UNIVERSITY OF GHANA, LEGON

EXPLORING UNIVERSITY STUBENTS' PREFERENCES FOR SAFETY PROTOCOLS TO COMABAT THE SPREAD OF COVID-19

CASE STUDY OF UNIVERSITY OF GHANA

BY

GROUP ONE MEMBERS

CHAPTER ONE

INTRODUCTION

1.1 Background

In the latter part of 2019, several reports of a flu-like infection were recorded in the Wuhan province of the People's Republic of China. A further study into the nature of the infection revealed that they were caused by a large group of viruses common amongst animals (zootic) called Coronavirus. The disease caused by the new coronavirus is the COVID-19 and is estimated by the World Health Organization to have an incubation period of 4-6 days. Although the coronaviruses were found by scientists to be zootic, a study by the US center for disease control and prevention says that they can be transmitted to humans from animals. In March 2020, several cases of the infection had been recorded in various parts of the world other than China, causing the World Health Organization to declare it a pandemic and a matter of global health concern.

The virus can be easily transmitted between individuals, given that one of them is infected. Mobility has been a known catalyst for the swift transmission. Ghana like many other countries, had it's first recorded case as an imported case, thus, introduced by an inter-country traveler. The novel Coronavirus can be transmitted through direct or indirect contact with secretions from an infected person such as cough or sneeze. The symptoms of infection of the virus include dry and persistent cough, fever, tiredness, difficulty in breathing, chest pain or tightness, and a loss of speech and movement in the advanced situation. Notwithstanding how rapid the spread, mortality of the virus remains very low and is much fatal amongst people with underlying health conditions that affect their respiratory system.

The fight against the coronavirus disease began right from the inception, with scientists trying as hard as they can to invent vaccines that have the potency to annul the effect of the virus in the human system. Various preventive measures and protocols have also been put in place by the World Health Organization to ensure safety. Various Governments, Ministries of Health and Health agencies have also introduced restrictions and impositions to help slow the spread and return the world to normalcy. Popular amongst these are the imposition of movement restrictions in "hotspot" areas of transmission (total or partial lockdown), to the mandatory wearing of face masks, the regular hand washing, disinfection of regularly touched surfaces, coughing or sneezing into the bent elbow or a tissue and disposing them off into a bin, observance of strict social distancing rule of at least two to 3 meters, to mention a few.

It is of no uncertain doubts that COVID-19 has had a thunderous effect in every aspect of the current world. It has affected various economic and social sectors of countries around the world. The educational systems of the world have been largely put to test by the surge in the infection. Schools have been forced to develop better online facilities to accommodate various teaching and learning activities as the ban on social gatherings would not allow for large number of students on campus for in-person tuition. Given the countless complaints that have bedeviled the switch in school systems, we analyze the preference for safety protocols of university students to combat the spread of the disease, using the University of Ghana as a case study.

1.2 Statement of the Problem.

On March 12 2020, the President of the Republic of Ghana by executive order, announced the mandatory close down of various teaching and learning institutions as part of measures to limit the spread of the coronavirus. The government, ministry of education and the various educational institutions have since then, found several means of putting teaching and learning back on track.

Various online platforms have been adopted to ensure that the various campuses are "decongested" to encourage the easy adherence to the preventive protocols and the safety of students and tutors. In the University of Ghana for instance, a modular system is being ran to ensure that half the number of students of the University is found on the campus at every point in a semester rather than the "full-house" university. Notwithstanding these commitments from the authorities of the University, adherence to these protocols is not at the expected levels. It is particularly important therefore to assess the preference of the students, who form majority of occupancy on the University of Ghana campus, about the safety protocols. We use the discrete choice experiment method, deploying various descriptive and inferential statistical methods to conclude on the assessment.

1.3 Purpose of The Study.

This study is aimed at evaluating how efficiently the protocols of COVID-19 have been adhered to and to explore what the suggestion of the University of Ghana Students is, in ensuring that there is a more efficient adherence to the COVID protocols. This study also aims at providing a more concrete recommendation for the management of the University on further decision making concerning the implementation of policy on the enforcement of COVID protocols on campus.

1.4 Significance of the Study.

The upsurge in the case count of COVID-19 has occasioned the research into what measures that various individuals (in this case, University students) prefer in the enforcement of these protocols. This study and its findings and recommendations will be very useful in planning and rolling out of policies on enforcement ok various campuses. We intend to mirror the happenings on various campuses with the case on the University of Ghana campus.

1.5 Research Questions And Or Hypothesis.

We have discussed the central idea of this survey in the various preceding paragraphs. We have exposed the significance and purpose of the study and highlighted how the case study could be a mirror reflection of the case on various other campuses. It is increasingly important to analyze various hypothetical questions and statements. Popular amongst these questions or statements are

(I) Are there any set of protocols that are likely favored by students?

(II) Are students of various universities likely to favor the mandatory enforcement of restrictions?

(II) What is the preference of University students in the observance of the COVID protocol?

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

Literature review is a search and evaluation of previously published works in a chosen topic area. Ghana has been greatly affected by the outbreak of the pandemic. This chapter reviews the impact of covid19 on Ghana and most importantly on the educational system of Ghana.

Following the outbreak of the virus, schools have been forced to restructure their academic system where some tertiary institutions like the University of Ghana have had to the transition to the modular system where students are divided into badges of two to prevent the spread of the virus. Currently most lecture periods are being conducted online to reduce the face-to-face interactions between lecturers and students.

The covid19 pandemic has impacted the country negatively bringing its economic activities to a standstill. A lot of people have been laid off due to the fact that most businesses in the country are nonproductive as a result of the precautionary measures taken by the government to stop the spread of the virus.

Amidst the negative impacts of covid on the country, covid19 has caused the country to improve electronically. Most educational institutions have to tend to lecturing students online and so has the health sector. Ghana Statistical Service in the 2021 census, transitioned from collecting data manually to electronically. These are some of the positive impacts of covid19.

2.1 Covid-19 in Ghana

The influenza infection was first verified in Ghana in October 2009 and the first cases were mainly among individuals with history of travel outside the country. There were also several confirmed cases according to laboratory reports throughout the country in 2010. In the Ashanti Region of Ghana, there were reported cases of acute febrile respiratory illnesses in primary schools in the capital city, Kumasi and some other communities outside the capital. For the past decades, the influenza surveillance system in Ghana have been able to detect and provide circulating strains as well as providing key information on response action. The reported cases of the infection resurfaced in May 2017 in a secondary school (population of about 2800 students) in the Ashanti region of Ghana specifically Kumasi, that resulted in the death of 4 students,(Ayibor et al.,2019). The next pandemic to course it's way to Ghana is the cholera pandemic. "Cholera remains an important public health challenge globally. Several pandemics have occurred in different parts of the world and have been epidemiologically linked by different researchers to illustrate how the cases were spread and how they were related to index cases. Even though the risk factors associated with the 2014 cholera outbreak were investigated extensively, the link between index cases and the source of infection was not investigated to help break the transmission process. This study sought to show how the index cases from various districts of the Greater Accra Region may have been linked,"(Addo et al.,2017). This was followed by a rare outbreak of meningitis due to S. pneumoniae in six districts of the Brong Ahafo region of Ghana. All age groups and sex were affected however, mortality was found to be higher in children less than 15 years. The outbreak peaked in epidemiological week 6 and lasted over 17 weeks. Upper respiratory infection prior to the outbreak and alcohol use were identified as factors that facilitated the transmission of pneumococcal meningitis in the region, (Aikins et al.,2018). According to the Deputy Director and

