWS in 23 universities and referral hospitals found in three towns in the Democratic Republic of Congo from march

to April on the acceptance of the COVID-19 vaccine states that around 38% of the participants are willing to accept the vaccine and the left of 72% were hesitant (33).

A descriptive analytic study was carried out on a sample of 3226 undergrad students attending three Italian universities in Rome, Bari, and Naples. The finding shows that more than half of the respondents were willing to accept the COVID-19 vaccine, but the Naples University students had a low acceptance rate as compared to Rome and Bari University, so the attitude towards the vaccine was increased time to time after taking the first dose of the COVID-19 vaccine. Generally, the participants were at a good level of awareness and knowledge related to the COVID-19 vaccine, that shows there is an effective communication method used during the COVID-19 campaign in a country(34).

According to a study conducted on medical students in Uganda, 376 (38.3%) of 600 participants were willing to accept the COVID-19 vaccine and 62.7% of them were unwilling to accept, which was related to the vaccine's safety; they read and listened to information from social media, newspapers, magazines, and peers or friends, which influenced them to not accept the vaccine definitively(26). A descriptive study was done in the state of South Carolina among college students who fulfil the criteria, which is at least who take a single dose of the COVID-19 vaccine was associated with the COVID-19 vaccine willingness to accept the vaccine, from 282 participants after being emboldened by health care professionals which is less than 50% of the respondents were show readiness to take the COVID-19 vaccine(35).

Study conducted in Ethiopia among college students in Addis Ababa on assessment of their knowledge and acceptance related to the COVID-19 vaccine, 39.8% of participants were willing to accept the COVID-19 vaccine and the left of 60.2% the participants were not intended to accept the vaccine (11).Studies carried out in Wolaita Sodo from a sample of 415 individuals show that near to half (46.5%) of the participants were shows redness to receive the COVID-19 vaccine(12).

2.2. Factors associated with intention to vaccinate COVID-19 vaccine

2.2.1. Socio-demographic factors

Understanding the barriers and facilitators of vaccines is a crucial step in implementing an effective intervention. In most studies investigating the association between intending to take COVID-19 vaccination and socio-demographic factors, older adults were more likely to be intending to take it than younger adult's(36). A study conducted on adult population shows that thus, adults who attended secondary school were almost three times more likely to accept the COVID-19 vaccine than comparable populations. Higher levels of education were found to be associated with increased approval of the vaccine.(37) .Studies conducted in Ethiopia found that the presence of health science students increased the likelihood of willing to accept the COVID-19 vaccine. In contrast, a student studying a health sciences subject was more likely to accept a COVID-19 vaccine as compared with other non-health science students. This may be because the health science student is familiar with her COVID-19 signs and symptoms and they simply understood the long-term costs of the pandemic(13).

A study done in Uganda shows that the acceptance rate for intent to accept vaccine against COVID-19,the participants age group between 18-20 were more likely to accept the vaccine(38). A study conducted on many European countries revealed that male participants accepted COVID-19 vaccine twice as compared to female(39).

2.2.2. COVID-19 vaccine literacy

Importantly, improving vaccine literacy in the low-literate population and establishing trust with healthcare providers on COVID-19 vaccination may minimize the percentage of people who are hesitant to COVID-19 vaccine (40). A cross sectional study conducted in Thailand among health volunteers shows that high vaccine literacy score were associated with intent to get vaccinated. People with high VL able to access, understand, analyze, evaluate and share information about vaccines, but in other way Individual with low VL have difficult access to health information and poor vaccination decisions.(41). Another study conducted in Japan on health care workers revealed that People with high vaccine literacy have a lower risk of having vaccine-related concerns and are more willing to take the COVID-19 vaccines. Higher vaccination literacy could lead to higher

vaccination coverage(42). Sufficient levels of COVID-19 VL, which is currently a high priority in public health action are necessary and critical, as high levels of VL and immunization can make a significant contribution to combating the on-going pandemic.(43) .

A studies done on chines college student revealed that Individuals with sufficient vaccine literacy are more likely to adopt COVID-19–related health behaviours, and COVID-19-related health behaviours will be positively linked with vaccine literacy(44). Another study states that a person with higher health literacy and better mask wearing, hand washing, physical distancing adherence were linked to a lower risk of suspected COVID-19 symptoms, this implies that health literacy were significantly associated with health protective behaviours(45). Another study conducted on medical students at Vietnamese universities states that higher levels of vaccine literacy were linked to less fear of COVID-19 than those with lower levels of vaccine literacy(46).

2.2.3. Perceived Susceptibility and Severity to COVID-19 disease

A study conducted in Lebanese among health care workers states that in terms of exposures, the majority of participants (86.5%) believed they were vulnerable to getting COVID-19 as a result of their workplace contact, and 91.6 per cent agreed that healthy persons can contract COVID-19. Only half of them (49.8%) claimed to be able to protect oneself better than others.(47). Another study conducted in Pakistan on health professional shows that the perceived vulnerability to SARS-CoV-2 (i.e., high infectivity ratio) correlates to increased COVID-19 vaccination intentions among health personnel and the general public and significantly associated with vaccination intention(48).

A population based cross sectional study conducted in Hong Cong revealed that perceived severity and perceived susceptibility of the participants to COVID-19 were positively correlated with COVID-19 vaccine acceptance and significantly associated(49). The other study done in Lebanese in terms of the severity and seriousness of COVID-19 infection, the majority of polled HCWs thought it was severe and agreed that it could be fatal in some cases. Furthermore, the majority of respondents (85.6%) believe COVID-19 is more dangerous than influenza. However, around 29.3 per cent of participants believed

they would become very unwell if they got COVID-19, while 30.7 per cent believed they would become very sick(47).

According to a study conducted from October 19 to October 30 in Taiwan with a sample of 1020, around 48.3% of the participants were refusing the vaccination, concerning risk perception, around 63.5% of the participants thought COVID-19 in Taiwan were not serious and nearly 40% of the respondents were not concerned about infection with COVID-19, therefore Participants with a higher perceived severity of COVID-19 reported that their probabilities of refusing the vaccination were much higher than the others (50).

During various infectious disease epidemics, men express lower perceptions of disease susceptibility than women; also it states risk perceptions differ by gender and age, as well as from person to person(51). Studies conducted in turkey the finding imply that during a novel coronavirus pandemic, susceptibility, perceived risk, and fear can greatly enhance engagement in COVID-19 preventative behaviours(52).

2.2.4 Descriptive Norm

According study conducted in Ethiopia shows that People who had a good descriptive norm and a better sense of behavioural control was more likely to intend to practice the COVID-19 PPMs. This means that the participants was influenced by their perceptions of social pressure and normative belief (53). Also another studies conducted in Germany on undergraduate student revealed that those participant with high descriptive norm has good intention and positive relationship with COVID-19 vaccination(54).

A descriptive study conducted on COVID-19 intention states that descriptive norm is significant predictor of COVID-19 vaccination intention(55). According to study conducted in Ethiopia says that Socio-demographic factors mainly sex and education level, from this male and degree were significantly associated with descriptive norm in acceptance of COVID-19 vaccine(56). Another study conducted in Pakistan shows that the positive relationship between descriptive norm and getting COVID-19 immunizations reflects discussions with friends and family about the relevance of the vaccines, which influences their readiness to immunize against SARS-CoV-2 (48).

2.2.5. Attitude towards COVID-19 vaccine

A cross-sectional study from South Carolina on COVID-19 vaccine acceptance among college students shows participants with positive attitude towards COVID-19 vaccine reported that they would definitely take the COVID-19 vaccine when available. Additionally, their intention toward taking the COVID-19 vaccine was influenced by authoritative advice from their schools, governments, and doctors(57). The attitudes toward the COVID-19 vaccine in Bangladesh also seem to be related to the female gender and a history of vaccination.(58). As study conducted in Malta shows that positive attitude towards COVID-19 vaccine was significantly associated with willingness to take covid-19 vaccine(59). Another community based cross-sectional study conducted in Ethiopia shows peoples with positive attitude towards the covid-19 vaccine revealed that they likely take the vaccine if it's recommended by health professionals(37) .

