

UNIVERSITY FOR DEVELOPMENT STUDIES

SCHOOL OF PUBLIC HEALTH

DEPARTMENT OF SOCIAL AND BEHAVIURAL CHANGE



**ASSESSMENT OF KNOWLEDGE, ATTITUDES AND UPTAKE OF COVID-19
VACCINATIONS AMONG ADOLESCENTS IN THE BOLE DISTRICT OF THE
SAVANNA REGION**

PROSPER WOONI CHIRADAM

INDEX NUMBER: UDS/CHD/0001/21



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A DISSERTATION SUBMITTED TO THE SCHOOL OF PUBLIC HEALTH, UNIVERSITY
FOR DEVELOPMENT STUDIES, TAMALE, IN PARTIAL FULFULMENT OF THE
REQUIREMENTS FOR THE AWARD OF MPhil COMMUNITY HEALTH AND
DEVELOPMENT

MARCH, 2025



DECLARATION

I declare that I am the sole author of this thesis and that it has never been submitted elsewhere before for credit toward a degree. Additionally, scholarly books that were used as information sources have been properly acknowledged by citing the authors where appropriate.

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SIGNATURE

CHIRADAM PROSPER

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Certification

I attest that this dissertation was prepared and presented under supervision in compliance with the dissertation supervision requirements established by the University for Development Studies, Tamale.

Name of Supervisor: Dr. Abukari Salifu

Signature:



Date:

31 / 07 / 2024



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DEDICATION

I dedicate this dissertation to the Chiradam family and to God, who is my creator



ABSTRACT

The SARS-CoV-2 virus is the infectious agent that causes coronavirus illness (COVID-19), causing over 4 million deaths across the world. The aim of study was to examine adolescents' knowledge, attitudes, and uptake of COVID-19 vaccinations in the wake of the pandemic in the Bole district of the Savannah Region. Analytical cross-sectional study with a mixed method approach was used to survey 501 teenagers. Thematic analysis and statistical methods were employed for data analysis. Statistical Package for Social Sciences (SPSS) version 22.0 was used for statistical analysis. Logistic regression analysis was used to identify determinants of dependent variable. Most respondents (30.0%) were within the age group 16-18 years. Majority of respondents (54.7%) had poor knowledge on COVID-19 vaccination. Furthermore, 67.5% of respondents had poor perception regarding the safety, efficacy, and importance of COVID-19 vaccines, and more than half of respondents had positive attitude towards COVID-19 vaccination. About 50.1% of respondents took COVID-19 vaccines. Good knowledge on COVID-19 vaccination (OR=2.60, CI=3.87-6.82, $p<0.001$), and good perception regarding the safety, efficacy, and importance of COVID-19 vaccines (OR=5.23, CI=9.05-12.63, $p<0.001$) were identified as determinants of COVID-19 vaccines uptake. Some Respondents also believed in myths surrounding COVID-19 vaccination, and peer influence was found to be one of major factors which influenced the attitude regarding COVID-19 vaccination among respondents. There is the need to improve knowledge and perception of adolescents regarding COVID-19 vaccines via effective education and communication to improve attitude regarding COVID-19 vaccination, and uptake of COVID-19 vaccines.



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CHAPTER ONE

INTRODUCTION

1.1 Background of the study

The SARS-CoV-2 virus is the infectious agent that causes coronavirus illness (COVID-19). (Demuyakor et al., 2021). Respiratory disease is experienced by those who have contracted the virus. Nonetheless, some people get severe illness and need medical care. The three most typical signs of COVID-19 are fatigue, dry cough, and fever (Dzinamarira et al., 2021). Because it is a respiratory condition, an infected person may spread the virus through sneezing, speaking, coughing and poor practices of respiratory etiquettes and hand hygiene. Among the methods to stop the infection from spreading to oneself and others are wearing an appropriately fitting nose mask, washing your hands often, and applying an alcohol-based rub (Gebru et al., 2021).

A major COVID-19 sickness is expected to attack the vulnerable, particularly the aged and other with medical illnesses such as diabetes, cardiovascular disease, cancer, or chronic respiratory ailments. However, the condition could also affect anybody which could become serious (Lamprey & Senkyire, 2022). According to Fazel et al. (2021), With the COVID-19 pandemic spreading to several countries and being labelled as a "disease of the young," the focus shifted to preventing the disease's spread among younger people. Due to their developing immune systems and limited ability to defend themselves against infectious diseases, adolescents were susceptible to the COVID-19 infection. Thus, in order to meet the immunization targets for public health, it is critical to assess the knowledge and attitudes regarding the uptake of COVID-19 vaccinations in this group (Cai et al., 2021).



Agyekum et al. (2021), claim that it is one of the deadliest illnesses in living memory. Around the end of 2019, the first case of the novel Corona Virus (COVID-19) SARS-CoV-2 was reported in China. By January 2020, the virus had quickly spread to other countries. The World Health Organization (WHO) declared the epidemic to be a pandemic on March 11, 2020 (Demuyakor et al., 2021).

The new coronavirus disease (COVID-19) had more than 200 million cases worldwide by August 2021. Over 4 million of those included in this number tragically passed away. At that point, there were approximately 4 million cases and over 100,000 deaths in the African region (Alhassan et al., 2021). On the 18th July 2022, the global view of Covid-19 stood at 569,194,391 cases and 540,403,013 deaths. Africa recorded 12,423,000 cases and 256,000 deaths in mid July 2022 (Dzinamarira et al., 2021). At the time of the COVID-19 pandemic, many African nations implemented lockdowns or quarantines to control the blow-out of the virus. However, these actions unintentionally resulted in negative consequences such as worsening non-COVID-19-related health outcomes, increasing mental health problems, and exacerbating economic inequality (Dzinamarira et al., 2021).

Ghana announced its first two COVID-19 cases on March 12, 2020. (Ofori-Adjei et al., 2020). Ghana declared a partial lockdown on March 28, 2020, commencing on March 30, 2020, at 1:00 local time, and continuing for 14 days. One hundred and forty-one cases of COVID-19 were confirmed in Ghana when the control measures were implemented. Only basic things like food, medicine, water, paying utility bills, going to the hospital, pharmacies, or banks were allowed for citizens to leave their houses (Afriyie et al., 2020). To handle the COVID-19 pandemic's probable repercussions in Ghana, the government set five main goals. These included (1) limiting and stopping the virus's importation, (2) containing its spread, (3)

providing proper treatment for the ill, (4) reducing the virus's negative effects on social and economic life, and (5) boosting domestic output to promote independence (Afriye et al., 2020). There have been reports that vaccination is one of the major developments in public health to have occurred in the 1900s. Smallpox has been eradicated and other infectious illnesses including poliomyelitis, measles, rubella, tetanus, and diphtheria have been brought under control thanks to vaccinations. Vaccination is seen as one of the greatest medical achievements of modern civilization (C et al., 2021). Despite every advancement in public health that has resulted in the immunization of people, populace continues to express skepticism about the necessity, protection, and usefulness of vaccines. This phenomenon is known as vaccine hesitancy (Dzinamarira et al., 2021). It could also be explained as the unwillingness to receive a vaccination disdain the accessibility of a vaccine (Hong et al, 2022). The COVID-19 crises had disproportionately affected elderly people, women, and kids around the world (Adu-Gyamfi & Asante, 2022).

The first COVID-19 vaccine was licensed as of December 2020, which prompted the development and execution of global mass immunization campaigns (Giuseppe et al., 2022). Ghana received 600,000 doses of the Oxford-AstraZeneca COVID-19 vaccine on February 24, 2021. Ghana was one of the countries in West Africa to obtain this product. However, the objective of the COVAX initiative was to ensure that the COVID-19 vaccines were distributed fairly around the world, especially to adolescents, who were discreetly identified as potential carriers of the virus. (Burki, 2021).

Adolescence is a period of life ranging from 10 to 24 years (Ahanhanzo, 2018). Due to a lack of vaccine availability and the fact that most young people were showing mild signs and symptoms, these groups of people was not prioritized. Young people, however, had infection rates that were comparable to those of other population groups, which means that they could potentially spread infection to more at-risk individuals in their homes, schools, and



communities.

Meanwhile, several investigations have demonstrated that COVID-19, especially when the delta variation is present, can be a dangerous illness that even affects children and teenagers, requiring hospitalization due to severe complications (Giuseppe et al., 2022).

Once more, early data from high-income to low-income nations indicates that children and teenagers younger than 18 may contract and spread SARS-CoV-2 illness (Sam, 2022). However, information that was accessible globally showed that youth and adolescents were becoming more and more representative of the COVID-19 case load (Sam, 2022). The insurgence of Covid-19 had dire consequences in all spheres of life affecting every human social and economic activity. Therefore, the study's main objective was to evaluate the participants' knowledge, attitudes, and perceptions on the Uptake of COVID-19 Vaccinations among Adolescents in the Bole District.

1.2 Problem Statement

A report from the Bole District Health Directorate (District Health Directorate, 2023) indicated that the district recorded a total 433 suspected cases out of which 93 were confirmed positive cases with 2 deaths from the start of the covid-19 pandemic in 2020 to the first quarter of 2023 in the Bole District (District Health Directorate, 2023).

In the Savanna region, out of the 7 districts, the total number of people vaccinated in Bole as at February 2023 for all doses (1st dose+2nd dose+ 1st booster+ 2nd booster) was 83,810. The entire count of individuals who received a dosage was 35,246 representing (15.6%) of the total population of 120,715, the total adolescent population (persons between the ages 10-19 years) was 29,040, representing 22.4% of the total district population vaccinated. This constituted the lowest age group being vaccinated against the district Covid-19 vaccination target of 58%. According to the Bole District Health Information Officer, "Ghana Health Service has



integrated Covid-19 vaccination into its routine vaccination schedule in an effort to contain the pandemic and prevent its resurgence after it was deemed to be a public health concern rather than an emergency”. The results are yet to be achieved most especially among the adolescents (Bole District Health Directorate, 2023).

Negative attitudes and misconceptions about vaccine safety and effectiveness can lead to reluctance to get vaccinated. Also, peer influence can influence the uptake of the vaccination among adolescents. Additionally, certain perceptions, such as beliefs in conspiracy theories or misinformation, can further hinder the acceptance and uptake of COVID-19 vaccinations among adolescents.