Head of the Surveillance Ghana Health Service, Dr. Franklin Asiedu-Bekoe on the meningitis situation in Ghana, several interventions for the meningitis epidemic can be undertaken including the following: Public Education (Radio announcements, Community durbars and meetings etc), Orientation of Community Based surveillance Volunteers, Training of health staff on case management and case definitions ,Treatment of cases at all health facilities FREE of charge , Active case search in all communities and health facilities using case definitions and finally, Laboratory testing of all samples to get the causative organism. The subsequent pandemic, which is the current pandemic, is the novel coronavirus. Ghana's Ministry of Health confirmed the first two cases of the coronavirus (COVID-19) on Thursday, March 13. The COVID 19 pandemic is a major challenge to the health of the world population, therefore these results assessing students' knowledge provide an important baseline for planning required interventions such as contact tracing and self-quarantine. These results may also help public health authorities by engaging communities in implementation of protective health measures including positive hygienic practices such as handwashing to reduce the risk of COVID-19, (Aolymat et al.,2020). Among the WHO's current recommendations, people with mild respiratory symptoms should be encouraged to isolate themselves, and social distancing is emphasized and these recommendations apply even to countries with no reported cases,(Biomed, 2020). Amid this turmoil, businesses have to reopen and many employees have to get back to work and abruptly accept fundamental changes to their work routines (Anicich, Foulk, Osborne, Gale and Schaerer, 2020) which include reopening of the colleges and universities while facing the new normal situation (Anderson, 2020). To reduce transmission of the COVID-19, several countries established measures on infection prevention and control by limiting contact between people (WHO, 2020). Most national response strategies include varying levels of contact tracing an self-isolation or quarantine; promotion of public health

measures, including hand washing, respiratory etiquette, and social distancing, preparation of health systems for a surge of severely ill patients who require isolation, oxygen, and mechanical ventilation, strengthening health facility infection, prevention and control, with special attention to nursing home facilities, an postponement or cancellation of large scale public gatherings. Almost 90% of the world was impacted by this global pandemic in such a way that social isolation was enforced. (Atalan, 2020). In today's situation, people all over the world are facing the dooms and smoldering ruins of COVID–19. Due to this pandemic crisis, countries around the world took tentative steps toward reopening to bounce back from the coronavirus pandemic (Ansari, Khan, and Schwartz, 2020).

2.2 COVID-19 and Higher Education in Ghana

Following the outbreak of COVID-19 in Ghana, all schools in the country were compelled to close down. This was to stop further spread of the virus as there was a spike in confirmed cases. University of Ghana for instance, suspended all lecture activities instructing non-resident students to stay at home and students who were residents on campus to remain on campus as well. This was done in a bid to contain the situation at hand. This followed up with the placing Veronica brackets at vantage points so people can wash them as a safety measure to combat the pandemic.

Getting caught up in the middle of the semester, there was the need to successfully complete the semester. Thus, complete the course syllabus and conduct examinations. Meeting on campus was not an option as the president locked down some parts of the country. With this at hand, most schools resorted to online teaching and learning. Some platforms used were; sakai learning management system, zoom video conferencing, goggle classroom, Microsoft teams and many more. Since it was kind of new to both students and lecturers, they were faced with challenges here

and there. However, they were able to adjust themselves with the new initiative. Examination was even conducted online.

With the hostel facility, some schools put measures in place to reduce the number of students at the hostel. Some even barred visitors from going to the hostel. This was done to reduce contacts within the walls of the hostel. And even if a member of a hostel gains access to his/her room, the person is required to wash their hands and the temperature is checked. Those who have high temperatures or demonstrating symptoms of the virus are taken to a fourteen (14) mandatory quarantine and tested. Those with negative test results are discharged at the end of the quarantine. Those who test positive are made to stay a bit longer to ensure they don't further spread the virus while the health officials perform contact tracing.

After the surge in the early parts of 2020 where the cases of COVID-19 were high, confirmed cases and deaths began to decline during the later part of the year. This paved way for the relaxing of some of the measures; the lockdown for example. It became prudent for students across the country to go back to school to continue their teaching and learning activities. The ministry of education approved an academic calendar for KG to SHS in a bid to curb the spread of the virus. Social distancing was observed across the board. The Ghana Education Service (GES) brought up the semester system which will now be observed by the JHS students with strict adherence to the safety protocols. To back this up, the ministry of education also stated that they will provide schools with Personal Protective Equipment (PPEs) as a means to contain the virus.

Following the president's directive for reopening to schools, most tertiary schools began with fumigating the school before the arrival of students of which University of Ghana is not an

exception. The University of Ghana resorted to the double track system. Here, the level 100s and 400s were first made to reopen after which the level 200s and 300s followed. The normal thirteen (13) weeks of teaching was reduced to an intensive (12) weeks of teaching which was mostly done online. The double track system was adopted to reduce overcrowding of students on campus which would have increased the chances of spreading the virus. Medical students were also faced with the challenge of not being able to undertake their clinical practice during the COVID-19 pandemic. Students on vacation who began their medical training overseas could not return back to their various countries of study as there were restrictions placed on travelling activities throughout the country. The borders of Ghana by land, air and sea were closed. Thus, no flight, ship or car were allowed in and out of the country. This became a plight for medical students in such situations. This caused schools to transform clinical and practical components of medical education from the normal face-to-face encounter to that of an online mode. The COVID-19 pandemic has forced higher education administrators to think outside the box in order to duplicate some of the face-to-face clinical contact and participation in a virtual environment.

Finally, the outbreak of the COVID-19 pandemic has demonstrated how a Ghanaian public higher education institution can adapt to change. This university has progressed from a face-to-face-oriented school to one that currently conducts the majority of its teaching and learning activities online. To cope with the increase in online teaching and learning, the institution has made use of existing technology infrastructure. Faculty and support staff have been forced to research and use alternate platforms in order to ensure that students complete their degrees within a set timeline as a result of the pandemic.

Online teaching and learning has become inextricably linked to the institution's customer outreach program. Faculty and support personnel will almost certainly need to be trained on how to use technology on a frequent basis in order to keep their abilities current and up-to-date while engaging students and teaching effectively online. Students who are unable to successfully engage in the university's online teaching and learning programs owing to technological limitations must find a creative solution. A more detailed paper could investigate how different departmental programs fared during the university's transition to online teaching and learning.

2.3 Covid-19 Preventive Measures (Safety Protocols)

Following, the outburst of the corona virus pandemic, World Health Organization has come out with preventive measures needed to be adopted by countries. Globally, according to Bonful, H.A et al (2020), there is minimal evidence on COVID-19 transmission patterns. Appropriate and frequent hand washing, as well as physical and social separation, are all recommended to prevent infection. An exploratory observational study was done in Ghana to measure compliance with these guidelines in selected transit stations. Between the 27th and 29th of March 2020, a one-hour audit of 45 public transportation terminals in the Greater Accra region was conducted. The availability and use of hand washing facilities, social distancing, and continuous public education on COVID-19 preventative measures were assessed, weighted, and scored using an adapted World Health Organization (WHO) hand hygiene assessment scale to determine the level of risk. Based on the overall score, compliance with suggestions was classed as "inadequate," "basic," "intermediate," and "advanced." The majority of Accra's stations (80%) have at least one Veronica Bucket with running water and soap, however the number of washing stations is insufficient. Only 18% of stations communicated the importance of washing hands regularly and appropriately, as well as practicing social/physical separation while at the station. Hand washing was either not seen

or only observed seldom at the majority of locations (95 percent). Almost all stations (93%) did not have alcohol-based hand sanitizers on hand for public usage, and social distancing was rarely used (only 2 percent). Face masks were either not worn or were worn by a few passengers in over 90% of the stations. COVID-19 preventive measures were found to be insufficient in 13 stations, basic in 16 stations, intermediate in 7 stations, and advanced in 9 stations. In the Greater Accra region, compliance with COVID-19 preventive measures in public transportation stations remains an issue. The goal of creating awareness should be to improve transportation operators' and clients' perceptions of COVID-19 risk. Hand washing and social separation require help and direction from transportation operators and stations.