2.2.6. COVID-19 preventive practice

Study conducted in Jordan among university students states that more 95% of the respondents were applying the preventive measures like, hand washing, wearing mask, alcohol and sanitizer hand rub and others to prevent the COVID-19 virus pandemic(60). Another studies conducted among nursing students on their preventive behaviour related during the COVID-19 pandemic, exhibited that a high level of adherences were seen among participants to preventive measures, the vast majority of participants correctly identified important behaviours that reduce the risk of COVID-19 infection (61).

A study has found that students who have family members who use COVID-19 preventative techniques are more likely to accept the COVID-19 vaccine than that of no family members. This implies that families can tell their kids that they must closely adhere to COVID-19 preventive measures and the immunization is essential(13).A descriptive study conducted on HCWs in south west Ethiopia shows that participants who have good preventive practice towards covid19 were more likely have intention to take the vaccine than among poor practice(62)

Conceptual Framework

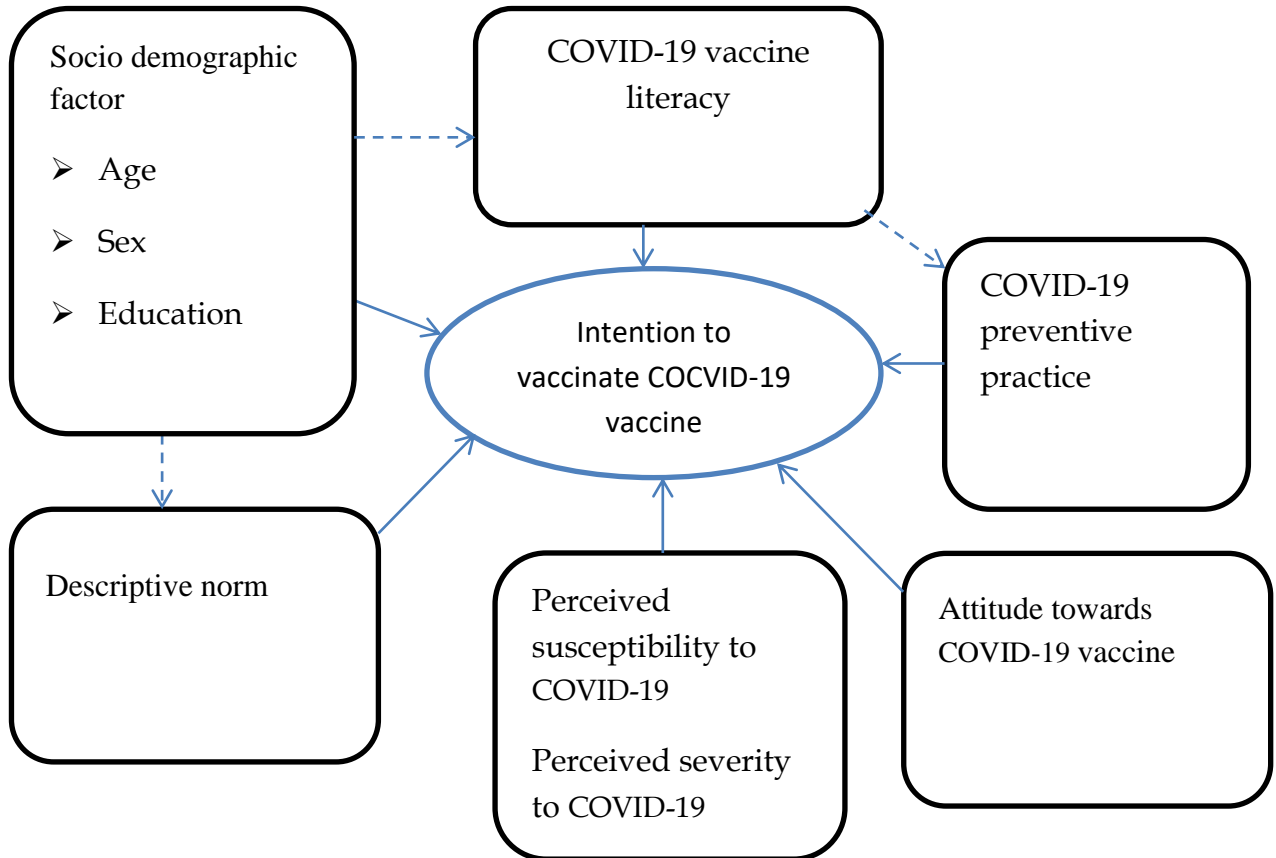


Figure 1: Conceptual framework of Intention to vaccinate COVID-19 vaccine and associated factors drawn based on reviewing different literatures (36, 39, 47, 49, 55 and 57)

CHAPTER THREE: OBJECTIVE

3.1. General objective

- To assess the level of intention to vaccinate COVID-19 vaccine and associated factor among Jimma University under graduate students

3.2. Specific objectives

- To determine the level of intention to vaccinate COVID-19 vaccine among Jimma university undergraduate students
- To identify associated factors of intention to vaccinate COVID-19 vaccine among Jimma university under graduate students

CHAPTER FOUR: METHOD AND MATERIALS

4.1. Study Area and Period

The study was conducted in Jimma University; which is a public research university located in Jimma town, Oromia region, Ethiopia which is found 352 far from Addis Ababa the capital city of the country in south west Ethiopia. It established in 1952 when Jimma College of agriculture was founded and it is recognized as the leading national university as ranked by federal ministry of education. The university has totally 43000 students are attending in regular, evening ,weekend and distance education with 56 in under graduate and 103 post graduate program. The data was collected from April –May 2022.

4.2. Study Design

A cross sectional quantitative study design supplemented by qualitative method was employed.

4.3. Source Population and Study Population

4.3.1. Source Population

- All regular under graduate students of Jimma university

4.3.2. Study Population

- Randomly Selected regular under graduate students during the time of data collection was used as the study participants.
- For qualitative part purposively selected students and key informants were used during the study time.

4.4. Eligibility Criteria

4.4.1. Inclusion Criteria

- Students who were available during data collection time were included in the study.

4.4.2. Exclusion Criteria

- Students who take the COVID-19 vaccine were excluded from the study.

4.5. Sample Size determination and Sampling Technique

4.5.1. Sample Size determination

The sample size was determined using single population formula with assumption of 69% COVID-19 vaccine acceptance rate in Debre Birhan University north west Ethiopia (13) was used assuming 95% confidence interval, precision of 5% between the sample and 10% non-response rate.

$$n = \frac{\left[\frac{Z_{\alpha}}{2} \right]^2 pq}{d^2}$$
$$n = \frac{[1.96]^2 0.69 * 0.31}{(0.05)^2} = 329$$

With adding 10% non-response rate the total sample size 362 was taken from under graduate students found in Jimma University were participated in the study. The study subjects were allocated in department by using proportional allocation formula.

4.5.2. Sampling technique

From Jimma University two colleges were selected randomly. Based on the number of the students proportional allocation were made to each college namely Institute of health and College of Business and Economics department was selected randomly. Students list were obtained from their respective departments and a simple random method was used to select the study participants by lottery method. Purposive sampling technique was used to conduct an in-depth interview for qualitative study. For the qualitative part the principal investigator purposively invited students from the four departments of anaesthesia, medical laboratory, economics and accounting and key informant interview from student services directors, student union and CDC and HIV/AIDS coordinator. Then they were involved in the in-depth interview. Saturation of idea was used to limit number of in-depth interviews to 12.