This study is required to fill a research gap concerning the knowledge, attitudes, and uptake of the COVID-19 immunizations among adolescents in the Bole District. While there have been studies exploring vaccine acceptance and hesitancy in general populations, there is limited research focusing specifically on adolescents. Prior studies have mostly concentrated on adult populations, which has resulted in a large knowledge vacuum on the variables influencing adolescent vaccination uptake in this district. Existing studies focused on ***covid-19 acceptance scale, predictors of covid-19 stress and covid-19 acceptance*** (Chen et al. 2022; Adgaottor et al.2022).

Moreover, a customized study is necessary to pinpoint the obstacles and prospects for enhancing adolescent vaccination uptake in the Bole district. The results of this investigation may help in the development of targeted interventions, educational campaigns, and strategies to increase vaccine uptake among adolescents.



1.3 Research Questions

Data from the present study answered the following research questions:

1. What is the extent of COVID-19 vaccine-related knowledge among adolescents following the pandemic in the Bole District?
2. What are the prevailing attitudes of adolescents towards the uptake of COVID-19 vaccination campaigns in the Bole District?
3. What are the perceptions held by adolescents regarding the safety, efficacy, and significance of COVID-19 vaccines in the post-pandemic period in Bole District?
4. Is there a significant correlation between the levels of COVID-19 vaccine-related knowledge and vaccine uptake among adolescents in Bole District?
5. How does adolescents' perception of COVID-19 vaccines relate to their vaccination uptake behaviour?

1.4 OBJECTIVES

1.4.1 Main Objective

The main objective of this study is to assess the knowledge, attitude, and uptake of COVID-19 vaccines among adolescents in the aftermath of the pandemic in Bole District.

1.4.2 Specific Objectives

1. To describe level of awareness among adolescents regarding COVID-19 vaccines.
2. To assess the attitudes of adolescents towards COVID-19 vaccination.
3. To explore the perceptions of adolescents regarding the safety, efficacy, and importance of COVID-19 vaccines.



4. To describe the association between knowledge levels and vaccine uptake among adolescents.
5. To determine the relationship between perceptions about COVID–19 vaccines and vaccine uptake among adolescents.

1.5 Significance of the Study

The health of adolescents holds significant importance for nations, territories, and localities globally, as they represent the future contributors to the advancement of their nations and the global community. Improving COVID–19 vaccines uptake among adolescents is particularly crucial for low-income nations striving to fulfil the Sustainable Development Goals (SDGs), with Goal 3 specifically emphasizing health (Bearinger et al., 2017). The findings from this study bring to light the awareness level, attitudes, perceptions, and uptake level of COVID-19 vaccines among adolescents. More so, findings from this study will inform health institutions in the country, such as the Ministry of Health to improve their efforts on the fight against COVID–19, especially among adolescents. This study can be used as basis for future studies focused on COVID–19 among adolescents.

1.6 Limitations of the study

The study is restricted to adolescents and not any other age category in the Bole District. Also four sub-districts were sampled out from the six sub-district to represent the entire district.

The study is equally restricted to the study of Bole district in the Savanna Region of Ghana



1.7 Organization of the study.

The study is organized in to six chapters. Chapter one is made up of background to the study, statement of the problem, research questions, objectives of the study, significance of the study, limitations of the study, and organization of the study. Chapter two which is the review of the related literature, is also made up of the introduction, adolescent knowledge on the uptake of covid 19, adolescent attitude towards the uptake of the covid 19 vaccines, benefits of the covid 19 vaccines, vaccines uptake, threats to the uptake of the vaccine, adolescent peer influence, and the vaccines availability. Chapter three is the methodology which is made up of introduction, study area, study design, sample size determination, sampling techniques, data collection tools, data management, ethical consideration, and the inclusion and exclusion criterion. Chapter four is analysis and reporting of data. It includes, introduction, knowledge of adolescents on covid 19 uptake, attitudes of adolescents, perception of adolescents towards covid 19 vaccines uptake, Correlation, and summary. Chapter five is the discussion of the thesis. It is made up of introduction, Knowledge of adolescent towards covid 19 uptake, attitudes of the adolescents towards covid 19 vaccines uptake, correlation between levels of covid 19 knowledge, and relationship between knowledge and uptake. Chapter six is the last chapter of the thesis. It is made up of introduction, summary, conclusion and recommendations.

1.8 Definition of Terms

SARS: Severe Acute Respiratory Syndrome.

Myths: A widely held but false beliefs or ideas

Vaccines: A vaccine is a biological preparation that provides active acquired immunity to a particular infectious disease

Vaccinations: To protect oneself from dangerous diseases before contracting them



Adolescents: An individual who is between the ages of 10 and 19.

Uptake: The rate or act of accepting something

Continuous: Marked by uninterrupted extension in space, time or sequence



CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter deals with literature review regarding the subject under discussion. Indeed, it relates ideas to other people who have written about adolescent health seeking behaviour and vaccines acceptance. Adolescent acceptance of using the immunizations, awareness of COVID-19, and attitude toward the disease. Adolescents should be vaccinated for COVID-19 to help achieve herd immunity, as they have the highest virus incidence and play a crucial role in community transmission (Efendi et al., 2022).

The menace of COVID-19-related hospitalizations is higher among adults, but children and teenagers can also experience serious effects from the virus. During the prevalence of the Omicron variant, there were 7.1 hospitalizations per 100,000 children, and with the Delta variant, there were 1.8 hospitalizations per 100,000 children. The largest increase in hospitalizations was observed among children aged 0-4 years (Marks et al., 2022).

Adolescents, especially those who have not had the vaccination, may experience severe and protracted symptoms from COVID-19. According to an Indonesian study, about 10.4% of all COVID-19 cases that have been reported involve adolescents. To increase vaccine coverage, it is imperative that the factors influencing teenage vaccination be investigated.

The median vaccination rate for teenagers was 50.40%, according to a scoping analysis by (Liu et al. 2020). The bulk of the research indicated that worries about vaccine efficacy, safety, and possible adverse effects were the main causes of adolescents' hesitation to receive vaccinations. Consistent with this discovery, (Cai et al., 2021), proposed that adolescents' the extent of their



understanding and trust in the COVID-19's efficacy and safety vaccine may influence how well-received it is. To determine how well teens comprehend the COVID-19 vaccination and how willing they are to get it, it is therefore necessary to investigate their understanding of the vaccine.

According to Efendi et al. (2022), indicate that, young people in Thailand adopted undesirable attitude for the COVID-19 vaccine because of its side effects. In addition, teenagers in Hong Kong, Canada, and the US voiced grave concerns regarding the efficacy and safety of immunizations. A separate survey carried out in China found 75.59% of Chinese teenagers would receive the COVID-19 immunization and that 76.3% of them thought it was safe. On the other hand, a study done on teenagers in the UK found that 12.9% of them decided not to have the COVID-19 vaccine, 37.0% were unsure, and 50.1% had an appointment for vaccination (Efendi et al., 2022).

Prior studies on the COVID-19 immunization in teenagers indicate that there is still a dearth of knowledge on this subject. Teenagers' dispositions and readiness to take the COVID-19 vaccines have been the focus of several studies, but none have examined how committed they are to getting the vaccine. There are no studies on adolescent immunization in Ghana, especially ones that address teenagers' compliance with the COVID-19 vaccine. To create plans that will hasten the rollout of the COVID-19 immunization, research on the variables influencing adolescents' willingness to receive vaccinations and their adherence to them is essential. Adolescent adherence is thought to be correlated with their knowledge and attitude levels.

The adherence of teenagers to the basic COVID-19 vaccination regimen was attributed to multiple critical criteria. A positive association was observed between teenage compliance with the COVID-19 immunization program and residential regions, excellent health, knowledge and confidence in vaccines, and positive attitudes (Efendi et al., 2022) .



Efendi et al., (2022), suggests that teenagers' COVID-19 vaccine compliance may be negatively impacted by younger age groups (12–14 years old), adolescents whose parents work, and parental education. This result is consistent with other research that showed children's and adults' vaccination coverage and willingness were lower in rural than in urban regions. This may be because rural areas have less access to healthcare facilities than urban ones do. Furthermore, city people frequently have easier access to information regarding the vaccine's efficacy, which reduces vaccine hesitancy. It can also be argued that, in comparison to those who live in cities, residents of rural areas sometimes do not have as easy access to healthcare facilities or professionals. In communities, there was restricted access to COVID-19 vaccine during the pandemic.

Adolescents who knew more about COVID-19 had a better likelihood of sticking with the vaccine than adolescents who knew less (Efendi et al., 2022). Misconceptions regarding the COVID-19 vaccination may result from ignorance of the shot. Additionally, Rehati et al., (2022) proposed a connection between Chinese students' vaccine hesitation and low levels of risk awareness, understanding of health issues, and exposure to accurate information regarding the value of immunization. The most often mentioned variables that could boost adolescents' intention to get vaccinated were learning more around the efficacy and safety of the COVID-19 vaccine as well as school immunization supplies. The same study also revealed a strong relationship between COVID-19 immunization adherence and positive sentiments of the vaccine. Most individuals in a prior study reported having good attitudes and intending to be COVID-19 vaccinated. Positive sentiments among adolescents about the vaccine indicate that they think it's safe and has few negative effects, which makes them more receptive to it.

Positive attitudes have the potential to encourage people to vaccinate themselves, according to Wolff, (2021). This embraces the theory of planned behaviour. Following the COVID-19 immunization protocol was also linked to confidence in the vaccine. This is supported by a



prior study that found that 39% of adolescents who had received vaccinations did so because they felt that their risk of contracting a disease would be higher if they had not received the vaccine.

According to a prior study, 15.1% of adolescents disregarded the COVID-19 immunization program because they were unsure about its efficiency, and 22.9% of adolescents did not follow the program. This result supports the idea that vaccination decision-making is strongly correlated with vaccine confidence (Fan et al., 2021). Additionally, it is claimed that adolescents' willingness to get immunized is significantly influenced by their understanding of the effectiveness and safety of the COVID-19 vaccine. The acceptance, trust, and uptake of vaccines among adolescents may be influenced by information provided about the vaccine, which was delivered by authorities or medical experts.