The first two instances of COVID-19 were reported on March 12, 2020, according to a study done by Kenu, E. et al (2020). The patients were all imported, but the sickness quickly spread across the community, and within a week of the first instances, the country had confirmed cases in people who had no connection to international travel. The majority of instances occurred in Accra and Kumasi, Ghana's two most populous cities. From there, immediate measures instituted to detect, contain and prevent the spread of the disease included a ban on all public gatherings, closure of schools, churches, mosques and other places of worship on March 16th; ban on entry for travelers coming from a country with more than 200 confirmed COVID-19 cases within the previous 14 days on March 17th, a mandatory quarantine of all travelers that arrived in the country 48hrs prior to the closure of the country's borders on March 22nd; a partial lockdown of Accra including Kasoa in the Central region and Kumasi on March 30th. On April 20th, the limitations on Accra and Kumasi were eased, and on April 26th, the usage of face masks became necessary. These steps were backed up by education on the disease and how it spreads, as well as preventative measures like hand washing with soap under running water or alcohol-based hand sanitizers, and the use of

face masks. Although improved surveillance is currently ongoing6, Ghana has seen a decrease in the number of confirmed cases since April 25, 2020. This could indicate that the virus was controlled and disseminated in Ghana as a result of the tactics implemented. These gains, however, need to be sustained and built on in our response efforts to end the COVID–19 pandemic in Ghana. A more measured approach based on epidemiological and clinical studies to determine the profile of the disease's disproportionately high asymptomatic patients, as well as genome studies on the viral strains of those who died from the disease, asymptomatic patients, and prognostic conditions, is required. These research will aid the government in identifying the risk profile of those who may be immune to the virus, as well as directing resources to those who are at high risk. Second, with well-defined batch system working groups that are segregated from one another, explicit social distance and personal hygiene standards should be imposed in the workplace. Finally, clear instructions for protecting persons with co-morbidities should be offered, since it is increasingly obvious that NCD prevention and control will play an important part in the overall COVID-19 response.

Thompson Rechel, G.A et al (2021) did another study that found that music can be utilized to teach or communicate information about public health emergencies. We investigated how songs are being utilized to raise awareness about COVID-19 in Ghana, a Sub-Saharan African country, using an edutainment approach. A search on YouTube yielded 28 songs that fulfilled the study's inclusion criteria. The lyrics of the song were subjected to a thematic analysis. The majority of the lyrics were in English, Ghanaian Pidgin English, Akan, Ga, or Dagbani, with a few exceptions. Half of the songs contained three languages to express their message, reflecting Ghana's multilingual population, while only five songs were in one language. Public health guidelines, COVID-19 is real and not a hoax, COVID-19 is infectious, prayer as a method to stop the virus,

emotional reaction and disruption of "everyday" activities, verbally expelling the virus, call for unity and collective efforts, and inspiring hope were the eight themes that emerged from the analysis. We show that songs have the potential as a method for rapidly sharing information about emerging public health crises. Even though, it is beyond the scope of this study to draw conclusions about the reception and impact of songs on awareness and knowledge, the study shows that examining song lyrics can still be useful in understanding local attitudes toward COVID-19, as well as strategies for promoting preventive behaviors. We note that additional multidimensional efforts are needed to increase awareness among the general public about the COVID-19 pandemic.

A comparative study was conducted by Dzisi,E.K.J and Dei,O.A (2020) on adherence to social distancing and wearing of masks within public transportation during the covid-19 pandemic. The first two cases of COVID-19 in Ghana were reported on March 12th, 2020, according to them. To prevent community spread of the disease, the government issued guidelines on physical separation and the use of face masks. Given that public transportation has been identified as a high-risk environment for transmission, it was of interest to determine user and operator compliance with public transportation operating guidelines over time as a measure of risk. On one of Kumasi's major roads, a roadside observer survey of over 850 of the most popular paratransit (trotro) buses was conducted. The researchers used guidelines from the Ministry of Transportation to determine compliance with the policy on physical separation, while compliance with the policy on face masks was determined by the researchers themselves based on the number of commuters wearing or not wearing face masks per bus. The findings suggest that the majority of buses (98.0 percent) follow the Ministry of Transportation's social distancing guidelines, but that the policy on face masks is only partially followed in most vehicles. Fewer than three commuters without face masks were found in 12.6 percent of vehicles, while 21.3 percent of buses had fewer than three people wearing

face masks. The findings imply that in the fight against COVID-19, public transportation remains a high-risk environment. It is suggested that operators be given extra guidelines

2.3 Universities and covid-19 Preventive Measures

Returning to school has taken on a new meaning and a new set of worries for parents and caregivers during the covid-19 and therefore a lot of new rules and adjustments have been made by some institutions to balance the educational, social and emotional needs of their students amidst the health and safety of their students and staff. Some schools either choose the distance learning system, others choose the shifts system and others also choose the in-person schooling. University of Ghana is currently using the shift system since students are made to go in batches according to their levels to prevent overcrowding which will combat the spread of covid-19. There are other preventive measures university of Ghana have put in place to guide the students in order to combat the spread of covid -19. Students are obliged to wear face masks in indoor public spaces and outdoors where there is a high risk of covid-19 transmission, recommended by the CDC and WHO. The university of Ghana community ensures that every student wears a face mask in the lecture halls, while walking around the school premises and entering or leaving the school hostels or halls. Rules have been made compulsory and anyone found not wearing a face mask is not allowed to walk freely in and out of the school premises. It I said that infected people can pass on the disease without even knowing that they have it because the virus is contagious and spreads fast. Practicing hand washing is also a preventive measure the universities in Ghana have adopted in combating covid-19. Students are made to wash their hands with medicated soaps under running water before entering gatherings and their hostels or halls. The soaps, water and big bowls or buckets are provided by the school authorities and placed at vantage points where necessary so that students

can wash their hand. People are assigned to make sure that there is frequent water and soaps I so that students wash their hands frequently because if there is no water at a point students enter these places without washing their hands and that is not safe. Therefore, those assigned make sure that everything is always available to avoid inconveniences. Washing our hands frequently and regularly as students helps us avoid contacting the covid-19 disease since our hands pick up gems quickly. Social distancing is also practiced in the universities in Ghana to help combat covid -19. During the covid -19 pandemic, the U.S Center for Disease Control and Prevention (CDC) and World Health Organization (WHO) recommend keeping at least 6 feet (2 meters) of space between yourself and people outside your household. (mayo clinic staff, 2021). Social distancing is the practice of allowing enough space between individuals to reduce the spread of the disease. The universities in Ghana have adopted this method to avoid the spread of the covid-19 disease. Students are made to sit with lots of spaces between them, therefore the lecture rooms are not overcrowded. Courses with higher numbers of students are made put into groups and made to go for lectures in batches so that social distancing is effectively practiced combatting covid-19. Keeping the hands clean does not only involve handwashing, but it also involves using hand sanitizers. It is suggested that every student or staff uses an alcohol-based hand sanitizer that contains at least 60% alcohol. The universities in Ghana shares hand sanitizers in the beginning of every academic year to the students and staff. Since it will not always be convenient to wash your hands, keeping a sanitizer in your pockets or bags would help. After sneezing or coughing, shaking hands, touching your face, doorknobs and money, use the hand sanitizers to avoid contacting the disease. Clean your phones and laptops clean as well by using the sanitizers. Practicing good hygiene is also encouraged as well. The universities in Ghana have also ensured that close monitoring is given to students. Students are made to stay at home or under isolation when sick.

Some symptoms include fever, nasal congestion or running nose, cough, sore throat, shortness of breath, fatigue, headache, muscle ache, nausea or vomiting, diarrhea, poor appetite, new loss of taste or smell, belly pain and pink eye. Students with such symptoms are placed under close monitoring and made to isolate themselves from their colleagues to avoid them from spreading the disease. A daily temperature reading is also done a part of the covid-19 symptom screening and the authorities have put it into practice as well. People have been stationed at vantage points to read the temperatures of students daily before they are allowed into gatherings. The universities in Ghana especially university of Ghana made provisions of the covid-19 vaccines at the school's hospital so that students would be vaccinated. The Pfizer-BioNTech COVID-19 vaccine requires two injections given 21 days apart. Research has shown that Pfizer-BioNTech COVID-19 vaccine 100% effective in preventing the covid-19 virus in children ages 12 through 15 and effective 95% in people aged 16 and older. (mayo clinic staff, 2021). Therefore, the school authorities made provision for students to be vaccinated to prevent the spread of the covid-19 disease. Students are not to skip vaccination whether classes are happening or not and that is why a time frame was provided so that students can individually choose what works for them. Students are made to understand that those vaccinated have a lower chance of contacting the disease rather than those who have not been vaccinated. Such people have a higher chance of getting the disease and that is risky therefore all students are entreated to get vaccinated.