4.6. Study Variables

4.6.1. Independent variables

- ❖ Socio demographic characteristics (age ,sex, religion Marital status, college and department)
 - COVID-19 vaccine literacy
 - Perceived severity to COVID-19
 - Descriptive norm
 - Perceived susceptibility to COVID-19
 - COVID-19 Preventive practice
 - Attitude towards COVID-19 vaccine

4.6.2. Dependent Variables

- ❖ Intention to vaccinate COVID-19 vaccine

4.7. Data Collection Tools and Procedure

4.7.1. Data Collection Tools

The quantitative data was collected using semi-structured self-administered questionnaire which is adapted after reviewing relevant different literatures (41,63–71). It consisted of six parts. Part one are on socio demographic and economic data that comprised of 10 items. Part two have 2 items of 5-point likert scale to measure intention to vaccinate COVID-19 vaccine. Part three contained 6 items of 5-point likert type scale to measure descriptive norm. Part four contained 12 items of 5-point likert type scale to measure susceptibility and severity of COVID-19. Part five contain 12 items of 5-point likert type scale to measure COVID-19 preventive practice and part six also contain 12 items of 5-point likert type scale to measure COVID-19 vaccine literacy. The responses categories are 5-point likert scales ranging from 1 strongly disagree to 5 strongly agree. After conducting factor analysis, factor with Eigen value greater than one was extracted and the items with scale of reliability coefficient (Crombach's alpha) of greater than 0.60 was considered. Only items having a communality of >0.50 on factor analysis were retained for further analysis. After conducting factor analysis, emerged scales/latent variables as part of the tools, were reported under operational definition with the total

variability explained and reliability coefficient. Factor loading of > 0.4 each of the items are reported. For qualitative data interview guide was developed using five items that are open for further detail questioning (probe) in manner that it addresses the prevention practice of COVID-19, beliefs related to COVID-19 vaccine, attitude, and source of information and perception of students towards intention to vaccinate COVID-19 vaccine. In order to support the quantitative data in-depth interviews was conducted on 12 participants who are purposively selected. The questionnaire were adapted from different literatures(72,73).

4.7.2. Data Collection Technique

The data was collected using a semi- structured self-administered questionnaire which was distributed to the study participants by data collectors. The study participant was invited to participate voluntarily by explaining the rational of the study at the time of data collection. The questionnaires were distributed by trained data collectors to all eligible students at the same time during the entry or exit times after informing them to fill the questionnaires privately. In-depth interview was conducted for 45-60minutes with 12 respondents at different unit after informing the rationale of the study privately by the principal investigators and one health education student (MPH) to get more accurate information that supplements the quantitative data. Each interview was tape-recorded and transcribed on the same day of the interview sessions. Study participants were students of Jimma University. The in-depth interviews were conducted in places where there is no interruption, and privacy was well maintained. The PI was responsible for supportive supervision on the spot and checking questionnaire on daily basis for self-administered data collection. The results of the qualitative study were presented concurrently with the quantitative study.

4.7.3. Data collectors and supervisors

Four nurses (BSc.) holder was recruited as data facilitators for quantitative self-administered questionnaire from the hospital with and without experience in data collection, but fluent in Amharic, & English language. In-depth interview was conducted by one health education specialty students (MPH). Over all supervision was conducted by principal investigator. They have been trained for two days by the principal

investigator on the objectives of the study, confidentiality and privacy of the participants, data collection procedures and how to keep it appropriately data collectors and supervisors.

4.7.4. Measurements and Operational definition

Descriptive norms related with COVID-19 vaccine: - students intended to take the COVID-19 vaccine when most of the students took the vaccine or the students intend to take the vaccine if they think other students will take the vaccine. This was measured using 6 items of 5-point Likert scale and 1 denoting none of them and 5 denoting all of them. After conducting factor analysis, the following scales were emerged as part of the tools that measure Descriptive norm: A factors with Eigen value greater than one were extracted. The factor explained 66.7% of the variability in Descriptive norm among the respondents. The factor is loaded with six items includes, How many of people in this University do you think will receive COVID-19 vaccine, How many of health workers do you think will receive COVID-19 vaccine, How many of your friends (classmates) do you think will receive COVID-19 vaccine, If vaccine is recommended for them, how likely do you think most of your friends (classmates) will get a COVID-19 vaccine, If vaccine is recommended for them, how likely do you think most of your teachers will get a COVID-19 vaccine, If vaccine is recommended for them, how likely do you think most of your family will get a COVID-19 vaccine. The reliability coefficient for this single factor was 0.756. Out of the total 6 items entered in to the model, two items were removed due to anti image and communality effect observed. Each score was created on a factor analysis and higher scores indicate higher descriptive norms related with COVID-19 vaccine.

Perceived susceptibility to COVID-19: - Refers to a student's subjective perception of the risk of acquiring COVID-19. This was measured using 6 items of 5-point Likert scale and 1 denoting strongly disagree and 5 denoting strongly agree. After conducting factor analysis, the following scales were emerged as part of the tools that measure perceived susceptibility: A factors with Eigen value greater than one were extracted. The factor explained 64.8% of the variability in perceived susceptibility to COVID-19 among the

respondents. The factor includes six items like, I afraid COVID-19 because people may discriminate me if I get it, I think that I am at risk for getting COVID-19 because I am a University student, No matter what I do, I'm likely to get COVID-19 at University, In many aspects, I am less likely to acquire COVID-19 at University, I think it is less likely for me to acquire COVID-19 as I am a young, University students are so young enough and can't get COVID-19. The reliability coefficient for this factor was 0.800. Out of the total 6 items entered in to the model, one item was removed due to anti image and communality effect observed. Each score was created on a factor analysis and higher scores indicate higher perceived susceptibility to COVID-19.

Perceived severity to COVID-19: - Refers to a student's perception on the seriousness of contracting COVID-19 and have severe sign and symptoms which can leads to social isolation and death. This was measured using 6 items of 5-point Likert scale and 1 denoting strongly disagree and 5 denoting strongly agree. After conducting factor analysis, the following scales were emerged as part of the tools that measure perceived severity: A factors with Eigen value greater than one were extracted. The factor explained 64.8% of the variability in perceived severity of COVID-19 among the respondents. The factor contain six items which is, I believe that COVID-19 infection is severe disease, I believe that COVID-19 can leads to death, I believe that COVID-19 has serious consequences on my future life, The COVID-19 is severe disease for everybody, The COVID-19 is severe disease for young people like me, COVID-19 has serious impact on my school performance. The reliability coefficient for this factor was 0.800. Out of the total 6 items entered in to the model, two items were removed due to anti image and communality effect observed. Each score was created on a factor analysis and higher scores indicate higher perceived severity to COVID-19.

COVID-19 vaccine literacy- students who have the ability to find, understand, read, looking and use information which is related to COVID-19 vaccine. This was measured using 12 items of 5-point Likert scale and 1 denoting never and 5 denoting always. After conducting factor analysis, the following scales were emerged as part of the tools that measure covid19 vaccine literacy: A factors with Eigen value greater than one were extracted. The factor explained 67.8% of the variability in vaccine literacy among the

respondents. The factor was loaded with twelve items includes, Have you considered the credibility of the sources, Have you had the opportunity to use the information, Did you check whether the information was correct, Did you find any useful information to make a decision on whether or not to get vaccinated, Did you find the information you were looking for, Did you discuss what you understood about vaccinations with a doctor or other people, Have you consulted more than one source of information, Did you consider whether the information collected was about your condition, Did you find that the texts were difficult to understand, Did you need much time to understand them, Did you find words you didn't know, Did you or would you need someone to help you understand them. The reliability coefficient for this factor was 0.819. Out of the total 12 items entered in to the model, four items were removed due to anti image and communality effect observed. Each score was created on a factor analysis and higher scores indicate higher COVID-19 vaccine literacy.

Attitude to get COVID-19 vaccination: It is the degree to which the person has favourable or unfavourable evaluation of being vaccinated against COVID-19. This was measured using 4 items of 5-point Likert scale and 1 denoting strongly agree and 5 denoting strongly dis agree. After conducting factor analysis, the following scales were emerged as part of the tools that measure attitude: A factors with Eigen value greater than one were extracted. The factor explained 66% of the variability in attitude towards covid-19 vaccine among the respondents. The total score was computed and higher score indicates more favourable towards the vaccine.