It was also discovered in another study that parental objection which accounted for as much as 49.56% of the reasons teenagers did not receive vaccinations was the primary cause. It was discovered that early adolescents had a greater non-adherence rate (75.4%) than middle-aged adolescents (47.4%). This could be because early adolescents have less autonomy than middle-aged adolescents when it comes to making their own health-related decisions. A 16–18-year-old study conducted in Israel revealed a substantial correlation between the level of involvement of teenagers in the vaccination decision-making process and the immunization that was administered. The likelihood of middle-aged teens making their own health-related decisions is higher. Furthermore, a US study found that vaccination decisions were already being made by adolescents as young as 12 or 13. It is more common for parents to include their kids in decision-making in societies like the industrialized Western world, where the values of autonomy, achievement, and self-direction are highly valued.



The COVID-19 pandemic emerged in late 2019 and has since become one of most significant global health crises in recent history (Li et al., 2020). The rapid spreads of the virus lead to unprecedented effort to develop effective vaccines. In response to the emerging pandemic, researchers and scientists rapidly initiated vaccine development, including inactivated whole virus vaccines, viral vector vaccines, and mRNA-based vaccines (Thanh Le et al., 2020). Notably, several vaccines of COVID-19 was developed including Pfizer-BioNTech COVID-19 (BNT162b2), Moderna COVID-19 vaccine (mRNA-1273), AstraZeneca COVID-19 vaccine (Covishield), and Johnson and Johnson COVID-19 vaccine (Ad26.COV2.S) (World Health Organization, 2020).

2.2 Adolescent Knowledge on COVID 19 Vaccines

Wang, (2022), reports that a survey reveals that more than 80% of teenagers have heard of COVID-19 vaccinations before. This survey aims to investigate Ghanaian adolescent vaccination uptake and awareness on COVID-19.

If 70% COVID-19 vaccination coverage is a target set by the World Health Organization, Africa must get 95% of all adolescents vaccinated against COVID-19 to meet this target. Additionally, teenagers can act as advocates by pushing friends and family to become vaccinated (Wang, 2022).

Nonetheless, research conducted in affluent environments highlights the alarming problem of teenage reluctance to receive the COVID-19 vaccine. In April 2021, the US Centers for Disease Control and Prevention polled teenagers and their parents, and the results revealed that only 52% of adolescents without vaccinations between the ages of 13 and 17 would most likely not obtain the COVID-19 vaccine (Wang, 2022). Studies on teenagers' reluctance to receive the COVID-19 vaccine have also been carried out in high-income nations and China; in contrast,



studies in sub-Saharan Africa and other Low and Middle Income Countries (LMICs) have mostly focused on the adult population (Wang, 2022)..

Li et al. (2021) assert that it is unclear how safe and effective COVID-19 vaccinations are for kids and teenagers. A study by Abbas et al. (2021), those with a lower level of education or who are illiterate, the unemployed, younger generations, and certain ethnic groups are more hesitant. A stage that separates childhood from adulthood is adolescence (Adjaottor et al., 2022). As a result, it is recognized as a period of intense emotional and physical upheaval during which teenagers attempt to conform to the expectations of society and assume adult roles.

2.3 Adolescent Attitude towards Covid-19 Vaccines

Vaccine hesitancy, as defined by (Akram et al., 2021) is a multifaceted and milieu-specific variable that varies across time, place, and vaccines. It incorporates characteristics such as contentment, accessibility, and confidence. Health professionals have cautioned against the possibly serious repercussions of such conspiracy theories because they believe that the widespread belief in COVID-19 conspiracy theories may be the cause of the comparatively high non-adherence in the US (Bierwiazzonek et al., 2020). Beyond the lone conspiracy theorist, these acts may have detrimental effects on society as a whole (for example, not vaccinating children may cause illnesses that were once thought to be extinct to resurface) (Uscinski, 2020).

Given the unusual extent and dissemination of conspiracy theories around COVID-19, in conjunction with prior research, there is cause for concern that these beliefs could have a detrimental effect on society (van Prooijen & Douglas, 2018). Conspiracy theories can weaken civic sustenance for government agendas and diminish key measures of voluntary compliance.



This includes diminishing trust in authorities, institutions, and the perceived credibility of those in power (Imhoff & Bruder, 2014). Bierwiazzonek et al., (2020), also noted in their study that conspiracies can thwart preventive actions connected to health. For example, there is a correlation between the belief in birth control conspiracies and a lower use of condoms. Supporters of conspiracy theories are less inclined of following laws and government-mandated immunization programs as well as social distancing protocols. An attitude like this is harmful to public health because it can accelerate the virus's spread and putting many people's lives in jeopardy (Wang et al. (2022).

Furthermore, a study by Wang et al., (2022) claimed that cultural, social, historical, political, and individual factors—all of which differ significantly across cultural and geographical settings are major drivers of perceptions and attitudes about vaccines. Because of this, there are significant regional and national differences in COVID-19 vaccine reluctance, as seen by numerous adult surveys conducted in the past. It's also possible that adult vaccination reluctance differs from teenage vaccine hesitancy in terms of both levels and factors. While studies in sub-Saharan Africa and other Low- and Middle-Income Countries (LMICs) have mainly focused on the adult population, earlier research on adolescents' reluctance to receive the COVID-19 vaccine was carried out in high-income nations and China.

In terms of protection, vaccines are thought to be effective. To help the globe transition to a post-COVID-19 world, COVID-19 vaccinations have been introduced to reduce transmission. The willingness and acceptance of the vaccine have been severely hampered by resistance, anxiety, and safety concerns along with conspiracy beliefs against vaccinations (Alhassan, Ako, et al., 2021). Vaccines are regarded as a form of defense. To prevent further COVID-19 transmission and help the world transition to an immediately following COVID state, COVID-19 vaccinations have been introduced. However, a portion of the populace express resistance



and worries about the safety of the vaccine. Hence show less willingness to accept the vaccine (Abrams et al., 2021).

The population's willingness to receive the vaccine, however, is a major factor in how well COVID-19 immunization programs affect disease transmission, morbidity, and mortality. The reasons given for vaccination hesitation involve, but are not limited to, worries or fears regarding vaccine safety, uncertainties or scepticism regarding vaccine benefits, moral and religious influence and cultural specific factors (Acheampong et al., 2021).

The main causes of South Africans' vaccine hesitancy are religious influence and concerns that immunizations are being utilized as a surveillance or monitoring tool by the government (Acheampong et al., 2021). Uncertainty regarding the safety and efficacy of vaccines, as well as a lack of awareness regarding the possible advantages of vaccination for children and adolescents, may be the primary causes of the lower vaccination acceptance rate among teenagers. Adolescents may also be less likely to take the COVID-19 vaccine due to the potential for pain and discomfort during vaccination (Cai et al., 2021).

2.4 Covid-19 Vaccine Benefit to the Society

Given the poor primary care visit rates among adolescents generally, school-based administration of these immunization programs has been quite beneficial. Data on adolescent COVID-19 vaccinations demonstrate the vaccines' overall safety thus far. Rare incidences of male-dominated teenage myocarditis and pericarditis have been reported; these cases generally occurred after the second immunization dose. For instance, early vaccination data from Israel, where vaccination is mandatory for everyone over 16, have shown the vaccination to be relatively safe and effective. In the case of vaccinated teenagers (12–15 years old), for instance, no significant morbidity was noted between January and May 2021; nevertheless, over the



same period, 15 unvaccinated adolescents were admitted to hospitals due to COVID-19 infection (Fazel et al., 2021).

2.5 Covid-19 Vaccines Uptake by the adolescents

Vaccinations are frequently a financially sensible strategy for enhancing population health. Immunity at the community level against infectious diseases is significant because it lowers the risk of the disease spreading throughout the population because many potential hosts are immune to the virus that causes the illness. Vaccination or naturally occurring immunity resulting from previous infection can both produce this population-level immunity, also referred to as herd immunity, to an infectious disease. Herd immunity requirements to disrupt the COVID-19 transmission chain are believed to be between 60% and 70% (Acheampong et al., 2021).

The best course of action to lessen the COVID-19 pandemic's impact right now is vaccination (Bagateli et al., 2021). The vaccination appears to lower the likelihood of hospitalization and other serious consequences, such as death, even while it does not provide complete protection against infection (Alhassan, Agyei, et al., 2021). Factors including but not limited to lack of public trust, poor funding, and a paucity of vaccine supplies, put low- and middle-income nations at risk of vaccination delays. This is because many high-income nations obtain a significant portion of the new vaccinations without giving other nations priority. Because of this disparity, low- and middle-income nations may find it more difficult to combat COVID-19 given the state of their healthcare systems now (Shitu & Mose, 2021).

Cai et al., (2021), discovered that younger teenagers possessed a greater chance of accepting the COVID-19 immunization than older teenagers. This finding may have been caused by the fact that younger teens are more obedient to positive instructions and have less access to online disinformation or negative information regarding vaccines. Teens who were previously



informed about COVID-19 vaccinations had a advanced likelihood of accepting COVID-19 immunization in the future, indicating a greater understanding of the vaccines' effectiveness in containing the pandemic. Since the disease's onset, China has implemented stringent public health measures to contain the spread of COVID-19 in response to the pandemic's severe effects. The health belief model predicts that vaccinations will probably be more beneficial than harmful.

A thorough examination of vaccine acceptance rates revealed that adult populations typically had COVID-19 acceptance rates greater than 70%. The countries with the greatest adult COVID-19 vaccination acceptance rates at the national level were China (91.3%), Malaysia (94.3%), Ecuador (97.0%), and Indonesia (93.3%). The USA (56.9%), France (58.9%), Italy (53.7%), Russia (54.9%), Poland (56.3%), Kuwait (23.6%), and Jordan (28.4%) on the other hand, had the lowest vaccination acceptance rates. (Acheampong et al., 2021).