CHAPTER THREE

METHODOLOGY

3.1 The Study Area

The research was carried out at the University of Ghana, which is the oldest and largest of Ghana's thirteen national universities. It was founded in 1948 as the University College of the Gold Coast in the British colony of the Gold Coast, and was renamed the University of Ghana in 1961 after acquiring full university status. It is positioned on the west view of the Accra Legon hills. This university offers a variety of degrees, including medicine, nuclear science, and related sciences, to mention a few, and is one of the few on the African continent to do so.

3.2 Sampling strategy

By contrasting two preventive techniques, the study aims to discover university students' preferences for safety protocols to combat the spread of COVID-19 on university campuses. The target group for this study is undergraduate and postgraduate students at the University of Ghana. A questionnaire was designed and distributed to students of the university in order to better understand their perspectives and assessments in the face of the Covid-19 pandemic on university campuses. The discrete choice approach was utilized to create the questionnaire, and it was administered in person. The sample method employed to measure this population was non-probabilistic and of convenience, with those who were interested in participating contacted in person.

3.3 Identification of Attributes and Corresponding Levels

Six (6) significant traits and their probable levels were identified following extensive preparatory through literature on covid-19 (two for each attribute). The six (6) qualities used in this research and are presented in the table3.3 below

Table 3.3: Attributes and corresponding levels

ATTRIBUTES	LEVELS
Students' gatherings (Hall week, onsite lectures, sports, religious events.	Not Permitted
	Permitted less than 2hours
Personal hygiene	Washing of hands with soap plus use alcohol-based hand sanitizers
	Use alcohol-based hand sanitizers only
Social distancing	Maintain 1 metres feet or 3 feet
	Maintain 2 metres or 6 feet
Wearing of nose mask when leaving Hall/Hostel	Not compulsory
	Compulsory
Social and life style venues (restaurants, bars, salons, gyms)	Closed
	open
Resident halls/hostels for visit	Closed
	Open

Source: Study design, 2021

3.4 Experimental design

Many experiments with two or more components consider neither factor to be unnecessary, resulting in a factorial experiment in which the focus is on the interaction of two or more factors on a measurable response (Milton and Arnold, 1995). In a factorial design, the levels of two or more independent variables are crossed to form the research conditions. The attributes and their corresponding levels resulted in $2^6 = 64$ experimental conditions (full factorial). Since a combination of these runs results in 2016 pairs of alternatives, it would not be possible to present all such pairs to respondents as it will result in information overload as frequently encountered in practice. As a result, the whole factorial design was reduced to six CHOICE SETS for the experiment, taking into account the criterion of optimality, using JMP (Version 16.0). Respondents were given these choice sets to evaluate during the survey. The respondents were asked to weigh in on each of the 18 option sets, taking into account the COVID19 PREVENTIVE MEASURE characteristics and their corresponding levels, and to indicate which options might have an impact on their preferences. Table3.4 shows an example of a choice set utilized in the survey.

Table 3.4: Sample choice set used in the survey

1	Preventive measure A	Preventive measure B
Students' gatherings (Hall week, onsite lectures, sports, religious events)	Not permitted	Permitted for less than 2 hours
Personal hygiene	Washing of hands with water only	Washing of hands with soap+ use alcohol-based hand sanitizers

Social distancing	Maintain 1 meter or 3 feet	Maintain 2 meters or 6 feet
Wearing of nose mask when leaving Hall/Hostel	Compulsory/always	Not compulsory
Social and life style venues (restaurants, bars, salons, gyms)	Closed	Closed
Resident halls/hostels for visit	Closed	Open
Which of the preventive measures (A or B) will mitigate the spread of the COVID virus on campus?	[ ]	[ ]

Which of the two OPTIONS do you prefer?   [ ] **Package A**   [ ] **Package B**

Source: Study Questionnaire, 2021

3.5 Survey Administration and Piloting

The survey questionnaire is preceded by an introduction that includes the study's title, the investigator's (enumerator's) institution's index number, the respondent's contact information, and how the results will be utilized. This is followed by inquiries regarding the demographics of the individuals. The investigator instructed the participants on how to express their choices for the numerous options offered to them. We piloted a version of the choice sets prior to the start of the

survey. The investigator was able to rehearse, recognize potential obstacles and problems during the survey, and check the data entry template during the pilot. Piloting also allowed the enumerator to examine respondents' or participants' grasp of the choice sets, as well as the definition of attributes and attribute levels, how they coped with the choice sets, and why they made specific choices. Pre-testing the questionnaire through piloting is a vital component of the study program, according to Adamowvic et al. (1998). Finally, the enumerator rebuilt the various choice sets and updated the phrasing of the qualities and their respective levels to improve comprehension.

3.6 Data Collection

The information used in this study came from a field survey done by members of group one (1) during the last two weeks of August. A total of 308 participants responded to the 18 CHOICE SETS, making up a representative sample of University of Ghana students. Face-to-face administration of the questionnaire was used to avoid low response rates. Before completing the questionnaire, the investigator instructed the participants in either English or Ghanaian (Twi) on how to express their preferences for the various choice sets. Participants were asked a series of demographic questions, including their age, gender, marital status, college, level of study, and comorbidities, at the start of the survey.

3.7 Data analysis

A Multinomial Logistic Regression model was fitted to the responses and used to estimate the probability of the many possible outcomes in order to find the elements that could predict students' perceptions of how to deal with the epidemic on the University of Ghana campus. Using the JMP (Version 16.0) within the random utility framework, multinomial logistic regression was utilized to predict categorical factors on a dependent variable based on several independent variables. The demographic characteristics of the respondents who filled out the questionnaire were summarized using descriptive statistics.

3.7.1 Model Specification

Discrete choice experiment modeling is rooted in Random Utility Theory (RUT). According to RUT, the utility U_{ci} a respondent i derives from choosing an alternative in a choice set c consists of a deterministic component V_{ci} and an unobservable random component ε_{ci} such that:

$$U_{ci} = V_{ci} + \varepsilon_{ci} \qquad\qquad (1)$$

The deterministic component V_{ci} of each alternative is a function of the attributes of the alternative itself and the characteristics of the respondent and the component ε_{ci} is random and represents unobservable influences when one makes a choice for a particular alternative.

THE MODEL EMPLOYED FOR THE STUDY IS PRESENTED IN THE FOLLOWING.

$Y = \beta 1 P1a + \beta 2 P1b + \beta 3 P2a + \beta 4 P2b + \beta 5 P3a + \beta 6 P3b + \ldots + \beta 23 P12a + \beta 24 P12b + \varepsilon$

where, Y= Response (choice for two options or alternatives)

βi = the utility estimates

23

P1a = option one (A)

P1b = option one (B)

P2a = option two (A)

P2b = option two (B)

P12a = option 12 (A)

P12b = option 12(B)

ε = error term

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

4.0 Introduction

This project seeks to assess University of Ghana's students' preference level for safety protocols needed to combat the spread of covid -19. This chapter thereby present the in-depth analysis and report of the results obtained from the survey data. The demographic features of the respondents are reported. The main results obtained from the multinomial logistics model are also provided. The analysis will be presented in table and graphs for easy interpretation and understanding.

4.1 Demographic Description of the Sample

Table 4.1 depicts the demographic characteristics of the 308 respondents who made up the sample size.