COVID-19 Preventive practice: continuous wearing face mask, hand washing, physical distancing; avoid shaking hands for greeting and covering cough using the bend of elbow. This was measured using 12 items of 5-point Likert scale and 1 denoting never and 5 denoting always. After conducting factor analysis, the following scales were emerged as part of the tools that measure preventive practice: A factors with Eigen value greater than one were extracted. The factor explained 64.9% of the variability in preventive practice among the respondents. The factor was loaded with twelve items includes, Not touch your face, eyes, nose and mouth, Shared cups, eating utensils, food or drinks with others students, Used facemasks in transportation such as school buses, Maintained physical

distancing of at least 1meter while in classroom, Maintained physical distancing of at least 2 meter while in outside classroom, Avoided going to crowded places in schools such as sports, student, gatherings, Wash your hands frequently with soap and water or using alcohol based hand rub, Avoided shaking hands for greetings, Covered your cough using the bend of your elbow or a tissue, Carefully disposing tissue disposable items in closed bin, Share what you learn about preventing COVID-19 with your family and friends, Attend health education in the school about prevention of COVID-19. The reliability coefficient for this single factor was 0.797. Out of the total 12 items entered in to the model, five items were removed due to anti image and communality effect observed. Each score was created on a factor analysis and higher scores indicate higher COVID-19 preventive practice.

Intention to vaccinate COVID-19 vaccine: is an indication of individual readiness to get vaccinated. This was measured using 2 items of 5-point Likert scale and 1 denoting strongly disagree and 5 denoting strongly agree. The score was created and higher score indicates higher intention to vaccinate COVID-19 vaccine. Note: The mean scores for all scales were reported as the percentages of scale mean score (%SM) after standardized the mean was calculated. It ranges from”0%.” to “100%”.

$$SM\% = \frac{\text{Actual score} - P. \text{ minimum}}{P. \text{ Maximum} - P. \text{ minimum}} \times 100\%$$

P. Maximum –P. minimum

After calculating the percentages of maximum possible scale score using the above formula for each scale scored by each case, the percentages scale mean (%SM) was analysed descriptively. After conducting factor analysis, the following scales were emerged as part of the tools that measure intention to vaccinate COVID-19 vaccine: Single factors with Eigen value greater than one were extracted. The single factors explained 72.58% of the variability among the respondents. I have high intention to be immunized with a COVID-19 vaccine; I would recommend the COVID-19 vaccine to my friends and colleagues to get protection from COVID-19 disease. The reliability coefficient for this single factor was 0.949.

4.7.5. Data Quality management

The questionnaire was prepared in English based on the higher Educational standards .the questionnaire was reviewed for appropriateness of wording; clarity of both contents and whether instructions elicited is going with responses. Moreover; during data collection time the principal investigator had been checked how the data collectors were doing their task. Also at the end of each data collection, the completeness of filled questionnaires has been checked by the principal investigator to ensure the quality of the collected data. Crombach's alpha was calculated to test internal consistency (reliability) of items. Crombach's alphas >0.6 was incorporated to the final analysis.

4.7.6. Data processing and Analysis

Editing and sorting of the collected questionnaires was done manually every day to check for completeness. The completed questionnaire was coded and entered into a data entry template in Epi-Data version 3.1. After checking and correcting errors, the data was exported to SPSS version 23.00 for analysis. All assumptions of linear regressions were checked. Normality of distribution was checked by observing p- plot and distribution of all the points over the line as well as by using histogram. Linearity was checked by observing scatter plot and observing proportional distribution of dependent and independent variables. Multicollinearity was checked by examining the variance inflation factors (VIF) and all the values of VIF were less than ten which signals no Multicollinearity. Finally, homoscedasticity was checked by observing all residual and scatter plots. So, all plots contained points were of the same width. In addition to this, all the assumptions of factor analysis were checked to conduct data reduction. Bartlett's Test of Sphericity was checked and it was taken as significant at $p=0.001$. Sampling adequacy for factor analysis was checked with Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the results in this measurement were accepted if it is >0.5 . Varimax rotation also was employed during factor extraction to minimize cross loading of items to many factors. Raw means, standard deviations, mean scores, and summary tables were used for describing the data. Simple linear regression was conducted and significant variables at $p\text{-value}<0.25$ were candidate for multiple linear regressions. The reduced model was constructed using forward model selection method. The qualitative data was analysed manually using thematic analysis method and support with the quantitative data.

4.8. Ethical Consideration

After approval of the proposal, ethical clearance & formal letter was obtained from Ethical Review Board of Jimma University Institute of Health. Then a letter was secured from the university to respective colleges to gain support for the study. Prior to administering the questionnaires, the aims and objectives of the study were explained to the participants and personal consent was obtained from study participant after explaining the objective of study. The confidentiality and anonymity was ensured throughout the execution of the study as participants were not requiring disclosing personal.

4.9. Dissemination plan

The findings will be presented to the Jimma University scientific community in a defense and the result will be submitted to the Jimma University Institution of Health and department of Health behavior and society. The findings will also be communicated to Jimma University to enable them to take and apply research recommendations during their planning process. Publications in peer-reviewed, national, or international journals will also be done.

CHAPTER FIVE: RESULT

5.1. Socio-demographic characteristics

Out of all eligible 362 students 359 of them were returned the questioners, making the response rate of about (99.1%). From the participants around 203(56.5%) were male and 156(43.5%) were female. Almost greater than half of the respondent's age was <25 years (80.5%) and the median age was 22 and majority of the participant's marital status were unmarried 330 (91.9%). From the respondents around 198(55.2%) were health science college and 161(44.8%) were business and economics college. From participants Anaesthesia 115(32.1%) and Accounting 91(25.3%) account the highest number. Out of 359 students 51(14.2%) of them are first year students, 105(29.2%) were second year, 41(11.5%), third year and 163(45.1%) were fourth year and above.

Table 1: Frequency distribution of socio-demographic characteristics among Jimma university under graduate students south west Ethiopia 2022 (n=359)

Variable	Category	No (%)
Age	<25	289(80.5)
	≥25	70(19.5)
Gender	Male	203(56.5)
	Female	156(43.5)
Marital status	Unmarried	330(91.9)
	Married	27(7.5)
	Other	2(0.6)
Religion	Orthodox	146(40.7)
	Muslim	91(25.3)
	Protestant	106(29.5)
	Other	16(4.5)
Nationality	Ethiopia	354(98.6)
	Other	5(1.4)
Ethnicity	Oromo	161(44.8)
	Amara	125(34.8)

	Tigre	26(7.2)
	Other	47(13.1)
College	Health Science	198(55.2)
	Business and Economics	161(44.8)
Department	Anaesthesia	115(32.1)
	Laboratory	83(23.1)
	Economics	70(19.5)
	Accounting	91(25.3)
Year of study	First year	51(14.2)
	Second year	105(29.2)
	Third year	41(11.4)
	Fourth year and above	162(45.1)

5.2. Level of intention to vaccinate COVID-19 vaccine

The Percentages mean score of students who participated in this study on intention to vaccinate COVID19 vaccine was 57.6 % (SD= 25.7). On the other hand, mean raw score of participants' intention to vaccinate COVID-19 vaccine was 30.4±5.33. Among the participants, above one third 137(38.2%) of them agreed that they recommend the COVID-19 vaccine to their friends and colleagues to get vaccinated and 135% (37.6%) of them agree that, have high intention to be immunized with COVID-19 vaccine. The percentage mean score of attitude among students participated in this study was 59 % (SD=12.2) with mean raw score of 20±2.55. Among the participants more than half (76.3%) of them agreed that, in my opinion getting COVID-19 vaccines plays a great role in protecting my life.

Table 2: Intention to vaccinate COVID-19 vaccine and attitude among Jimma university under graduate students south west Ethiopia, 2022

Items	scale				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Intention to vaccinate COVID-19 vaccine					

I have high intention to be immunized with a COVID-19 vaccine.	49(13.6%)	135(37.6%)	56(15.6%)	84(23.4%)	35(9.7%)
I will recommend the COVID-19 vaccine to my friends and colleagues to get vaccinated	45(12.5%)	137(38.2%)	106(29.5%)	55(15.3%)	16(4.5%)
Attitude of participant towards COVID-19 vaccine					
For me getting vaccinated against COVID-19 is good for us	6(1.7%)	261(72.7%)	26(7.2%)	59(16.4%)	7(1.9%)
Getting the COVID-19 vaccine will make me feel happy	21(5.8%)	256(71.3%)	20(5.6%)	53(14.8%)	9(2.5%)
In my opinion getting COVID-19 vaccines plays an great role in protecting my life	2(.6%)	274(76.3%)	31(8.6%)	52(14.5%)	
Getting the COVID-19 vaccine has a positive influence on my health.		256(71.3%)	32(8.9%)	70 (19.5%)	1(.3%)

The participant of in-depth Interview states that vaccine is an important thing to protect peoples from different disease, but in the case of COVID-19 vaccine many rumors were raised related with the effectiveness of the vaccine like after vaccinated the individual was infected by the virus and the vaccine cannot protect the virus totally. The student doubt safeness and effectiveness of the vaccine, and there is ambiguity related with its production how and from where it comes what ingredient it produced since it is not produced in our country and the like leads the students to refusing the vaccine.