As of July 30, 2021, more than 4.1 million people had died worldwide with COVID-19, according to Johns Hopkins University, which reports 196 910 814 cases. Several COVID-19 vaccines were introduced, offering hope for reducing the disease burden worldwide (Abrams et al., 2021). Acheampong et al. (2021) claimed that, in terms of educational attainment, individuals with a secondary education (high school) degree have the highest likelihood of receiving the vaccination—62 percent. On January 20, 2022, COVID-19 vaccinations were only authorized for use in Ghana for individuals over the age of 15, which includes teenagers enrolled in secondary schools (15–17 years old) but not junior high school students (12–14 years old). According to Abrams et al., (2021), a high vaccination rate is necessary for any sort of return to normal.

The Pfizer-BioNtech mRNA COVID-19 vaccine (BNT162b2) was first approved for emergency use in adolescents aged 12 to 15 years old by the US Food and Drug Administration



on May 10, 2021. Vaccines appear to lower hospitalization and other serious consequences, such as death. However, the public, particularly health care workers (HCWs), are afraid, anxious, and hesitant, which puts the vaccine's effective distribution in many countries, including Ghana, in jeopardy (Alhassan, Agyei, et al., 2021).

Like many other African nations, Ghana has a history of having strong opposition to vaccine trials and vaccination uptake. Review of the literature indicates that a major obstacle to acceptance and uptake of the COVID-19 vaccine is the widespread disinformation spread by the mass media (e.g., linking it to 5G technology and claiming that vaccination chips are implanted in human bodies). The trial finally began in April 2019 following successful stakeholder interactions. The public's perception of vaccine trials and vaccination acceptance, particularly the COVID-19 vaccine, is influenced negatively by certain religious leaders and groups, who also spread false information (Alhassan, Agyei, et al., 2021).

Only 1% of people living in low-income countries have gotten at least one dose of vaccines as of July 13, 2021, according to the World Health Organization (WHO). As of that date, 3 billion vaccine doses had been delivered worldwide, accounting for 25% of the world's population.

World Health Organization (WHO) indicated that there are at least seven distinct vaccinations available on three platforms. Ghana received the initial shipment of 600,000 Oxford Astra-Zeneca vaccinations from COVAX on February 24, 2021, making it the first nation in the West African sub-region to do so. On March 2, 2021, the vaccine was subsequently made available, and in an effort to foster public faith, the President, prominent politicians, and representatives of traditional and religious organizations publicly received the shots (Alhassan, Ako, et al., 2021).

No published information was found regarding the adverse effects that individuals who received the AstraZeneca vaccine encountered, or how these impacts would relate to the chance



that they would receive another shot or promote it to others. Although there may be a few isolated reports of unfavourable occurrences following vaccination, anecdotal evidence does not yet corroborate these accounts in a way that is consistent with scientific findings (Alhassan, Ako, et al., 2021).

First, it will help me protect my family, friends, and other community members (69%); second, the vaccine is effective at preventing me from getting COVID-19 (67%); and third. I must contribute to the pandemic's fight on behalf of public health. These are the top three reasons for those who are very likely or somewhat likely to get the vaccine. The primary justifications offered by those who aren't sure were: (1) a lack of knowledge about the vaccine's potential side effects (60%); (2) a lack of confidence in the vaccine's clinical safety (41%); and (3) a lack of confidence in the vaccine's ability to protect against COVID-19 (23%).

Lastly, the top three reasons given by individuals who were extremely or somewhat unlikely to receive the vaccination were as follows: (1) I'm not sure whether the vaccination is clinically safe (61%); (2) I don't know enough about the vaccine's potential side effects (53%); and (3) I'm not sure if the vaccine works to keep people from contracting COVID-19 (35%) (Acheampong et al., 2021). Major concerns of health workers were vaccine safety, efficacy, and potential side effects. Higher socioeconomic status, directly working with patients, perceived risk and fear of COVID-19, and a history of influenza vaccination were associated with higher vaccine uptake (Adane et al., 2022).

As of May 5, 2022, 4.63 billion people worldwide had received all recommended vaccinations from the vaccine manufacturer, out of a total of 5.13 billion. Regrettably, in Ghana, COVID-19 vaccines were only authorized for use in individuals over the age of 15, which includes adolescents enrolled in senior high schools (15–17 years old) but not junior high school students (12–14 years old) (Adjaottor et al., 2022). Regardless of the kind and format of



vaccination, there are communities in Africa that have always opposed immunization. claiming that spiritual elements are the cause of ailments, which has a negative impact on seeking medical attention (Dzinamarira et al., 2021). There is also a claim that low- and middle-income nations are vulnerable to vaccination delays for several reasons, including a lack of public confidence, a lack of funding, and a shortage of vaccine supplies.

2.6 Threats to Vaccination uptake by the adolescents

When mass vaccination acceptance is not attained, herd immunity—which provides some protection to those who have not received a vaccination—is jeopardized. Regardless of the kind and format of vaccination, there are communities in Africa that have always opposed immunization. According to recent research on the health-quest behaviours of pontifical groups in Zimbabwe, the belief that spiritual forces cause disease has a negative impact on seeking medical attention. (Dzinamarira et al., 2021).

One key obstacle to vaccination uptake will be the amount of different public skepticism over the safety and effectiveness of vaccines, as well as the prevalence of myths and conspiracies. Based on studies, those who are less educated or illiterate, jobless people, younger generations, and members of specific ethnic groups are less likely to take risks (Abbas et al., 2021).

Early in the pandemic, non-pharmaceutical interventions (NPIs) including as regular hand washing, social and physical separation, and wearing face masks in public were the focus of public health measures around the globe. Despite the fact that these NPIs are still essential in the global pandemic response, effective vaccine deployment is the last line of Defence that allows humanity to resume its normal existence (Alhassan, Agyei, et al., 2021).

Obstacles to expanding vaccination coverage globally are also linked to unfavourable perceptions and misbelief regarding COVID-19 vaccinations. Evidence from certain medical



professionals regarding the uptake of the COVID-19 vaccine showed expressions of a negative attitude toward becoming vaccinated (Adane et al., 2022). Fears and anxiety related to injections could potentially impede the long-term advantages of immunization (Freeman et al., 2021). Recent findings regarding adult the COVID-19 vaccination reluctance in Africa is mostly attributed to mistrust of governments, conspiracy theories and religious beliefs, worries about safety and efficacy, and erroneous information disseminated on social media. There have also been reports of mistrust towards Western vaccines due to the past unethical Western medical practices in Africa. (Gittings & Cluver, n.d.). According to Gittings & Cluver, (n.d.), Unlike other age groups, a COVID-19 vaccination was approved in May 2021, especially for participants between the ages of 12 and 15. However, Children and adolescents were not a priority group for immunization, and COVID-19 vaccines have been more recently licensed for these subgroups.

Additional research on COVID-19 vaccines revealed that participants in those studies stated the vaccine contains particles of the human immunodeficiency virus, implants tracking chips, alters the human DNA, or causes irreversible harm to health (Rzymiski et al., 2021).

2.7 Adolescent Peer Influence on the uptake of the Covid-19 Vaccines

In their daily lives, adolescents face a variety of risks (Maxwell, 2002). According to Harris (1998), peers are frequently held accountable in the public eye for the start of risky behaviours including drug use and teen pregnancy. Peers may also have a significant impact on the development of their colleagues through the influencing their regularising beliefs and how they interpret information about risky behaviours (Rzymiski et al., 2021). This implies that parents, teachers, and the media teach teenagers about risky behaviour, but other sources might also be significant. To put it briefly, peer standards play a role in determining whether a behaviour is

considered "hip," safe, and attractive. Acknowledging that adolescents are particularly susceptible to peer influence, it is important to know how the process occurs.

2.8 Covid-19 Vaccines Availability

According to reports, the first COVID-19 vaccine was licensed as of December 2020, which prompted the development and execution of global mass immunization campaigns (Giuseppe et al., 2022). Considering the inadequate vaccine availability, Giuseppe et al.'s study from 2022 revealed that children and adolescents typically exhibit a moderate condition or no symptoms at all, therefore immunization was not prioritized for them. Because of this, only one vaccination was authorized for patients who were older than 16.

It is also indicated that, the first vaccination doses for Ghana are being supplied by COVAX and other bilateral sources, including the Sputnik V vaccine from Russia. Initially, the AstraZeneca/Oxford vaccine was given to the Ghana in 600,000 doses and on May 7, 2021, it received an additional 350,000 doses of the AstraZeneca coronavirus vaccination. Data from the Ghana Health Service indicates that as of 30 April 2021, Ghana has provided 849,527 first doses of the vaccines. These included vaccinations obtained through COVAX as well as those obtained directly or through donations, including the Russian Sputnik V vaccine (Acheampong et al., 2021).

According to Wang et al., (2022), during the inception of covid 19 vaccination, immunization was carried out only in adults. Adolescent vaccination offers the double advantages of preventing adolescent illness and death while also slowing the virus's transmission through the development of herd immunity. This evidence in Wang et al., (2022), they stated that, death rates of COVID-19 are much lower in adolescents than among adults. It is imperative that adolescents get vaccinated with COVID-19 vaccine for Africa to meet the target of WHO.



Moreover, teenagers have the potential to act as advocates by motivating their friends and family to receive vaccinations (Wang et al., 2022).

The development of a COVID-19 vaccine that is both safe and efficacious would undoubtedly be extremely beneficial to the pandemic response. Even while governments typically give priority to health workers and other specified groups for the immunization program, there are worries over the acceptance of these vaccines once they become available to the public. The public's acceptance of vaccinations does not always follow from their sufficient supply. A crucial element in every vaccination program's success is the participant's desire to accept or reject vaccination (Aram et al., n.d.).

In February 2021, the Ghanaian government declared its intention to acquire about 17.6 million doses of vaccine by June 2021. On March 26, 2021, the Ministry of Health also declared that it anticipated obtaining 42 million doses of the COVID-19 vaccine. This would be sufficient to immunize roughly 63% of Ghana's adult population over the age of 15, enabling the achievement of 60% to 70% herd immunity threshold (Acheampong et al., 2021)..

The research that is now available shows that children and adolescents are susceptible to both severe illness and death from SARS-CoV-2 infection. According to available statistics, children in African nations may also have higher rates of COVID-19-related morbidity and mortality than their counterparts in other parts of the world (Sam-, 2022).

Six commonly used COVID-19 vaccines currently have full approval for use in children under the age of 18 in at least one nation, or emergency use authorization.12-19 (Sam-, 2022).