Table 4.1 Demographic Characteristics of the Sample by Age

Characteristics	Category	Age			
		18-24 n(%)	25-34 n(%)	35-49 n (%)	50+ n (%)
Gender	Male	177(62.8)	20(80.0)	1(100)	2(100)
	Female	105(37.2)	5(20.0)	0(0.0)	0(0.0)
Marital status	Married with kids	0 (0.0)	1(4)	0(0.0)	0(0.0)
	Married without kids	2(0.7)	1(4)	0(0.0)	0(0.0)

	Single	279(98.9)	21(84)	1(100)	0(0.0)
	Other	1(0.4)	2(8.0)	0(0.0)	0(0.0)
Education level	Postgraduate	3(1.2)	3(9.1)	1(9.1)	0(0.0)
	Undergraduate	139(54.9)	13(39.4)	2(18.2)	0(0.0)
College	CBAS	72(25.5)	7(28.0)	0(0.0)	0(0.0)
	Education	24(8.5)	4(16.0)	1(100.0)	1(50.0)
	Health Sciences	25(8.9)	2(8.0)	0(0.0)	0(0.0)
	Humanities	161(57.1)	12(48.0)	0(0.0)	1(50.0)
Comorbidity	No comorbidity	273((96.8)	25(100.0)	1(100.0)	2(100.0)
	Respiratory comorbidity (asthma, lung diseases)	9(3.2)	0(0.0)	0(0.0)	0(0.0)

Source: Survey data, 2021

As seen from table 4.1 above, out of the 308 respondents who partook in the survey, 201 are males and 107 are females.   About sixty percent (62.8%) fall in 18 -24 age group, twenty percent falls in age group 25 to 34, one percent fall in age group 35 to 50 and two percent are over fifty years . Also, concerning the females, thirty seven percent are within the age group 18 to 24, twenty percent (20%) are females with no females falling in the age of 25 to 34 and 50 plus. More of the participants in the 18 to 24 age group are single constituting 98.9 percent followed by those in age

group 25 to 34. Equal proportion is attributed to those in age group 25 to 34 who are married with and without kids.

All the respondents have some level of education. About sixty percent (54.9) of the respondent in age group 18 to 24 are at undergraduate level and about two percent (2%) are at the postgraduate level. Also, 39.4% of the participants in age group 25 to 34 are the undergraduates with about nine percent (9.1%) at the postgraduate level. About nine teen percent (18 .2 %) of the people in age group 35 to 49 are at undergraduate level and ten percent (10%) are at postgraduate level.

Out of the total respondents in the age group 18 to 24, 25.5% are from the college of basic and applied sciences, 8.5% are from college of education, 25% are from the college of the health sciences and 57.1 % are from college of humanities. Considering the age group 25 to 34, 28% are from the college of basic and applied sciences, 16% are from the college of education, 8% and 48% are from college of health sciences and humanities respectively.

Almost all the respondents are having no comorbidity. 96.8% of the respondents in age group 18 to 24 have no comorbidity with the remaining percentage (3.2%) are suffering from respiratory comorbidity. All the respondents in the age groups 25 to 34, 35 to 49 and 50 plus are not suffering from any commodity.

Table 4.1 Demographic Characteristics of the Sample by Gender

Characteristics	Category	Gender	
		Male	Female
		n(%)	n(%)
Marital Status	Married with kids	1(0.5)	0(0.0)

	Married without kids	2(1.0)	1(0.9)
	Others	3(1.5)	0(0.0)
	Single	194(97.0) 109(99.1)	
College	College of basic and applied sciences	48(24.0)	31(28.2)
	Education	22(11.0)	8(7.3)
	Health Science	22(11.0)	5(4.5)
	Humanities	108(54.0)	66(60.0)
Level of Study	Undergraduate	187 (93.5) 108(98.2)	
	Postgraduate	13(6.5)	2(1.8)
comorbidity	No comorbidity	194(97.0) 107(97.3)	
	Respiratory (asthma, lung diseases)	6(3.0)	3(2.7)

From the table above, the 308 respondents who took part in the survey, 201 are females and 107 are males. Zero percentage (0.0%) of females falls under Married with kids with a number of zero people and zero-point five percent (0.5%) falls under males with a number of one. For the Married without kids, zero-point nine percent (0.9%) of them are females with a number of one respondent whiles one percent (1.0%) are males with a respondent of two. With respect to others, there are zero percent females (0.0%) which represent a zero respondent and one point five percent (31.5%) are males with a respondent of three. For those who are Single, there are one hundred and nine respondents which constitute ninety nine percent (99.1%) of the respondent and one hundred and ninety-four respondents with a percentage of ninety-seven percent.

For level of education with respect to gender, the College of Basic and Applied Sciences, 31 respondents are females with a percentage of 28.2% and a male respondent of 48 with a percentage level of 24%. College of Education has 8 respondents being females with a percentage of 7.3% and a male respondent of 22 consisting of 11.0%. With the college of Health Sciences, we have 5 female respondents having 4.5% and 22 male respondents being 11.0%. As with the College of Humanities, 66 of the respondents are females having a percentage of 60.0% and a male respondent of 108 which constitute 54.0%.

Also, the level of study by the respondents, it was recorded that for undergraduate, 108 of the respondents are females with a percentage of 98.2 and a male respondent of 187 which is 93.5%. For the postgraduate, the females were recorded to be 2 with a percentage of 1.8 and the males were 13 in number with a percentage of 6.5.

And for comorbidity by Gender, 194 males had no comorbidity having 97.0% and 107 females with 97.3%. the ones with respiratory (asthma, lung diseases), 6 of them are males and 3 are females with each having a percentage of 3.0 and 2.7.

4.2 The Parameter Estimates of Multinomial Logit Model

The parameter estimates of the MNL model with their respective standard errors (Std. Err.) are presented in the following Table 4.2.1.The results, as discussed below, show the participants' preferences for the various attributes that were given to them during the survey and the influence of these attributes on their choice decisions.

Table 4.2.1: Multinomial Logit Model Results

Attribute	Estimate	Std Error	Lower 95%	Upper 95%
Students gatherings(hall week, online lectures ,sports, religious events)(Not permitted)	-0.0115	0.0423	-0.0948	0.0712
Students gatherings(hall week, online lectures ,sports, religious events) (Permitted for less than two hours)	0.2165	0.0406	0.1374	0.2965
Personal hygiene (Use alcohol-based hand sanitizer only)	-0.2157	0.0434	-0.3010	-0.1308
Personal hygiene (Washing of hands with water only)	-0.1512	-0.0516	-0.2525	-0.0503
Social distancing (Maintain 1 metre or 3 feet)	0.1476	0.0464	0.0516	0.2388
Social distancing (Maintain 2 metre)	0.1651	0.0416	0.084	0.247
Wearing of nose mask when leaving halls (always)	0.3312	0.0356	0.2618	0.4015
Social and lifestyle venues (Closed)	0.0543	0.0346	-0.0135	0.1223

Attribute	Estimate	Std Error	Lower 95%	Upper 95%
Resident halls or hostel for visit (Closed)	-0.0068	0.0397	-0.0848	0.0711
AIC	2313.2409			
BIC	2362.8692			
Loglikelihood	2295.1433			
Prob>chi square	0.0001			

Table 4.2.1 log worth and p-value

Attribute	Log Worth L-R Chi-Square	DF	P-Value
Students gatherings(hall week, online lectures ,sports, religious events)	29.241	2	<0.001
Personal hygiene	92.985	2	<0.001
Social distancing	30.798	2	<0.001
Wearing of nose mask when leaving hall or hostel	90.680	1	<0.001
Social and lifestyle venues (Closed)	2.466	1	0.1163

Table 4.2.1 and Table 4.2.2 are used to assess the significance of the attributes and their levels The likelihood ratio and the p-value were used to evaluate the relevance of the model. The model as a whole is statistically significant, with a likelihood ratio chi-square vale of 2295.1433 and p-vale of 0.001.Using 95% confidence interval in determing the significant level, of the coefficients, out of the nine regressors used, four weren't significant and the other five were significant. The five variables whose coefficient are significant are, student gathering not permitted, personal hygiene (use alcohol-based hand sanitizer only),personal hygiene(washing of hands) , Social and lifestyle venues (Closed) and Resident halls or hostel for visit (Closed). The rest weren't significant. The utility estimates are used to compare relative importance between different levels of the same attributes or between levels of entirely other attributes. All the coefficient estimates have the expected signs.