“ One who a 25 years old respondent says that my friend was diabetic patient he saw many information related with comorbidity disease condition and he put himself as at high risk at that time, after that he took the vaccine immediately when a vaccine arriving at Jimma town. But later on time he complains sign of COVID-19, and then when he goes to hospital and tested for COVID-19 he was positive, therefore there is no difference between vaccinated and non-vaccinated peoples and I reject the vaccine”.

“Another participant of 22 years old male student said that there are many things talked about the vaccine, I don’t know how much it’s good or bad and many people get sick and complain of headache, fever and joint pain after they received the vaccine. Due to that I ’am afraid of the vaccine and I decide not to vaccinate at that time”.

5.3. Descriptive norm

The percentage mean score for descriptive norm participant was 50.03 %(SD 15.945) and the mean raw score of descriptive norm was 18.008± 3.82. Among the participants near to half 171 (47.6%) of some of them that how many of your friends (classmates) do you think will receive a COVID-19 vaccine and 162(45.1%) of participants most of them that, how many of people in this University (e.g. teachers) do you think will receive a COVID-19 vaccine.

Table 3: descriptive norm among Jimma university under graduate students south west Ethiopia 2022

Items	Scale				
	None of them	Some of them	Undecided	Most of them	All of them
How many of people in this University (e.g. teachers) do you think will receive a COVID-19 vaccine	3(.8%)	103(28.7%)	81(22.6%)	162(45.1%)	10(2.8%)
How many of health workers do you think will receive a COVID-19 vaccine		123(34.3%)	96(26.7%)	118(32.9%)	22(6.1%)
How many of your friends (classmates) do you think will receive a COVID-19 vaccine	12(3.3%)	171(47.6%)	80(22.3%)	89(24.8%)	7(1.9%)
If vaccine is recommended for them, how likely do you think most of your friends (classmates) will get a COVID-19 vaccine	16(4.5%)	121(33.7%)	103(28.7%)	101(28.1%)	18(5.0%)
If vaccine is recommended for them, how likely do you think most of your teachers will get a COVID-19 vaccine	9(2.5%)	168(46.8%)	55(15.3%)	103(28.7%)	24(6.7%)
If vaccine is recommended for them, how likely do you think most of your family will get a COVID-19 vaccine	35(9.7%)	129(35.9%)	68(18.9%)	87(24.2%)	40(11.1%)

In in-depth interview, some stated they did not have enough information about the COVID-19 vaccine and wanted to see other people take it first. A majority of the

respondents feared it would not be effective or have too many side effects, and as a result, stated that they preferred other methods to prevent COVID-19. A few of the participants thought that the vaccine that would be distributed in Ethiopia would be of lower quality. Others thought it would be used as a biological weapon by the developed nations to cause infertility and control the population of poor countries. Moreover, it was also mentioned that the vaccines might be used as a weapon to insert drugs made by the illuminati into the body as the mark of the beast "(666)" that would cause them to forsake their faith. A few others did not think they needed the vaccine because they had God's protection.

"A 20 years old male student says that I do any things in religious context, but during watching tik tok I saw that person who gets vaccinated while applying coin to vaccination site they attract the coin as magnet effect, so I think that they prepare as the community for micro-chips for the next round."

Another "A 24 years old respondent said that a religious taken as a spirit of 666 because of during the end of century devil utilize people for bad things even they talk to get market also need to be member of the spirit and they implanted chips into hands and to access many information from the person simply without expending any resource. I don't think the vaccine will come to this country, and even if it does, I don't need it; God will be my vaccine."

5.4. Perceived Severity and Susceptibility

Perceived Severity and Susceptibility to covid-19, the percentage mean score for severity to COVID-19 participant was 65.59 % (SD=24.249) and percentile mean score for susceptibility to COVID-19 participant was 30.99 % (SD=21.460). the mean raw score for severity to COVID-19 scale was 21.74 ± 5.81 and the mean raw score for susceptibility to COVID-19 was 8.95 ± 3.43 . Among the participants near to half 158 (44%) of them strongly agreed for severity to COVID-19, that I believe that COVID-19 can leads to death and 136(37.9%) of them disagreed for susceptibility to COVID-19 that, in many aspects, I am less likely to acquire COVID-19 at University.

Table 4: perceived susceptibility to COVID-19 among Jimma university under graduate students south west Ethiopia 2022

Items	Scale				
	strongly disagree	Disagree	Undecided	Agree	strongly agree
I think that I am at risk for getting COVID-19 because I am a University student	39(10.9%)	77(21.4%)	72(20.1%)	131(36.5%)	40(11.1%)
No matter what I do, I'm likely to get COVID-19 at University	84(23.4%)	108(30.1%)	79(22%)	64(17.8%)	24(6.7%)
In many aspects, I am less likely to acquire COVID-19 at University	92(25.6%)	136(37.9%)	64(17.8%)	54(15%)	13(3.6%)
I think it is less likely for me to acquire COVID-19 as I am a young	103(28.7%)	131(36.5%)	63(17.5%)	49(13.6%)	13(3.6%)
University students are so young enough and can't get COVID-19	204(56.8%)	86(24%)	32(8.9%)	21(5.8%)	16(4.5%)

Table 5: perceived severity to COVID-19 among Jimma university under graduate students south west Ethiopia 2022

Items	Scale				
	strongly disagree	Disagree	Undecided	Agree	strongly agree
I believe that COVID-19 infection is severe disease	17(4.7%)	56(15.6%)	31(8.6%)	126(35.1%)	129(35.9%)
I believe that COVID-19 can leads to death	14(3.9%)	29(8.1%)	59(16.4%)	99(27.6%)	158(44%)
I believe that COVID-19 has serious consequences on my future life	23(6.4%)	63(17.5%)	52(14.5%)	134(37.3%)	87(24.2%)
The COVID-19 is severe disease for everybody	19(5.3%)	92(25.6%)	77(21.4%)	93(25.9%)	78(21.7%)
The COVID-19 is severe disease for young people like me	34(9.5%)	83(23.1%)	63(17.5%)	120(33.4%)	59(16.4%)
COVID-19 has serious impact on my school performance	15(4.2%)	48(13.4%)	72(20.1%)	83(23.1%)	141(39.3%)

The findings on the qualitative part of the study states that majority of the participants were very afraid and anxious initially, believing that they were definitely getting infected

and that they would certainly die if they caught it. Some stated that while they were still aware that it was a serious illness, they were less concerned since they believed it was preventable. Others stated that the reason for their lack of or decreasing concern was that they believed they would recover if they got infected. In contrast to these responses, we also found participants who stated that while they initially were not concerned, they are starting to get worried now since the number of infected individuals and the resulting death to all in this country is increasing.

“One 23-year old male participant stated that "I am not scared because I expected this to happen; we brought this on ourselves and we are paying for our sins." It has been a long time coming. I was afraid that everyone in Ethiopia would die because even white people could not handle it. I think the only reason we have survived is because Ethiopia is God’s country”.

A key informant interviewers rose that students were not treat as the COVID-19 virus as serious diseases and they didn’t give attention to the disease, simply they can move her and there without any protective measures, in case of susceptibility they were exposed to the virus because they were living in communal in the dorm, crowded in dining places and classroom.

5.5. Preventive practice

Preventive practice Percentile means score of participant was 60.84 %(SD =11.842) and the average raw score was 41.20±8.1. Among the participants above half 212(59.2%) of the participants most often wash their hands frequently with soap and water and 211(58.8%) of them most often used face masks in transportation such as public bases and taxi.