2.9 Socio-economic Impact of Covid-19 Vaccines

Globally, the prevalence of COVID-19 posed a major danger to both public health and socioeconomic development (Hong et al., 2022). Okeke et al. (2022), reported that a recent analysis of data on teenage pregnancies in sub-Saharan Africa revealed that the pandemic exacerbated pre-existing factors associated with teenage pregnancies. Education accessibility is one factor that frequently influences adolescent pregnancy. Worldwide data suggests that during the COVID-19 pandemic, school closures, socioeconomic hardship, interrupted access to sexual and reproductive health (SRH) services, and a rise in sexual violence may have had a role in adolescent pregnancy and child marriages. Adolescent girls were more vulnerable to increasing their sexual activity or having their first sex when they stayed home from school. It is noteworthy that this surge was taking place during restricted access to contraception and other reproductive health services.

The introduction of Covid-19 had a detrimental effect on global activity's economy and way of life. The livelihoods of the local populations and cultural workers were in danger because more than 80% of UNESCO World Heritage sites were closed (United Nations Ghana, 2020).

Numerous cultural institutions and facilities, including museums, theatres, and cinemas had to lay off workers due to daily income losses in the millions. According to UNESCO, creative organizations, people, and artists across the world were having financial difficulties. The majority of these persons were already working part-time, irregularly, or under precarious contracts before the epidemic. (United Nations Ghana, 2020).

The Ghanaian government took action to mitigate the pandemic's effects in line with global patterns, implementing a partial lockdown in strategic locations within the greater Accra area and Ashanti regions and the prohibition of gatherings. Churches, mosques, theatres, schools, and leisure venues including pubs were all shuttered. The cancellation of all artistic events,



including live performances, had put the creative and cultural community in a tough position (United Nations Ghana, 2020).

According to a study done in Ghana (Aduhene & Osei-Assibey, 2021), the coronavirus pandemic had a detrimental effect on the socioeconomic status of Ghanaians. The study showed that the pandemic's impact on Ghana's healthcare system was so great that temporary buildings were used as isolation and treatment facilities. According to the study, Ghana may be able to turn these COVID-19 pandemic difficulties into opportunities (Aduhene & Osei-Assibey, 2021).

2.10 Conspiracy Theories about Covid-19 Vaccines

Since immunization was first proposed and widely accepted, there has been anxiety and suspicion over vaccinations. "Agree" is the response given by respondents to a nationally representative study of Americans when it comes to "doctors and the government still wanting to vaccinate children even though they know these vaccines cause autism and other psychological disorders." For instance, the idea that vaccines can cause autism is unsupported by empirical evidence (Shapiro et al., 2016).

State officials promoted conspiracy theories in some nations, such as the US, which recorded the most confirmed COVID-19 cases (Bierwiazzonek et al., 2020), and a disturbing one-third of US residents appeared to have believed in these beliefs, such as that the virus was intentionally created. Conspiracy theories are explanatory ideas concerning a group of people who work together covertly to achieve evil objectives (Bierwiazzonek et al., 2020). Other conspiracies claimed that COVID-19 was purposefully bioengineered, a biological weapon, or a plan to control the populace (Douglas, 2021).



Douglas, (2021), asserted that when psychological demands are not being addressed, conspiracy theories are significant, a poll from the Netherlands, Germany, and Italy indicated 92–99% of respondents resorted to various social distancing practices (Jager et al., 2008). What then can account for the USA's comparatively high non-adherence rate? One significant factor may be the widespread acceptance of COVID-19 conspiracy claims. For instance, some literature demonstrates evidence that a hot environment kills viruses, yet COVID-19 is spreading to some hot nations (Abbas et al., 2021).

COVID-19 immunization campaign is facing a "infodemic" in Europe. Europe's reluctance to receive vaccinations is mostly due to "infodemic." Excessive information that spreads quickly, is purposefully or unintentionally deceptive, and prevents the general public from acting appropriately in times of public health emergency is referred to as a "infodemic (Akram et al., 2021).

The global public health emergency associated with the Covid-19 epidemic has passed. Over the course of more than a year, the population's immunity to infection and vaccination has grown, fatality rates have dropped, and overall strain on health services has lessened, putting an end to the pandemic. Therefore, I fervently hope that I may officially proclaim Covid-19 to be over as a worldwide health emergency. But that does not imply that Covid-19 is no longer a hazard to international health (Dr. Tedros Adhanom Ghebreyesus, WHO, 4th May 2023) .

While there has been substantial progress in COVID-19 vaccine development and distribution, the uptake of vaccines among adolescents remains a critical concern. Understanding the knowledge, attitudes, and perceptions towards COVID-19 vaccinations among adolescents is crucial for designing effective vaccination campaigns tailored to this specific age group. The Bole District, located in Savanna Region of Ghana, represents an important setting for



examining the uptake of COVID-19 vaccinations among adolescents due to its unique characteristics, such as the youth dominance of the population of the district.

2.1 Theoretical Framework

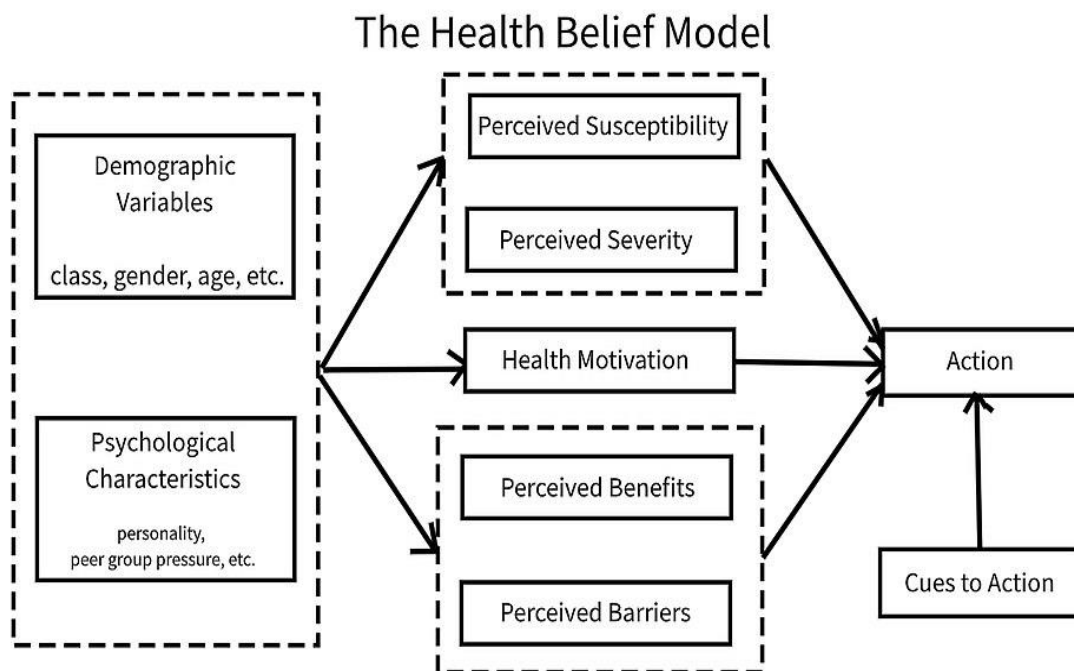


Figure: Health Belief ModelSource: (Rosenstock & Ph, 2015)

This study is based on an adopted theoretical framework from (Rosenstock, 1966) on health belief model. The concept discussed some components that may affect the behaviour of people to accept immunization/vaccination. It explains why most people failed to utilize health services such as immunization/vaccination. It also highlights the role of certain beliefs in stimulating preventive health actions. It goes on to say that people's actions linked to their health will change based on how serious they believe the threat to their health to be. It looked at six (6) different methods to this module in its conclusion. **Perceived susceptibility** or **vulnerability** refers to an individual's subjective assessment of the likelihood of contracting an illness. **A person's perception** of the seriousness of getting sick or of not getting treatment for

their sickness is known as perceived severity. **Perceived benefits** refer to an individual's assessment of the efficacy of different interventions aimed at preventing or curing sickness.

Perceived barriers are people's perceptions of the difficulties in carrying with advised health actions, Cues to action: the internal or external stimulus required to start the decision-making process to embrace a recommended health action **Self-efficacy** is the degree to which an individual believes that he can carry out an action successfully.

This framework also recognised the need for a study to be carried out before any intervention is designed. This study is therefore in accordance with the framework.



CHAPTER THREE

METHODOLOGY

3.0 Introduction

The chapter deals with the research setting and study design. It provides the contextual framework and the study methodology. The chapter also indicates the study population and the sampling selection procedures. The sampling technique employed was the multistage sampling procedure. This chapter also lists the data sources, describes the data gathering procedure, and illustrates the techniques used to extract relevant data. Data analysis methods, with validity and reliability measures depicts the methodological foundation. Ethical considerations concerning participants' rights and data handling were addressed, ensuring the study's ethical integrity.

3.1 Study Area

Adolescents in the Savannah Region and the Bole district participated in the study. Among the sixteen regions of Ghana, the Savannah region occupies around 70,384 square kilometers, or 29% of the country's total land area. As of the 2020 census, 2,336,196 people are estimated to live there. It is split up into seven (7) administrative and political districts, each of which is led by a district chief executive. The districts are further divided into 45 health sub-districts, one of which being Bole district, the site of the study(Bole District Assembly, 2020).