Considering the students gathering, the participant had high preference for permitted less than two hours it as compared to the other levels. Since it has high utility effect of 0.21653 and marginal probability of 0.4078, a confidence interval of (0.137, 0.2965) and standard error of 0.0406. Also, more value was placed on washing of hands with water, soap and alcohol based sanitizer. It marginal utility is 0.36689, a marginal probability of 0.4642.Less preference was placed on using only alcohol based hand sanitizer with marginal utility -0.21570 and a confidence interval,(-0.3010,-01308).

Figure 4.2.1 shown, majority of the respondents prefer and highly place value on personal hygiene with a log worth 92.985. Wearing of nose mask when leaving halls or hotels was the second safety protocol; they gave priority as a measure to mitigate the spread of COVID-19 in University of Ghana with log worth 90.680. Social distancing was the third safety protocol preferred by the participants with a log worth of 30.798 and the next protocols preferred most is student gathering

(hall week, online lectures, sport and religious events) with a log likelihood of 29.241.   Social and lifestyles venues on campus being closed was the protocol preferred least by the participant as a measure of combating covid-19 on campus with log worth value of 2.466.

Effect Marginals for main dataset

Marginal Probability	Marginal Utility		Students gatherings (hall week, online lectures, sports, religious events)
0.3247	-0.01145		Not permitted
0.4078	0.21653		Permitted for less than two hours
0.2675	-0.20508		Permitted for more than two hours

Marginal Probability	Marginal Utility		Personal hygiene
0.2592	-0.21570		Use alcohol-based hand sanitizer only
0.2765	-0.15119		Washing of hands with water only
0.4642	0.36689		Washing of hands with water, soap and used alcohol-based hand sanitizer

Marginal Probability	Marginal Utility		Social distancing
0.3775	0.14755		Maintain 1 metre or 3 feet
0.3842	0.16510		Maintain 2 metres or 6 feet
0.2383	-0.31266		Maintain 3 metres or 9 feet

Marginal Probability	Marginal Utility		Wearing of nose mask when leaving hall or hostel
0.6598	0.33116		Compulsory or always
0.3402	-0.33116		Not compulsory

Marginal Probability	Marginal Utility		Social and life style venues (resturants, bars, salons, gyms, pubs, cinemas)
0.5271	0.05430		Closed
0.4729	0.05430		Open

Marginal Probability	Marginal Utility		Resident halls or hostels for visit
0.4966	-0.00677		Closed
0.5034	0.00677		Open

Figure 4.2.1 Effect Marginal of the Overall Survey Data

Participants preferred the wearing of nose mask always with marginal utility of 0.33116 and marginal probability of 0.7598 and a confidence interval of (0.2618, 0.4015). Also, the participant have same level of preference for social life styles venue (restaurants, bars, salon, gyms, pubs and cinemas) being closed or open, marginal utility of 0.05430. They also prefer social practicing of social distancing 2 meters or 6 feet with marginal utility 0.16510 and probability of 0.3842. They prefer resident's halls or hostel being open for visit with marginal probability of 0.00677 and a confidence interval of (0.0516, 0.2388).

4.3 Subgroup Analysis by Gender

Here we present how the gender of respondents affect the attributes and the relationship between the two genders in accordance with their responses for the choice of preventive measures that can mitigate the spread of COVID-19 in Ghana. In this section, we will provide a thorough analysis and report the results obtained from the survey data. The analyzes will include response summary, effect summary, likelihood ratio chi-square test and p-value, and the marginal effect of the attributes and their level

Table 4.3.1: Response by Gender on COVID-19 Safety Protocols

COVID-19 Safety Protocols /Measure	Categories	Male n(%)	Female n(%)
University authorities should make the COVID-19 preventive measures mandatory	Neither agree nor disagree	8(4.0%)	2(1.8%)
	Somewhat agree	28(14%)	9(8.2%)
	Somewhat disagree	17(8.5%)	13(11.8%)
	Strongly agree	101(50.5%)	63(57.3%)
	Strongly disagree	46(23%)	23(20.9%)
Handshake your fellow students or colleagues	No	99(49.5%)	67(60.9%)
	Yes	101(50.5%)	43(39.1%)

Do you observe social distancing of at least 1 meter or 3 feet	No	98(49.0%)	46(41.8%)
	Yes	102(51.0%)	64(58.2%)
Often wash your hands with soap and water for at least 20 seconds	No	61(30.5%)	29(26.4%)
	Yes	167(83.5%)	96(87.3%)
Cover your cough or sneeze with tissue and dispose it in close bin	No	33(16.5%)	14(12.7%)
		167(83.5%)	96(87.3%)
	Yes		

Always wear a mask, particularly when leaving hall or hostel	No	26(13.0)	9(8.3%)
	Yes	174(87%)	101(91.8%)
Avoid touching your nose, eyes and mouth	No	94(47.0%)	54(49.1%)
	Yes	106(53.0%)	56(50.9%)
Disinfect frequently touched objects or surface such as doorknobs	No	104(52.0%)	52(47.3%)
	Yes	96(48%)	58(52.7%)
Avoid close contact with student who are at risk of contracting the covid-19 virus	No	49(42.5%)	12(10.9%)
	Yes	151(75.5%)	98(89.1%)

Arrest and fined sttudent for flouting the covid safety protocols	Neither agree nor disagree	21(10.5%)	10(9.1%)
	Somewhat agree	20(10%)	22(20.0%)
	Somewhat disagree	32(16.0%)	20(18.2%)
	Stongly agree	12(6.0%)	12(10.9%)
	Strongly disagree	12(60.0%)	12(10.9%)
Campus security should beat those who flout the covid-19 protocols	Neither agree nor disagree	14(7.0%)	5(4.5%)
	Somewhat disagree	34(17.0%)	16(14.6%)
		15.6%	20.0%
	Strongly agree	12(6.0%)	13(11.8%)

	Strongly disagree	140(70.0%)	76(69.1%)
Campus security should let those who flout the covid-19 safety protocols weed or clean the gutters	Neither agree nor disagree	11(5.5%)	11(10.0%)
	Somewhat agree	26(13.0%)	27(24.5%)
	Somewhat disagree	31(15.5%)	16(14.5%)
	Strongly agree	19(9.5)%	9(8.2%)
	Strongly disagree	113(56.5%)	47(42.7%)

The table above shows the response summary base on gender regarding the practices of the COVID-19 safety protocols and the effective ways to implement the COVID-19 safety protocol laid down by the University of Ghana authorities. Most of the participants were males representing 64.5% and 35.5% for females. The proportion of the male participants is two times that of the female. It can be observed that the average response for both genders is similar. More females strongly agree to the fact that, University authorities should make the covid-19 preventive measure mandatory representing 57.3% and males contributing 50.5%.

41.8% of the female participants agree that people who flout the COVID-19 safety protocols should be arrested and fined, while 57.5% of the male participants disagree that the people who break the COVID-19 safety protocols should be arrested and fined. Of the male participants, 70% were against the measure that the campus securities should beat those who flout the COVID-19 safety protocols spelled out by University authorities. 69.1% of the female participants were also against the law that people who break the COVID-19 safety protocols should be beaten by the campus security personnel. Also, both genders disagree that the campus security personnel should let those who flout the COVID-19 safety protocols weed or gutter, 42.7% of the female participant and 56.5% of the male participants. Regarding the practice of the COVID-19 safety protocols, 50.5% of the males and 39.1% of the female avoided handshakes during this time of the novel coronavirus. There is a wider difference between the T number of females who avoided handshakes and males who avoided handshake thus 11.4 percentage points. 51.0% of the male participants and 58.2% of the female participants observed social distancing of at least 1 meter or 3 feet. Of the participants, 69.5% and 73.6% for males and females, respectively, admitted that they washed their hands with soap and water for at least 20 seconds. 87.0% of the male participants and 91.8% of the female participants also wear nose masks always when leaving their various hostels. Many of the participants cover their cough or sneeze in this time of novel coronavirus, 87.3% of the female and 83.5 that of the males. Moreover, 50.9% of the female participants and 53.0% of the male participants said they avoid touching their nose, eyes, and mouth. Most of the females practice the act of disinfecting touched frequently touched objects (remote controls, doorknobs) as compared to males. That this, 52,7% and 48.0% of both female and male

respectively. Most of the participants, 89.1% of the females and 75.5% of the males, admitted that

they avoid close contact with people at risk of contracting coronavirus.