Table 6: COVID-19 preventive practice among Jimma university under graduate students south west Ethiopia 2022

Items	Scale				
	Never	some times	Undeci ded	most often	Always
Not touch your face, eyes, nose and mouth	10(2.8%)	126(35.1%)	2(.6%)	178(49.6%)	43(12%)
Shared cups, eating utensils, food or drinks with	23(6.4%)	119(33.1%)	23(6.4%)	132(36.8%)	62(17.3%)

others students		1%)	%)	%))
Used facemasks in transportation such as public buses and taxi		41(11.4%)	8(2.2%)	211(58.8%)	99(27.6%)
Maintained physical distancing of at least 1meter while in classroom	31(8.6%)	103(28.7%)	31(8.6%)	129(35.9%)	65(18.1%)
Maintained physical distancing of at least 2 meter while in outside classroom	85(23.7%)	104(29%)	43(12%)	100(27.9%)	27(7.5%)
Avoided going to crowded places in schools such as sports, student, gatherings	44(12.3%)	131(36.5%)	36(10%)	97(27%)	51(14.2%)
Wash your hands frequently with soap and water or using alcohol based hand rub	3(.8%)	24(6.7%)	15(4.2%)	212(59.2%)	105(29.2%)
Avoided shaking hands for greetings	23(6.4%)	91(25.3%)	11(3.1%)	131(36.5%)	103(28.7%)
Covered your cough using the bend of your elbow or a tissue	42(11.7%)	41(11.4%)	26(7.2%)	128(35.7%)	122(34%)
Carefully disposing tissue disposable items in closed bin	5(1.4%)	90(25.1%)	45(12.5%)	117(32.6%)	102(28.4%)

Interviewees who were asked about their practice towards COVID-19 prevention stated that they did not think the University administration was not taking the pandemic seriously. They justified it by saying that in the early stages of the pandemic, they were actively working on it as a campaign. However, as time goes by, the activities towards prevention and awareness creation have become disorganized and loose. A COVID-19 prevention practice in our campus was decreased. It seems the student has an awareness of the pandemic, but they are not practicing the prevention mechanisms. The interviewees unanimously agreed that the prevalence of the pandemic is increasing day to day. In prevention of COVID-19 pandemic some of the respondents exercising the prevention methods by wearing mask, proper hand washes with soap and water, rubbing hands with sanitizer and keeping distance in and outside of the class room. As some participants rose that even mask wearing and hand washing is not enough to protect the person from COVID-19 virus, when he/she appropriately use the protective equipment's.

“A 20 years female student says initially we practice everything as commanded officially. At dormitory level most of my friends was not leave from dorm, even if when we go to cafeteria we keep our distance as much as possible. We used mask, avoid closing each other even in bed and making the class in good ventilation during the pandemic time.”

“A 22 years male student raised that I practice self-protective measures because my duty as a health science student even if it’s unwanted even if it’s in non COVID-19 circumstance I protect myself but in COVID-19 someone comes to me only but I contact many clients/peoples due to that I always use masks, glove and distance as much as possible in most area of peoples collected.”

As participants of key informants stated that the preventive measures that is used protect the students from the COVID-19 the University take some action in reducing the transmission of the virus from person to person by putting soap and water in areas were students simply access. Also it’s not adequate to distribute the protective equipment to the whole students like face mask and sanitizers, because of the shortage of the resources as a government the students buying by themselves and prevent the virus as much as possible.

Student’s exercises COVID-19 preventive measures like hand washing with soap, sanitizing their hands with sanitizer, wearing face mask, avoiding hand shaking for greeting and far from where mass gathering places. But most of the students were complain of related shortage of protective materials like face mask and soap during the pandemic (Jimma University student union vice president).

5.6. COVID19 vaccine literacy

The percentages mean score for COVID-19 vaccine literacy participant was 62.9 % (SD=11.69) and the mean raw score of COVID19 vaccine literacy was 27.806± 5.61. Among the participants above half 219(61%) of them some times that, when you look for information/news about COVID-19 vaccine, Have you consulted more than one source of information and 138(38.4%) of the participants most often that, when you look for information/news about COVID-19 vaccine, did you check the information was correct

Table 7: COVID-19 vaccine literacy among Jimma university under graduate students south west Ethiopia 2022

Items	Scale				
	Never	some times	Undecided	most often	Always
When you look for					

information/news about COVID-19 vaccine					
Have you considered the credibility of the sources	40(11.1%)	173(48.2%)	12(3.3%)	132(36.8%)	2(.6%)
Have you had the opportunity to use the information	14(3.9%)	217(60.4%)	26(7.2%)	102(28.4%)	
Did you check whether the information was correct	65(18.1%)	130(36.2%)	21(5.8%)	138(38.4%)	5(1.4%)
Did you find any useful information to make a decision on whether or not to get vaccinated	3(0.8%)	209(58.3%)	60(16.7%)	87(24.2%)	
Have you consulted more than one source of information	3(.8%)	219(61%)	51(14.2%)	86(24%)	
Did you discuss what you understood about vaccinations with a doctor or other people	3(0.8%)	201(56%)	55(15.3%)	100(27.9%)	
When you read or listen information/news about COVID-19 vaccine					
Did you find that the texts were difficult to understand	8(2.2%)	177(49.3%)	66(18.4%)	108(30.1%)	
Did you need much time to understand them	10(2.8%)	210(58.5%)	33(9.2%)	106(29.5%)	
Did you find words you didn't know	13(3.6%)	204(56.8%)	24(6.7%)	118(32.9%)	
Did you or would you need someone to help you understand them	8(2.2%)	177(49.3%)	66(18.4%)	108(30.1%)	

A participants interviewers raised that COVID-19 vaccine related information were gained from multi approaches like social media, internet, face to face message deliveries by health professionals

“As a 21years old Student stated that I gather and read information related to COVID-19 vaccination from social media (face book), television, posters and messages from federal ministry of health”.

Predictors of Intention to vaccinate COVID-19 vaccine

Socio-demographic predictors

After checking of linear regression assumptions, simple linear regression analysis was conducted to assess the association b/n dependent and other independent variables. The first model was consisting of Socio-demographic variables such as (age, gender, marital status, college and department) which explained 80% variability in intention to vaccinate COVID-19 vaccine among the participants. Among variables entered in simple linear regression gender and age explain the highest variability. From this variable Health science college ($p=0.06$), Gender of the respondents ($p=0.025$) and Age of the respondents ($p=0.045$) were candidate for multiple linear regression. From this model gender and age was significant predictors of intention to vaccinate COVID-19 vaccine.

Table 8: Socio-demographic related predictors of Intention to vaccinate COVID-19 Vaccine among Jimma university under graduate students south west Ethiopia 2022

Socio-demographic related factor	Un standardized coefficient <i>B</i>	Standardized coefficient <i>Beta</i>	p-value	95 % CI
Age	.021	.106	.045	(.000, .042)
Gender	.106	.118	.025	(.199, .013)
Health science College	.088	.098	.063	(.05, .180)

The second model consists of five independent variables (COVID19 preventive practice, descriptive norm, attitude, perceived susceptibility to COVID-19, and perceived severity to COVID-19, and COVID-19 vaccine literacy) which explained 85.2% variability in intention to vaccinate COVID-19 vaccine among the participants. Among this variables perceived susceptibility to COVID-19 ($p=.057$), descriptive norm ($p<0.001$), attitude ($p<0.001$), perceived severity ($p<0.05$) and COVID-19 vaccine literacy ($p<0.001$) were candidate for

multiple linear regression. From this model descriptive norm , COVID-19 vaccine literacy and attitude was significant predictors of intention to vaccinate COVID-19 vaccine.