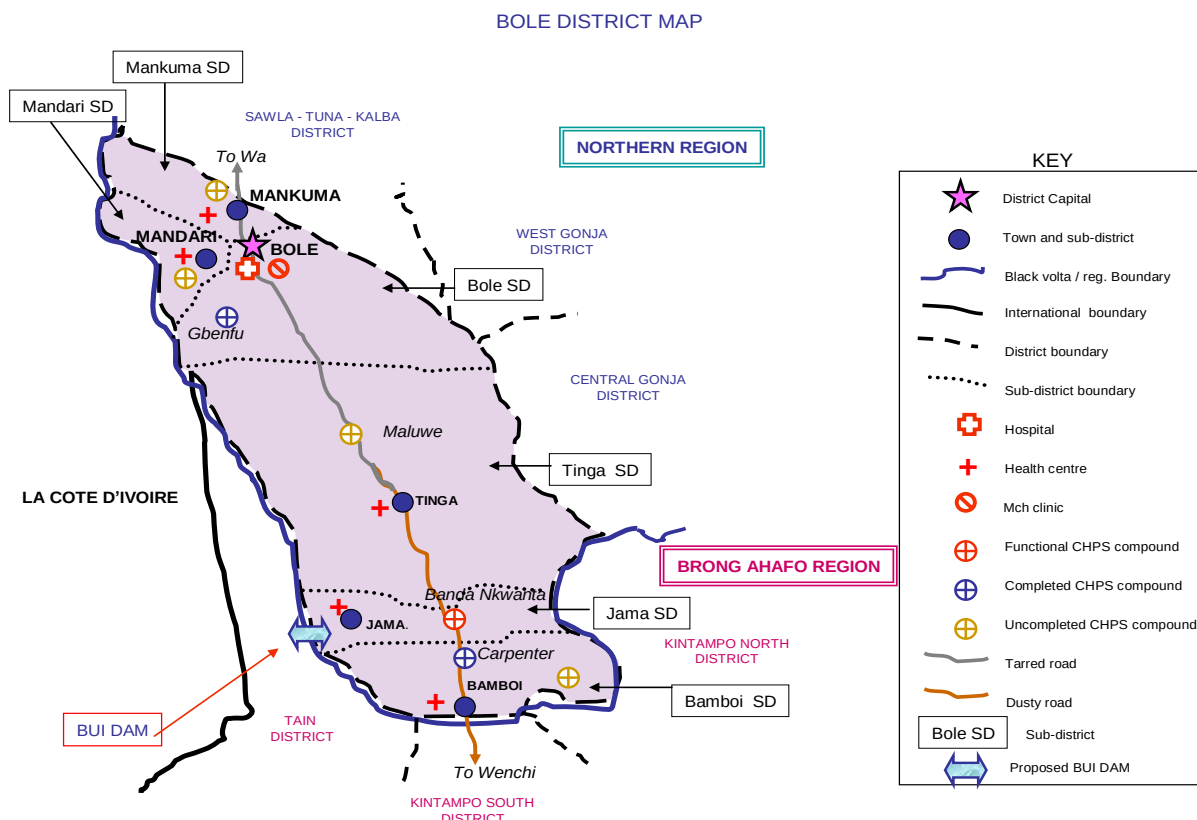


Figure 3. 1: Map of Bole District

The study area is Bole District in the Savannah Region of Ghana. The district is situated between latitude 8°10.5 and 09° and longitude 1.50E° and 2.45 W. It is located at the extreme western part of the Savannah region of Ghana. It is also bordered to the north by the Sawla-Tuna-Kalba district, to the west by the Republic of Cote D'ivoire with the Black Volta as the boundary between the two neighbouring countries, to the east by the West Gonja district and to the south by the Kintampo and Wenchi Municipalities in the Bono and Bono East regions.

The population of the district is 120,715 projected based on the 2020 population census of 62,719 using 3.6% National Growth Rate and 78,836 using 2.9% Growth Rate of Savannah Region. The people of the district are predominantly Gonja's with few minority tribes like the Safalba, Brefo, Mo, Vagla and others. Ghana Health Service is the main institution that provides health services including CHAG facilities (Bole District Assembly Report, 2020).

3.1.1 Health Services Provided

Health services provided at the health institutions include preventive, promotive, curative, palliative and rehabilitation. Specific services are reproductive and child health (RCH) which embodies ANC, Skilled Delivery, PNC, Family Planning services, Expanded Program on Immunization (EPI), Growth promotion, integrated outreach services, community –based health planning and services (CHPS) as well as treatment of clinical cases, minor ailments and screening services. In otherwise preventive, promotive, curative and community base (CHPS) services are provided in the district (District Health Directorate, 2023).

Table 3. 1: Summary of sub districts and projected population as at 2023

NO	NAME OF SUBDISTRICT	#COMMUNITIES	TOTAL POPULATION(2023)	ADOLESCENT POPULATION
1	BAMBOI	27	19,314	1,9094
2	BOLE	64	36,214	6,600
3	MANDARE	28	9,657	1,550
4	MANKUMA	29	12,072	1,270
5	JAMA	22	16,900	3,800
6	TINGA	31	26,557	5,700
TOTAL	DISTRICT	201	120,715	38,014

(District Health Directorate, 2023).

The health status of the people of Bole district is among the worst in the Region. Utilization of available health facilities and health services is very low especially among the adolescents and supervised delivery by skilled attendants.



There is poor health seeking behavior and many patronize the services of quack doctors, herbalist and rather report very late to the health facilities as a last resort. Family Planning Acceptor Rate is very low 4.3%. This is as a result of socio-cultural and religious beliefs coupled with rumors that need to be addressed (District Health Directorate, 2023).

3.1.2 Educational facilities

The district has one (1) Nursing and Midwifery Training College, four (4) senior high schools, one (1) TVET, Forty two (42) Junior High Schools, sixty four (64) primary schools, and seventy four (74) Kindergarten schools (BOLE DISTRICT ASSEMBLY, 2020)

3.2 Study design

Analytical cross-sectional study design was adopted. Both qualitative and quantitative was used. The study participants for this study were selected based on the inclusion and exclusion criteria stated for this study. It was reasonable for this study to utilize a cross-sectional study design and mixed methodologies because it is an example of a population-based survey and is used to assess the knowledge, attitude, and uptake of Covid-19 vaccines among adolescents at a relatively faster rate. There was a parallel collection of qualitative and quantitative data, each of which is analysed independently before being combined in a convergent parallel mixed design. The theory, which states that independent variables will either favourably or adversely affect dependent variables for participants at the site, is tested in this study using quantitative data. The primary phenomenon for participants at the site were investigated using the qualitative data.

Also, cross-sectional study with mixed methods was able to provide information that was useful for public health. It also evaluated the odds ratios to investigate the relationship between exposure and the research's outcome variables, even though the analysis of cross-sectional



study designs makes it challenging to infer causal relationships. To lessen selection bias, which is typical of cross-sectional study designs, the study participants were chosen using a straightforward random sampling technique. Six research assistants took part in the data collection process, which involved administering a pretested, structured questionnaire. The questionnaire was administered through face to face. To pre-test the questionnaire, the research team conducted a pilot study with 30 selected adolescents. The aim was to assess internal validity, reliability and consistency to improved questionnaire content.

3.4 Study Population

The study population included adolescents who resided in the Bole district of the Savannah region.

3.4.1 Inclusion Criteria

An adolescent was eligible for the study if he or she was between the ages of 10 – 19 years and who had either taken a job with evidence card or had never taken a job. Also, adolescents who lived in urban and rural communities within the Bole district were included.

3.4.2 Exclusion Criteria

The study excluded adolescents who had psychological/mental challenges.



3.5 Sample size and sampling technique

3.5.1 Sample size determination

With an estimated study population of 27,040 adolescents of the total district adolescent population of 38,014 the sample size was mathematically derived from the Slovic's formula

Required sample size, $n = \frac{N}{1 + N(\alpha)^2}$

$$1 + N(\alpha)^2$$

Where n = sample size.

N = sample frame (total study population),

α = margin of error $(0.05)^2$ and a confidence level of 95%. By substituting big N for total study

Population of 27,040 and a marginal error of $(0.05)^2$ into the equation, $n = \frac{27,040 + 1}{27,040 (0.05)^2}$

$$27,040 (0.05)^2$$

$n = 501$, therefore my sample size is 501.

3.5.2 Sampling technique

Multistage sampling technique was adopted. Four sub-districts were randomly selected from the 6 sub-district to represent clusters. The proportion of adolescents to be sampled from each of the cluster were computed by dividing the number of adolescents in each cluster by the total number of adolescents in the clusters. The result was multiplied by the computed sample size.

3 communities were randomly selected from each cluster to give a total of 12 communities.

Adopting the formula $k = \frac{N}{n}$ in determining despondence interval, systematic sampling was used for selecting adolescents in the houses. All teenagers who met the requirements for



inclusion were put on a list. Next, using the lottery approach without replacement, a simple random sampling was utilized to determine the number of teenagers.

3.6 Data Collection Tool

A structured questionnaire was developed after extensive literature search. The questionnaires were uploaded onto Kobo Collect Tool for android phones. The design of the electronic application was linked to a single data recipient account via internet.

Focus Group Discussion (FGD) was conducted to allow in-depth exploration of different points related to the topic. That is a maximum of ten adolescents in a group of four were included in the discussions to obtain insights on the pre-determined objectives of the study. Adolescent participants were purposely selected. Focus Group Discussion guide was prepared to guide for study. Also, field notes were taken alongside the use of a tape recorder to complement the written notes. Participants with the same characteristic such as socio-economic, age and sex created an enabling environment for them to communicate freely. They were identified in the communities based on their own interest to be part of the discussions. Their opinions were respected at all times to enable them actively contribute to the discussion without fear, and to enable the researcher compare findings. The discussion was led by a moderator and there was a note taker. Each discussion lasted between one and half hours. For the sake of privacy, the study participants were isolated from the general public for the discussion.



3.7 Study variables

3.7.1 Dependent variable

Uptake of COVID-19 vaccine was measured by asking study participants whether or not they have received COVID-19 vaccination jabs. Those who mentioned that they have received COVID-19 vaccination jab were categorized under high uptake. However, those who reported that they have not received COVID-19 vaccination jab were categorized to have low uptake

3.7.2 Independent variables

The independent variables of this study include study respondent's socio-demographic factors, knowledge regarding COVID-19 vaccines, attitude towards vaccination, and their perceptions on COVID-19 vaccination. Socio-demographic factors including age, gender, educational level, and type of residence relating to study respondents were identified. Furthermore, study respondents who achieved the mean score or more regarding questions asked on knowledge, attitude, and perceptions were categorized to have achieved good knowledge, good attitude, and good perception respectively. However, respondents who achieved a score less than the mean score were categorized to have achieved poor knowledge,

3.6.1 Design and administration of questionnaires

Questionnaires were designed and administered out to as many respondents on face to face using Kobo collect.