Effect Marginals for female

Marginal Probability	Marginal Utility		Students gatherings (hall week, online lectures, sports, religious events)
0.3162	-0.03367		Not permitted
0.4214	0.25351		Permitted for less than two hours
0.2625	-0.21985		Permitted for more than two hours

Marginal Probability	Marginal Utility		Personal hygiene
0.2598	-0.21400		Use alcohol-based hand sanitizer only
0.2769	-0.15023		Washing of hands with water only
0.4632	0.36423		Washing of hands with water, soap and used alcohol-based hand sanitizer

Marginal Probability	Marginal Utility		Social distancing
0.3510	0.05476		Maintain 1 metre or 3 feet
0.3530	0.06052		Maintain 2 metres or 6 feet
0.2961	-0.11529		Maintain 3 metres or 9 feet

Marginal Probability	Marginal Utility		Wearing of nose mask when leaving hall or hostel
0.7071	0.44072		Compulsory or always
0.2929	-0.44072		Not compulsory

Marginal Probability	Marginal Utility		Social and life style venues (resturants, bars, salons, gyms, pubs, cinemas)
0.5304	0.06083		Closed
0.4696	-0.06083		Open

Marginal Probability	Marginal Utility		Resident halls or hostels for visit
0.4931	-0.01378		Closed
0.5069	0.01378		Open

Figure 4.3.1 Effect Marginals for female

Effect Marginals for male

Marginal Probability	Marginal Utility		Students gatherings (hall week, online lectures, sports, religious events)
0.3293	0.00325		Not permitted
0.4063	0.21324		Permitted for less than two hours
0.2644	-0.21648		Permitted for more than two hours

Marginal Probability	Marginal Utility		Personal hygiene
0.2580	-0.21828		Use alcohol-based hand sanitizer only
0.2736	-0.15976		Washing of hands with water only
0.4684	0.37803		Washing of hands with water, soap and used alcohol-based hand sanitizer

Marginal Probability	Marginal Utility		Social distancing
0.3920	0.20285		Maintain 1 metre or 3 feet
0.3977	0.21725		Maintain 2 metres or 6 feet
0.2103	-0.42011		Maintain 3 metres or 9 feet

Marginal Probability	Marginal Utility		Wearing of nose mask when leaving hall or hostel
0.6303	0.26685		Compulsory or always
0.3697	-0.26685		Not compulsory

Marginal Probability	Marginal Utility		Social and life style venues (resturants, bars, salons, gyms, pubs, cinemas)
0.5216	0.04320		Closed
0.4784	-0.04320		Open

Marginal Probability	Marginal Utility		Resident halls or hostels for visit
0.4884	-0.02325		Closed
0.5116	0.02325		Open

Figure 4.3.2 Effect Marginals for male

Figure 4.3.1 and 4.3.2 above shows the marginal utility of the female and male participants to determine their preference level among the preventive measures. Both the males and females prefer student's gatherings to be permitted for less than two hours. However, the marginal utility for females for that preventive measure is greater than that of the males indicating that, the females preference for that measure is more than the males. Their respective marginal are 0.21324 for males and 0.25351 for females. Also, both males and female participants prefer washing of hands with soap and alcohol based sanitizer with respective marginal 0.37803 and 0.36423, wearing of nose mask always when leaving hall or hostel with marginals of 0.26685 and 0.44072. They all have equal stands and indifferent on social life styles and venue being closed or open, hall or hostels being closed or open for visitors since they equal marginal utility for all levels under these factors. However, with regards to the social distancing, both genders have different preferences. This because, the males prefer the maintain of 2 metres or 6 feet social distancing with marginal utility of 0.21725 whiles the females prefer the maintain of 3 metres or 9 feet social distancing with marginal of 0.22529.

4.4 Subgroup Analysis by Age

We discussed how the age of the respondents affect the choice of a preventive measure. The results is shown in the table below,

Table 4.3.1: Response by ages on COVID-19 Safety Protocols

COVID-19 Safety Protocols /Measure	Categories	18-24	25-34	35-49	50+
		n(%)	n(%)	n(%)	n(%)
University authorities should make the COVID-19 preventive measures mandatory	Neither agree nor disagree	8(2.8%)	2(8.0%)	0(0.0%)	0(0.0%)
	Somewhat agree	35(12.4%)	2(8.0%)	0(0.0%)	0(0.0%)
	Somewhat disagree	28(9.9%)	2(8.0%)	0(0.0%)	0(0.0%)
	Strongly agree	148(52.5%)	13(52.0%)	1(100%)	2(100.0%)
	Strongly disagree	63(22.3%)	6(24.0%)	0(0.0%)	0(0.0%)
Hans hake your fellow students or colleagues	No	152(53.9%)	12(48.0%)	0(0.0%)	2(100.0%)
	Yes	130(46.1%)	13(52.0%)	1(100.0%)	0(100.0%)
Do you observe social distancing of at least 1 meter or 3 feet	No	131(46.5%)	12(48.0%)	1(100.0%)	0(0.0%)

	Yes	151(53.5%)	13(52.0%)	0(0.0%)	2(100.0%)
Often wash your hands with soap and water for at least 20 seconds	No	81(28.7%)	7(28.0%)	1(100.0%)	1(50.0%)
	Yes	201(71.3%)	18(72.0%)	0(0.0%)	1(50.0%)
Cover your cough or sneeze with tissue and dispose it in close bin	No	41(14.5%)	6(24.0%)	0(0.0%)	0(0.0%)
	Yes	241(85.5%)	19(76.0%)	1(100.0%)	2(100.0%)
Always wear a mask, particularly when leaving hall or hostel	No	32(11.3%)	3(12.0%)	0(0.0%)	0(0.0%)
	Yes	250(88.7%)	22(88.0%)	1(100.0%)	2(100.0%)
Avoid touching your nose, eyes and mouth	No	134(47.5%)	12(48.0%)	1(100.0%)	1(50.0%)
	Yes	148(52.5%)	13(52.0%)	0(0.0%)	1(50.0%)
Disinfect frequently touched objects or surface such as doorknobs	No	137(48.6%)	17(68.0%)	1(100.0%)	1(50.0%)
	Yes	145(51.4%)	8(32.0%)	0(0.0%)	1(50.0%)

Avoid close contact with student who are at risk of contracting the covid-19 virus	No	56(19.9%)	3(12.0%)	1(100.0%)	1(50.0%)
	Yes	226(80.1%)	22(88.0%)	0(0.0%)	1(50.0%)
Arrest and fined student for flouting the covid safety protocols	Neither agree nor disagree	29(10.3%)	1(4.0%)	1(100.0%)	0(0.0%)
	Somewhat agree	41(14.5%)	1(4.0%)	0(0.0%)	0(0.0%)
	Somewhat disagree	48(17.0%)	3(12.0%)	0(0.0%)	1(50.0%)
	Stongly agree	20(7.1%)	4(16.0%)	0(0.0%)	0(0.0%)
	Strongly disagree	144(51.1%)	16(64.0%)	0(0.0%)	1(50.0)
Campus security should beat those who flout the covid-19 protocols	Neither agree nor disagree	16(5.7%)	3(12.0%)	0(0.0%)	0(0.0%)
	Somewhat disagree	44(15.6%)	5(20.0%)	0(0.0%)	1(50.0%)
	Strongly agree	24(8.5%)	0(0.0%)	1(100.0%)	0(0.0%)

		18-24	25-34	35-49	50+
	Strongly disagree	198(70.2%)	17(68.0%)	0(0.0%)	1(50.0%)
Campus security should let those who flout the covid-19 safety protocols weed or clean the gutters	Neither agree nor disagree	19(6.7%)	2(8.0%)	0(0.0%)	1(50.0%)
		49(17.4%)	3(12.0%)	1(100.0%)	0(0.0%)
	Somewhat agree	43(15.2%)	4(16.0%)	0(0.0%)	0(0.0%)
	Somewhat disagree	24(8.5%)	4(16.0%)	0(0.0%)	0(0.0%)
	Strongly agree	147(52.1%)	12(48.0%)	0(0.0%)	1(50.0%)
	Strongly disagree				

From the above table show, it helps to show the response of ages regarding the practices of the COVID-19 safety protocols and the effective to prevent the spread of the virus and measure to put in place. From the data on the university authorities making the COVID-19 preventive measures mandatory, more students agree on the authorities mandatory. 52.5% of ages between 18-24, 52.0% of age between 25-34, 100% of age between 35-49 and 100% of ages between 50+.