Table 9: Predictors of intention to vaccinate COVID-19 vaccine among Jimma university under graduate students south west Ethiopia 2022

Variables	Unstandardized coefficient	standardized coefficient	p-value	95%CI
	B	Beta		
Descriptive norm	.180	.258	.000	(.109, .250)
susceptibility to COVID-19	.053	.100	.057	(-.002, .107)
vaccine literacy	.602	.632	.000	(.525, .678)
Attitude	.378	.849	.000	(.354, .403)
Severity to COVID-19	.064	.140	.008	(.017, .112)

Independent predictors of intention to vaccinate COVID-19 vaccine

The eight variables, which had statistical significant association with intention to vaccinate COVID-19 vaccine in the preceding two models, are considered as candidate variables for multiple linear regressions analysis. So these variables were entered into the final model multiple linear regression. Out of the eight variables, only four variables retained in the last forward stepwise model, from which four of them were significant independent predictors of intention to vaccinate COVID-19 vaccine factor score (p <0.05). Attitude towards COVID-19 vaccine (B=0.323, 95%CI, .293, .353, p<0.05), COVID-19 vaccine literacy (B=0.155, 95%CI, .090, .217,p<0.001),descriptive norm (B=.089, 95%CI, .047, .123, p<0.05) and perceived severity to COVID-19 (B=.035, 95%CI, .006, .055,p<0.05) were statistically significant predictors of intention to vaccinate COVID-19

vaccine. This means a positive unit increment in attitude, descriptive norm, and severity to COVID-19 and COVID-19 vaccine literacy score resulted in 0.323, .089, .035, and 0.155 units increase in the score of student's intention to vaccinate COVID-19 vaccine respectively, keeping constant all other variables.

Table 10: Independent predictor of Intention to vaccinate COVID-19 Vaccine among Jimma university under graduate students south west Ethiopia 2022

Variables	Unstandardized	Standardized	p-value	95% CI
	Coefficients	Coefficients		
	B	Beta		
Attitude	.322	.722	.000***	(.293, .353)
Perceived severity	.035	.076	.008**	(.006, .055)
vaccine literacy(VL)	.155	.162	.000***	(.090, .217)
Descriptive Norm(DN)	.089	.128	.000***	(.047, .123)

Constant 1.637, R= .873, R Square= .761, Adjusted R Square= .757, * significant at p value<0.05 ** significant at p value <0.01 ***significant at p value <0.001, Max VIF= 5.58<15VIF

FINAL MODEL : is 1.637 +.PSV.035 +AT.322 +.089 DN+.155 VL

CHAPTER SIX: DISCUSSION

This study aimed to assess intention to vaccinate COVID-19 vaccination among Jimma University under graduate students. One of the effective methods to stop the spread of infectious diseases, such as COVID-19, is vaccination. Reluctance and delay may lead to vaccination refusal; policymakers and health authorities must secure acceptability and trust from the public and healthcare professionals. These might have catastrophic effects on public health and limit the capacity of the healthcare system to handle the pandemic's challenges.

The result of this study point out that intention to vaccinate COVID-19 vaccine percentage mean score of all students participated in this study was 57.6%. The finding is lower than study conducted in, southern Italy (91.9%)(34) the possible reasons for the difference might be due to awareness difference in vaccine, socio-economic status and in the period of COVID-19 pandemic outbreak there was a worldwide concern and catastrophic anxiety among the world community but after adaptation, being reckless, less social media pressure, decrement of the severity of the pandemic, and other related beliefs and common-sense of the pandemic might lead to less intention to vaccinate COVID-19 vaccine among the people than these developed nations. Also its lower than previously conducted study in North East Ethiopia (69.3%) (13). The possible reason for the difference might be sample size difference and study period. It is consistent with study conducted in South Carolina College (60.6%)(74) and France (58%) (75).

However this result is higher than study conducted in Uganda (37.3%)(26), Egypt (35%)(32), Ghana (39%)(76), Democratic Republic of Congo (25.3%)(27) and Jimma (27.1%)(28), the reason for discrepancy might be related with relatively increased, period, awareness, understanding and attitude change, readmission of the student to the institution because it was a mandate to every student to take the vaccine while they were admitting therefore the result of intention to vaccinate was relatively higher than these the above mentioned studies.

The current study showed that vaccine literacy is significantly predict the intention to vaccinate COVID-19 vaccine, when the participants vaccine literacy level increased the intention to vaccinate COVID-19 vaccine level was increased by 0.155% ($B=.155$, 95%CI, .090, .217, $p<0.001$). This implies that students, who look information, read, understands, listen and search COVID-19 related health information had good intention to take of the vaccine than that of the others. From those predictors vaccine literacy were the most and the highest predictor of intention to vaccinate COVID-19 vaccine. From the items consulting more than one source of information related with covid-19 vaccine was the highest and the item explain more covid-19 vaccine literacy by 61%. The existing literatures shows that people with higher level of vaccine literacy are more likely to show towards taking the COVID-19 vaccine (77). The current study nearly consistent with study conducted in Thailand which shows that vaccine literacy positively and significantly predicts intention to take COVID-19 vaccine (41).

Another predictor of intention to vaccinate COVID-19 vaccine was attitude, each unit increased in attitude the intention to take COVID-19 vaccine was increased by 0.322% ($B=0.322$, 95%CI, .293, .353, $p<0.001$) and it significantly associated and positively predicts intention to vaccinate covid-19 vaccine. From the items that measure attitude, in my opinion getting COVID-19 vaccines plays a great role in protecting my life was the highest and more explain attitude towards covid-19 vaccine by 76.3%. This finding is consistent with the finding of studies conducted at different settings which showed that attitude towards covid-19 vaccine as the most significant predictor of adult's intention to toward COVID-19 vaccine(59,78). In this case, as people develop a positive attitude towards the vaccine, they may be inclined to accept it.

The other predictor of intention to vaccinate COVID-19 vaccine was perceived severity to covid-19, in this study a unit increased in perceived severity to COVID-19, increased in intention to vaccinate COVID-19 vaccine by .035% ($B=0.035$, 95%CI,006, .055, $p<0.05$). This implies that when the participants perceived serious to COVID-19 disease the possibility to vaccinate themselves was high. From the items that measure perceived severity to covid-19, I believe that COVID-19 can leads to death was the highest and more explain perceived severity to the virus by 44%. With the same to other predictor's

perceived severity to COVID-19, which significantly and positively predict the intention to vaccinate COVID-19 vaccine. The current study in line with studies conducted in areas states that positive association between perceived severity to the virus and intention to receive the covid-19 vaccine.(79,80)

The other predictor of intention to vaccinate COVID-19 vaccine was descriptive norm, in this study ($B=0.089$, 95%CI, .047, .123, $p<0.01$) which significantly and positively predict the intention to vaccinate COVID-19 vaccine and provide the support that individuals' perception of what other people will do is a powerful predictor of COVID-19 vaccine acceptance behaviour. From the items, how many of your friends (classmates) do you think will receive a COVID-19 vaccine was the highest and more explain descriptive norm by 47.6%. This finding is in line with founded that a positive association between descriptive norm and intention to receive the COVID-19 vaccination, perceiving that others are also following the suggestion of receiving the COVID-19 vaccination might increase their likelihood to perform the behaviour. Perceiving that more members of the social system are implementing an innovation also helps to lessen the uncertainty surrounding the novel ideas and strengthens someone's opinion that the behaviour is suitable, which in turn encourages intention to engage in the behaviour(76,77).

It's possible that the higher the perceived prevalence of a healthy behaviour, the less likely an individual will be to repeat that behaviour. This is especially true for health behaviours like immunization against infectious illnesses, when the efforts of other community members help to protect the public health. That is if someone thinks that others will follow protective behaviours like getting vaccinated, they might free ride on their efforts, especially if the effectiveness, safety, and importance of a vaccine are uncertain. Many of the perceived standards for COVID-19 safety practices, including hand washing and vaccination where applicable are likely made up in private. Such imagined norms might be regarded as less reliable and as having less influence on behaviour(32,56).

Limitation of the study

Some of the limitations of the study were information bias like social desirability bias. The tool was comprised of both positive and negative statements that enhance their concentration to minimize their biased response. Difficult to name the factor on split loading effect.

CHAPTER SEVEN: CONCLUSION AND RECOMMENDATION

7.1. Conclusion

In this study the percentages mean score of intention to vaccinate COVID-19 vaccine among Jimma University under graduate of students was 57.6%. The reasons for not being vaccinated were doubts about vaccine effectiveness, fear of side effects and miss believe related to the vaccine. The study revealed that attitude; perceived severity, descriptive norm and COVID-19 vaccine literacy are important predictors and significantly associated with intention to vaccinate COVID-19 vaccine.