3.6.2 Pre-testing

Pre-test of the questionnaires were carried out on thirty (30) adolescents who were randomly selected at different communities. This helped to evaluate the logical sequence format and clarity wording of the questionnaires. It also enables for standardization of interpretation of



words in English and needed to be translated in local dialect- Gonja, Safalba, Dagari and Vagla. Finally, the pre-testing revealed the reactions of respondents to the research procedures and to questions related to sensitive issues which was modified before the actual field work.

3.6.3 Practicalities

To be able to conduct the study effectively, six (6) data collecting /assistants were employed and trained. They were people who have been exposed and have experience in both qualitative and quantitative research including data collection techniques, ethical consideration on research procedures. They equally understand the local language and culture of the community.

3.7. Data Management and Analysis

The data collected was analysed using the thematic analysis, and the audio recordings transcribed by putting them into themes and coded. The teams were identified by bringing together the fragment of ideas and experiences from the data collected. It was translated and interpreted. The differences and the similarities of the data was compared. The data collection continued until there was saturation of information and themes, where no new theme was generated in the final interview. This method of analysis was for qualitative data.

Also, the data analyses were done using SPSS 22.0 version at a statistical significance of a p-value < 0.05 at 95%. The study employed descriptive analysis to investigate the distribution of respondent characteristics, including knowledge, attitude, and uptake of the COVID-19 vaccine. To evaluate relationships between the dependent and independent variables, statistical techniques such as univariate, bivariate, and logistic regression were used.

Kobo collect and SPSS 22.0 version and Excel was employed for coding, analysing, and cleaning of quantitative data.



3.8 Ethical Clearance

Ethical clearance was obtained from the ethics committee of the University for Development Studies. Bole District Health Administration before the commencement of the study. Confidentiality was assured about the information provided. The anonymity of the participants was guaranteed, and Focus Discussion Group made to agree to keep the discussion confidential. The purpose of the study as well as the general themes was explained to participants to understand what the discussion was about.

3.8.2 Informed Consent

Participants were counselled and permission was sought before questionnaire was administered. Trained data collectors explained the questionnaires to the best understanding of the participants.

3.8.3 Confidentiality

Computed data was protected by a password to prevent others from having access to it. The results would be shared with the Bole District Health Directorate. Moreover, results of the study would be displayed at research seminars and published and would not contain any identifiable information of participants.



CHAPTER FOUR

RESULTS

4.0 Introduction

This chapter examines the demographic profile of respondents, unveiling key socio-economic factors shaping their perspectives. The study explores the extent of vaccine-related knowledge, attitudes towards the vaccination campaign. Adolescents' perceptions regarding the safety, efficacy, and significance of COVID-19 vaccines are dissected, offering a nuanced understanding. Again, the chapter explores the correlation between knowledge levels and vaccine uptake. Finally, it depicts the relationship between adolescents' perceptions and their vaccination behaviour, offering insights into the post-COVID-19 era in Bole District.

4.1 Demographic Features of the Respondents

This section presents an overview of the demographic characteristics of the study participants, as illustrated in Table 4.1. Table 4.1 reveals that in terms of age, the majority of respondents are in the 16-18 years bracket, making up 59.88% of the total. This is followed by the 12-15 years group comprising of 20.16%, and the 19-24 years group also made of 19.96%. The gender distribution male (49.90%) and female (50.10) respondents. From an educational standpoint, the majority of individuals have completed Junior High School (39.92%), followed by Senior High School (29.94%), College/University (15.96%), and Other (14.18%). Most people live in rural areas when it comes to residential locations (76.05%). Regarding previous vaccinations, 47.90% of participants received vaccination, while the remaining 39.92% did not.



Table 4. 1: Results on the Demographic Features of the Respondents

Demographic Feature	Categories	Frequency	Percentage (%)
Age	12-15 years	101	20.16
	16-18 years	300	59.88
	19-24 years	100	19.96
Gender	Male	250	49.90
	Female	251	50.10
Educational Level	Junior High School	200	39.92
	Senior High School	150	29.94
	College/University	80	15.96
	Other	71	14.18
Residential Location in Bole District	Urban	120	23.95
	Rural	381	76.05
Prior Vaccinations	Yes	240	47.90
	No	200	39.92
	Not sure	61	12.18

Source: Field Data Analysis, (2023)

4.2 Extent of COVID-19 Vaccine-Related Knowledge among Adolescents in Bole District Following the COVID-19 Pandemic

Table 4.2 presents the study participants' COVID-19 vaccine knowledge. In terms of knowledge confidence, 29.94% reported feeling somewhat confident, 23.95% were not very confident, and 20.16% were not confident at all, with a mean score of 3.29 and a standard deviation of 0.95. 52% were unclear about the appropriate age bracket for vaccination, 35.92% thought it was 18-25 years, and 11.97% felt it was 26-30 years, with a mean score of 2.73 and



a standard deviation of 0.87. In terms of information sources, 49.90% depended on healthcare experts or trustworthy sources, while 25.94% had no information and 24.15% were unsure, yielding a mean score of 2.50 and a standard deviation of 0.67. In terms of understanding benefits, 25.94% were fairly informed, 19.96% were very well aware, and 17.96% were not very informed, with a mean score of 2.98 and a standard deviation of 0.78. In terms of side effects, 39.92% reported no one encountered them, 24.15% were unsure, 19.96% knew someone who did, and 15.96% themselves experienced them, with a mean score of 2.48 and a standard deviation of 0.81.

Focus Group Discussions were also conducted with groups of adolescents on their level of knowledge about COVID-19. Below is a presentation of the results from the focus group discussions with the adolescents:

4.2.1 Focus Group Discussion Responses

The results from the focus group discussions with the participants were presented under six (6) themes. Under each theme, respondents were prompted to share the views on their level of knowledge about the COVID-19 vaccine. Below are the results

1. Knowledge About COVID-19 Vaccines:

"I know vaccines protect against COVID-19, but specifics like types and effectiveness vary among us." Participant 1 in Group 3

"Learning in school helps, but media updates and discussions with friends add more details."
Participant 2 in Group 2

"Some think vaccines cause the virus or alter DNA; clarifying such myths is crucial."
Participant 3 in Group 1



2. Sources of Knowledge and Information of COVID – 19 Vaccines:

"I receive information on COVID-19 from school teachers and health care workers"

Participant 4 in Group 2

"I get some information on COVID-19 on the media, however, healthcare providers explain better during check-ups or special sessions." Participant 5 in Group 3

"We share information with each other; it's like a mix of school lessons and friend discussions." Participant 6 in Group 1

3. Reliable Sources of Information:

"Healthcare providers are trustworthy; they give personalized advice, making it more reliable." Participant 3 in Group 2

"Official announcements and news are good, but sometimes they're too general; we prefer detailed discussions." Participant 9 in Group 3

"We rely on fact-checking websites; they help confirm if what we hear elsewhere is accurate." Participant 10 in Group 1

4. Barriers or Challenges in Accessing Information:

"In rural areas, limited internet access affects getting timely updates; we rely more on community discussions." Participant 1 in Group 3

"Misinformation spreads fast, and it's hard to separate fact from fiction; clearer guidance is needed." Participant 4 in Group 3

"Sometimes, healthcare information seems complicated; simplifying it would make it more accessible." Participant 2 in Group 2



5. Myths or Misconceptions:

"People say vaccines give you COVID-19; it's confusing, and we need more accurate information." Participant 7 in Group 2

"Some think microchips are in vaccines; these ideas spread fast and create unnecessary fears." Participant 8 in Group 1

"Misconceptions about fertility issues need addressing; they affect decisions, especially among girls." Participant 9 in Group 1

6. Concerns or Doubts:

"Side effects worry some; understanding what's normal and what's would not be reassuring."
Participant 3 in Group 3 in Group 1

"Long-term effects are a mystery; more information on that would help clear many doubts."
Participant 5 in Group 1

"People are unsure about vaccine safety; building trust in the process is essential."
Participant 1 in Group 2



Table 4. 2: Results on COVID-19 Vaccine-related Knowledge

Variable	Categories	Frequency	%
Confidence in Knowledge	Very Confident	80	15.96
	Somewhat Confident	150	29.94
	Neutral	50	9.98
	Not Very Confident	120	23.95
	Not Confident at All	101	20.16
	Mean	3.29	-
	Standard Deviation	0.95	-
Recommended Age Group for Vaccination	18-25 years	180	35.92
	26-30 years	60	11.97
	Unsure	261	52.09
	Mean	2.73	-
	Standard Deviation	0.87	-
Information Source	Healthcare professional or trusted source	250	49.90
	No information	130	25.94
	Not sure	121	24.15
	Mean	2.50	-
	Standard Deviation	0.67	-
Understanding of Benefits	Very Well Informed	100	19.96
	Moderately Informed	130	25.94
	Somewhat Informed	80	15.96
	Not Very Informed	90	17.96



	Not Informed at All	101	20.15
	Mean	2.98	-
	Standard Deviation	0.78	-
Experience of Side Effects	Personally experienced side effects	80	15.96
	Someone I know experienced side effects	100	19.96
	No one experienced side effects	200	39.92
	Not sure	121	24.15
	Mean	2.48	-
	Standard Deviation	0.81	-

Source: Field Data Analysis, (2023)

4.3 Attitudes of Adolescents in Bole District towards the COVID-19 Vaccination Campaign

Table 4.3 presents the study participants' attitudes regarding the COVID-19 immunization programme, including mean scores and standard deviations. Feelings towards the campaign were mixed, with 29.94% feeling slightly good, 19.96% extremely positive, and 20.15% very negative, yielding a mean score of 2.63 and a standard deviation of 0.79. In terms of vaccination relevance, 25.94% rated it as very essential, 23.95% as extremely important, and 20.15% as not important at all, with a mean score of 3.01 and a standard deviation of 0.84. In terms of encouraging others, 23.95% had not encouraged anyone, 19.96% acknowledged it but did not actively promote, and 15.96% actively encouraged others, with a mean score of 2.56 and a standard deviation of 0.78. Confidence in controlling the spread varied, with 23.95% feeling somewhat sure, 17.96% very confident, and 25.94% not confident at all, for a mean score of



2.65 and a standard deviation of 0.86. In terms of willingness to participate in awareness efforts, 30.13% were certainly unwilling, 23.95% were possibly willing, and 13.7% were definitely willing, with a mean score of 2.95 and a standard deviation of 0.92.