Handshake of fellow students or colleagues can also spread COVID-19. From the above table more students pick out the no handshaking of fellow student or colleagues to the handshaking of fellow students or colleagues. The ages between 18-24 is 46%, 48% of ages between 25-34, 0% of ages between 35-49 and 100% of ages between 50+.Form the survey taking more students agree on having 1 meter or 3 feet social distancing between themselves than students who do not agree.

A percentage of 53.3% of the ages between 18-24, 13% of the ages between 25-34, the ages between 35-49 of 0% and 100% of the ages between 50+.

Students agree on washing of hands with soap and water for at least 20 seconds form the survey collected. The ages between 18-24 support the washing of hands with a 71.3 and 72% between the ages of 25-34.85.5% of the ages between 18-24, 76% of the age between 25-34. 100% of the between 35-49 same with the ages between 50+. On the survey collected more students do cover their sneeze with a tissue and dispose it in close bin. This helps to prevent the spread of the virus. From the data collected, student wear their mask particularly when leaving hall or hostel. Which is more than student who do not. The ages between18-24 of 88.7%, 88% of the ages 25-34, 100% between the ages of 35-39 and same for the ages of 50+.From the preventive measure putting by the university authorities, student avoid touching of their nose, eyes and mouth. The ages between 18-24 as a 52.5%, 25-34 ages as a 52.0%, 0% the ages between 35-49 and 50% between the ages of 50%.Disinfect frequently touched objects or surface such as doorknobs, from the data more disagree. The ages between 18-24 as 52.5%, 13% of the ages between 25-34 and 50% between the ages of 50+.Avoiding close contact with student who are at risk of contracting the COVID-19 virus, student agree on the avoiding from friends who are contracted with the virus. This helps to decreasing the spread of COVID-19. The ages between 18-24 as 80.1%, 88% of the ages between 25-34 and 50% between the ages of 50+.

Most students strongly disagree on the arrest and fined of student for flouting the covid safety protocols. The university authorities have to educate student. 51.1% between 18-24, 64.0% between the ages of 25-34, 0% the ages 35-49 and 50% between the ages of 50+ do not support.

70.2% of ages 18-24, 25-34 of ages with 68% and 50% of ages between 50+ students strongly disagree on campus security beating those who flout the COVID-19, this means that authorities have to educate student on the cause and effect on the virus on an individual.

Most student strongly disagree on campus security letting those who flout the COVID-19 safety protocols weed or clean the gutters. The ages between 18-24 with 52.1%, 48.0% of the ages 25-34, 0% between 35-49 and 50% between the ages of 50+ do not support the campus security letting student clean gutters. Authorities have to put things in place to help student stay save and reduce virus spread.

CHAPTER FIVE

SUMMARY, RECOMMENDATIONS AND CONCLUSIONS

5.0 Introduction

The chapter summarizes the key findings obtained from the choice experiment analysis, provides conclusion and propose recommendations to University of Ghana authorities and other universities worldwide on the various measures to be adopted in their attempt of combating covid-19.

5.1 Summary

The main purpose of this study was to employ discrete choice experiments to investigate and model the preferences of the University of Ghana students on preventive measures that mitigate the spread of COVID-19 on University of Ghana Campus. The primary data used for this work was obtained from a field survey conducted by the authors through a face-to-face questionnaire. There were 308 participants for the study who were mainly university of Ghana. The survey data were entered using Microsoft Excel before importing to JMP (Version 16.0) for the main data analysis using the multinomial logit model. The primary dataset was further classified, and subgroup analysis was performed based on gender, Age, and educational level. Based on the estimated model parameters, and in order of importance, the choice experiment study revealed that gender and age play pivotal roles in the preferences or choice of the preventive measures that can mitigate the spread of COVID-19 on University of Ghana Campuses, which were further supported by the marginal effects. The analysis based on subdivisions by gender revealed that both male and females have similar preference preventive measures that can mitigate the spread of COVID-19 in Ghana.

Regardless of the subdivision, almost all the participants prioritized their hygiene as the critical measure that can mitigate the spread of COVID-19 in all Universities in Ghana, followed by wearing of nose mask and social distancing. Social life style and venues was the minor significant attribute that the participants gave attention to mitigate the spread of COVID-19 in University. Over 50 percent of both females and males strongly agree that university authorities should ensure that covid-19 preventive measures are mandatory and also those who flout the protocols should be allow to weed and clean gutters and university surroundings.

5.3 Recommendations

The following recommendations are made to explore public preferences for safety protocols to mitigate the spread of COVID-19 in Universities.

1. Based on the findings, we recommend that a law be created and implemented in Universities against persons who flout the rule on the safety protocols to mitigate the spread of COVID-19.

2. We also recommend that there should be public education for the need to for all adhere to the COVID-19 safety protocols in Ghana.

3. Protective devices must be used whenever there is potentially close contact with a suspect case, especially when the potentially infected person does not wear a surgical mask that could reduce the spread of viruses in the environment.

4. Stated or discrete choice experiments can be used in areas where there is no primary data.

5.4 Conclusion

It was observed from the results that, the results of the estimated model outperform the model with all coefficients equal to zero (null-model) using the value of the likelihood ratio Chi-square

and the P-value. This implies that the model indicated the goodness-of-fit of the data, and the set objectives for the study were justified by the results .Also, majority of the estimated utility parameters were significant, proving that the corresponding attributes influenced the individual preferences that can mitigate the spread of COVID-19 significantly. The findings from the choice experiment study based on the order of importance of the preference weights (or estimated utility parameters) revealed that the participants kept in place specific preferences before making choices. The average response for the males and females regarding the measures that can mitigate the spread of COVID-19 in Universities is the same. Sanitizers and washing hands frequently. As a precautionary measure, frequent touching the face, mouth, eyes, and nose should be avoided.

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GIFTY DAUH	10666706	Data Analysis ,chapter five and combined all the work
SINTIM JOSEPH DANSO	10658654	Data entry and analysis
BENJAMIN PEPRAH KODUAH	10663559	Data analysis
ABDUL-WADUDU TUFELO	10674790	Data entry
CHARLES NKRUMAH	10677653	Data Analysis
HILARY TSAR	10669908	Data Analysis
SETH FIAH	10664085	Data Analysis
DAVID YOVO	10662881	Methodology
DANIEL AMIHERE	10674436	Methodology
IRENE MANLENZE	10670909	Literature Review
PATRICIA APPIAH	10690139	Literature Review
TETTEH OBED	10670623	Literature Review
SAMUEL OSEI MIREKU	10660161	Literature Review

ISSAHAKU ALARU	10665558	Literature Review
MATEY RICHMOND	10659056	Literature Review
JESSICA NAA LAMILEY FRANCE	10672063	Literature Review
ALBERTA OPOKU	10662966	Introduction
OPPONG KYEKYEKU ALEX	10661519	Introduction

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