7.2. Recommendation

Based on the analysis made and the conclusion arrived at in this study, I recommend the following to concerned bodies relating with Jimma university, JUMC, town health office and for researchers. The author;

- Recommend the university to give value in facilitating and work in collaboration with hospital and town health office to increase the intention to vaccinate COVID-19 vaccine.
- Suggest that if each levels of management bodies in Jimma University medical Center increase the uptake of COVID-19 vaccine.
- Jimma University medical Center is recommended to arrange timely and effective awareness creation, health education and trainings to enhance their vaccine uptake for the student wellbeing.

- Further research is needed on intention to vaccinate COVID-19 vaccine at community level to prevent the community from COVID-19.

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5. ANNEEX

JIMMA UNIVERSITY INSTITUTE OF HEALTH, DEPARTEMENT OF HEALTH BEHAVIORAND SOCIETY.

Consent Hello! My name is _____ and I am collecting data for the research being conducted by Mr. Ashebir Cherinet, Postgraduate student from Jimma University. I am doing a research on Intention to accept COVID19 Vaccine and associated factors among Jimma University under Graduate Student as partial fulfilment for the requirement degree of Masters of Public Health in Health Behaviour and Society. The researcher kindly requests your participation in filling this questionnaire because your participation by giving clear and accurate answer is very important for realization of the research. There is no harm or incentive paid for participation. If you have any questions about this study you may contact me or the principal investigator of this study Mr **Ashebir Cherinet + 251-917247203 or email ashebir.cherinet09@gmail.com**

Are you willing to participate?

1. If yes, proceed to our questions
2. If no, thank you and skip to the next participant

Name of the data collector -----

Name of super visor-----

Date-----

English Version for Quantitative part

Instruction: please indicate your response to each of the following statement by using a Circle where appropriate to fit the respondent's opinion

S.N	Socio-demographic Related characteristics of students	Categories
1.	Age	Mention: -----
2.	Sex	1.male 2.female
3.	Marital status	1.un married 2. married 3.widowed 4. divorced
4.	Religion	1.orthodox 2.muslim 3.protestant 4.other
5.	Nationality	1.Ethiopia 2.others
6.	Ethnicity, if Ethiopian	Mention: _____
7.	Which institute/college do you belong to?	1. Agriculture 2. Business and Economics 3. Health 4. Social sciences and humanities 5. Education and behavioural sciences 6. Institute of technology
8.	Which department do you belongs to?	Mention: _____
9.	Class year or batch	1. First year 2. Second year 3. Third year 4. Fourth year and above

Instruction: please indicate your response to each of the following statement by using a sign of (√) in the appropriate answer box according to the following code of definition. 1=strongly dis agree, 2= disagree, 3=neutral, 4=agree, 5= strongly agree

D-1	Intention to accept COVID19 vaccine	1	2	3	4	5
10.	I feel Vaccine is an important to protect me from COVID-19					
11.	I feel that coronavirus vaccine will allow us to get back to 'normal'					
12.	I feel very good If I get the COVID-19 vaccine					
13.	I feel Vaccination can reduces my risk of catching COVID					
14.	I feel that COVID-19 vaccine helps my body fight the COVID-19 virus					
15.	The COVID-19 vaccines plays an important role in protecting my life and that of others					
16.	The contribution of the COVID-19 vaccine to my health and well-being is important					
17.	I can choose whether to get a COVID-19 vaccine or not					
18.	Getting the COVID-19 vaccine has a positive influence on my health.					
19.	I have high intention to be immunized with a COVID-19 vaccine.					
20.	I feel taking vaccine will protect myself from COVID-19 disease					
21.	I recommend the COVID-19 vaccine to my friends and colleagues to get protection from COVID-19 disease					
D-2	Descriptive norm: beliefs about prevalence or number of referent others who willing to receive the COVID19 vaccine in the future. Scale: 1= None of them, 2= Some of them, 3= Undecided, 4= Most of them, 5= All of them	1	2	3	4	5
22.	How many of people in this University (e.g. teachers) do you think will receive a COVID-19 vaccine?					
23.	How many of health workers do you think will receive a COVID-19 vaccine?					
24.	How many of your friends (classmates) do you think will receive a COVID-19 vaccine?					
25.	If vaccine is recommended for them, how likely do you think most of your friends (classmates) will get a COVID-19 vaccine?					
26.	If vaccine is recommended for them, how likely do you think most of your teachers will get a COVID-19 vaccine?					
27.	If vaccine is recommended for them, how likely do you think most of your					

	family will get a COVID-19 vaccine?					
D-3	Perceived susceptibility and severity of COVID19: please indicate your response to each of the following statement by using a sign of (√) in the appropriate answer box according to the following code of definition. 1=strongly disagree, 2= disagree, 3=Undecided, 4=agree, 5=strongly agree	1	2	3	4	5
28.	I believe that COVID-19 infection is severe disease					
29.	I believe that COVID-19 can leads to death					
30.	I believe that COVID-19 has serious consequences on my future life					
31.	The COVID-19 is severe disease for everybody					
32.	The COVID-19 is severe disease for young people like me					
33.	COVID-19 has serious impact on my school performance					
34.	I afraid COVID-19 because people may discriminate me if I get it					
35.	I think that I am at risk for getting COVID-19 because I am a University student					
36.	No matter what I do, I'm likely to get COVID at University					
37.	In many aspects, I am less likely to acquire COVID-19 at University					
38.	I think it is less likely for me to acquire COVID-19 as I am a young					
39.	University students are so young enough and can't get COVID-19					
D-4	Preventive practices: During the last years of your university stay, how often did you usually have practiced the following practices to protect yourself from the corona virus infections 1=never, 2=some times 3=undecided, 4=most often, 5=always					
40.	Not touch your face, eyes, nose and mouth					
41.	Shared cups, eating utensils, food or drinks with others students.					
42.	Used facemasks in transportation such as public buses and taxi					
43.	Maintained physical distancing of at least 1meter while in classroom					
44.	Maintained physical distancing of at least 2 meter while in outside classroom					
45.	Avoided going to crowded places in schools such as sports, student, gatherings					
46.	Wash your hands frequently with soap and water or using alcohol based hand rub					

47.	Avoided shaking hands for greetings					
48.	Covered your cough using the bend of your elbow or a tissue					
49.	Carefully disposing tissue disposable items in closed bin					
D-5	COVID19 vaccine literacy 1=never, 2=some times 3=undecided, 4=most often, 5=always	1	2	3	4	5
50.	When you look for information/news about COVID-19 vaccine					
51.	Have you considered the credibility of the sources					
52.	Have you had the opportunity to use the information?					
53.	Did you check whether the information was correct?					
54.	Did you find any useful information to make a decision on whether or not to get vaccinated?					
55.	Did you find the information you were looking for?					
56.	Did you discuss what you understood about vaccinations with a doctor or other people?					
57.	Have you consulted more than one source of information?					
58.	Did you consider whether the information collected was about your condition?					
59.	When you read or listen information/news about COVID-19 vaccine					
60.	Did you find that the texts were difficult to understand?					
61.	Did you need much time to understand them?					
62.	Did you find words you didn't know?					
63.	Did you or would you need someone to help you understand them?					

Part Two: Guidelines for In-Depth Interview

Name of the Institution _____ Code _____

Hello my name is _____ I came from Jimma University to assess the association between Intentions to accept COVID19 vaccine and associated factors in this campus. I would like to obtain information about COVID19 vaccine. The information you provide will assist in designing for the improvement of vaccine acceptance in this University. The information you provide will not disclosed to anyone. If you have any question regarding this study, please forward.

May I continue? Yes _____ NO _____ Thank you

Age _____ Sex: _____

1. Explain your experiences about COVID-19 prevention practices (**Probe:** towards precautionary measures, such as mask, distance and hand washing)

2. Would do you please tell us your perception, belief, attitude about Covid-19 Vaccination (probe....)
3. Would do you please tell us where do you get about COVID-19 and its vaccine related information in the campus (probe...)
4. Can you tell me please what types of action were used to increase acceptability of COVID-19 vaccine by students (probe....)
5. Would you tell us please what protective measures were used by the students to protect them during COVID-19 pandemic (probe...)