4.3.1 Interview Responses

The interview responses provide insights into various themes related to attitudes towards and factors influencing COVID-19 vaccination among adolescents. These themes include general attitudes towards vaccination, factors influencing attitudes, discussions with family or friends about vaccination, specific concerns or fears regarding vaccination, confidence in vaccine safety and effectiveness, and barriers or challenges in accessing vaccination.

THEME 1. General Attitudes Towards COVID-19 Vaccination:

- Respondent 1: *"I've noticed a positive shift, especially among those with family members affected. They see vaccination as a protective measure."*
- Respondent 2: *"Mixed feelings, some are eager for protection, while others question the need for vaccination, influenced by various factors."*
- Respondent 3: *"Many adolescents are curious but cautious. They want to understand more before making a decision."*

THEME 2. Factors Influencing Attitudes Towards COVID-19 Vaccination:

- Respondent 4: *"Peer influence is strong, and reliable information plays a vital role. Those who trust their sources tend to be more receptive."*
- Respondent 5: *"Past experiences with vaccinations shape attitudes. Also, family opinions and cultural beliefs impact their perspectives."*



- Respondent 6: *"It's a mix of media influence and community discussions. Adolescents often mirror the opinions they encounter."*

THEME 3. Discussion with Family or Friends About COVID-19 Vaccination:

- Respondent 1: *"Families play a crucial role. Supportive discussions help ease concerns, but differences in opinions are common."*
- Respondent 2: *"Adolescents often consult family members. Some encounter resistance, while others find encouragement."*
- Respondent 3: *"Discussions vary. Some families are well-informed and supportive, while others have reservations."*

THEME 4. Specific Concerns or Fears Regarding COVID-19 Vaccination:

- Respondent 4: *"Speed of development is a concern. Addressing these fears requires targeted education campaigns."*
- Respondent 5: *"Fear of side effects is prevalent. Clear communication about vaccine safety is essential."*
- Respondent 6: *"Misinformation causes fear. Correcting false beliefs is an ongoing challenge."*

THEME 5. Confidence in the Safety and Effectiveness of COVID-19 Vaccines:

- Respondent 1: *"Trust in science is a key factor. Those who follow reputable sources are more confident."*
- Respondent 2: *"Doubts persist, especially among those exposed to misinformation. Continuous education is needed."*



- Respondent 3: *"Confidence levels vary. Effective communication on vaccine safety is critical."*

THEME 6. Barriers or Challenges in Accessing COVID-19 Vaccination:

- Respondent 4: *"Transportation remains a hurdle, especially in remote areas. Making vaccination centers accessible is crucial."*
- Respondent 5: *"Awareness about vaccination centers is lacking. Improving outreach can enhance accessibility."*
- Respondent 6: *"Logistical challenges affect access. Overcoming these hurdles requires community-specific strategies."*



Table 4. 3: Results on Attitudes towards the COVID-19 Vaccination Campaign

Variable	Option	Frequency	%
Feelings about the Campaign	Very Positive	100	19.96
	Somewhat Positive	150	29.94
	Neutral	80	15.96
	Somewhat Negative	70	13.97
	Very Negative	101	20.15
	Mean	2.63	-
	Standard Deviation	0.79	-
Importance of Vaccination	Extremely Important	120	23.95
	Very Important	130	25.94
	Moderately Important	100	19.96
	Slightly Important	50	9.98
	Not Important at All	101	20.15
	Mean	3.01	-
	Standard Deviation	0.84	-
Encouragement to Others	Actively encourage others	80	15.96
	Mention but don't actively encourage	100	19.96
	Haven't encouraged anyone	120	23.95
	Not sure	101	20.15
	Mean	2.56	-
	Standard Deviation	0.78	-
Confidence in Controlling Spread	Very Confident	90	17.96

	Somewhat Confident	120	23.95
	Neutral	60	11.97
	Not Very Confident	101	20.15
	Not Confident at All	130	25.94
	Mean	2.65	-
	Standard Deviation	0.86	-
Willingness to Participate in Awareness Campaigns	Definitely Willing	70	13.97
	Probably Willing	120	23.95
	Neutral	100	19.96
	Probably Not Willing	60	11.97
	Definitely Not Willing	151	30.13
	Mean	2.95	-
	Standard Deviation	0.92	-

Source: Field Data Analysis, (2023)

4.4 Perceptions Held by Adolescents in Bole District regarding the Safety, Efficacy, and Significance of COVID-19 Vaccines in the Post-Pandemic Period

Table 4.4 presents the results of participants' perceptions of the safety, efficacy, and relevance of COVID-19 vaccination. Regarding perceived safety, 23.95% felt moderately safe, 19.96% felt very safe, and 28.14% felt extremely unsafe, with a mean score of 2.61 and a standard deviation of 0.79. In terms of protective effectiveness, 25.94% rated it as extremely effective, 23.95% as moderately effective, and 26.14% as ineffective, with a mean score of 2.62 and a standard deviation of 0.82. The primary motivation for vaccination varied, with 29.94% vaccinating to protect themselves, 19.96% to resume normal life, and 15.96% to protect others, yielding a mean score of 2.89 and a standard deviation of 0.92. Understanding of long-term



impacts varied from extremely well informed (17.96%) to not aware at all (32.13%), with a mean score of 2.26 and a standard deviation of 0.77. Concerning belief in vaccinations' critical role, 26.14% strongly disagreed, 25.94% agreed, and 23.95% very agreed, yielding a mean score of 2.62 and a standard deviation of 0.84.

4.4.1 Focus Group Discussion Results

The focus group discussions revealed several key themes regarding COVID-19 vaccination. Theme 1: Perceived Safety. Theme 2: Efficacy in Protection. Theme 3: Significance of Vaccines. Theme 4: Understanding of Long-term Effects. Theme 5: Belief in Crucial Role of Vaccines.

Theme 1: Perceived Safety

Participant in Focus Group 1: Observed thus *"I believe the vaccines are safe, especially after observing family members get vaccinated without any major issues."*

Another participant in Focus Group 2 asserted that: *"There's some concern about long-term effects, but overall, I trust the science behind the vaccines."*

Participant in Focus Group 3: *"Safety is a priority, and I rely on healthcare professionals for accurate information on vaccine safety."*

Theme 2: Efficacy in Protection

Participant in Focus Group 1 intimated that: *"I've seen the vaccines work in preventing severe illness, so I'm confident in their effectiveness."*

Participant in Focus Group 2 has it that: *"I'm unsure about how long the protection lasts, but the immediate protection is reassuring."*

Participant in Focus Group 3 equally observed as: *"There's a general belief that the vaccines are effective in reducing the spread of the virus."*



Theme 3: Significance of Vaccines

Participant in Focus Group 1 asserted that: *"Vaccines are crucial for protecting vulnerable populations and achieving herd immunity."*

Participant in Focus Group 2 says that: *"I see vaccination as a way to return to normalcy and protect my loved ones."*

Participant in Focus Group 3 observes the following: *"Despite some doubts, I understand the importance of vaccines in controlling the pandemic."*

Theme 4: Understanding of Long-term Effects

Participant in Focus Group 1 says that: *"I'm curious about any potential long-term effects, but I trust ongoing research to provide answers."*

Participant in Focus Group 2 indicates that: *"There's a need for more information on the long-term effects of the vaccines to alleviate concerns."*

Participant in Focus Group 3 has it that: *"Long-term effects are a concern, but I weigh them against the immediate benefits of vaccination."*

Theme 5: Belief in Crucial Role of Vaccines

Participant in Focus Group 1 asserted that: *"I believe vaccines are essential in ending the pandemic and preventing future outbreaks."*

Participant in Focus Group 2 indicates: *"Despite some skepticism, I recognize the role vaccines play in saving lives and reducing hospitalizations."*

Participant in Focus Group 3: *"I have faith in the science behind vaccines and their ability to protect us and our communities."*



Table 4. 4: Results on Perceptions of Safety, Efficacy, and Significance of COVID-19

Vaccines

Variable	Option	Frequency	%
Perceived Safety	Very Safe	100	19.96
	Somewhat Safe	120	23.95
	Neutral	80	15.96
	Somewhat Unsafe	60	11.97
	Very Unsafe	141	28.14
	Mean	2.61	-
	Standard Deviation	0.79	-
Effectiveness in Protection	Very Effective	130	25.94
	Moderately Effective	120	23.95
	Neutral	70	13.97
	Slightly Effective	50	9.98
	Not Effective at All	131	26.14
	Mean	2.62	-
	Standard Deviation	0.82	-
Primary Reason for Vaccination	To protect myself	150	29.94
	To protect others	80	15.96
	To return to normal life	100	19.96
	Not sure	71	14.17
	Mean	2.89	-
	Standard Deviation	0.92	-
Understanding of Long-term Effects	Very Well Informed	90	17.96



	Moderately Informed	100	19.96
	Somewhat Informed	80	15.96
	Not Very Informed	70	13.97
	Not Informed at All	161	32.13
	Mean	2.26	-
	Standard Deviation	0.77	-
Belief in Crucial Role of Vaccines	Strongly Agree	120	23.95
	Agree	130	25.94
	Neutral	70	13.97
	Disagree	50	9.98
	Strongly Disagree	131	26.14
	Mean	2.62	-
	Standard Deviation	0.84	-

Source: Field Data Analysis, (2023)

4.5 Association between the Levels of COVID-19 Vaccine-Related Knowledge, Perception, socio-Demographic Characteristics, with Vaccine uptake among Adolescents in Bole District

Objective Four explores the association between levels of COVID-19 vaccine-related knowledge and vaccine uptake among adolescents in Bole District. Table 4.5 presents the results. Results shows that COVID-19 vaccine-related knowledge was statistically associated with vaccine uptake among adolescents in Bole District with p-value <0.001. However in terms of socio-demographic characteristics, no association was identified with vaccine uptake among adolescents (p>0.05).

Adolescents who reported to have good knowledge were more likely (OR=2.60, CI=3.87-6.82, $p<0.001$) to take COVID-19 vaccine more than those who had poor knowledge (Table 4.6). Furthermore, Adolescents who reported to have good perception were more likely (OR=5.23, CI=9.05-12.63, $p<0.001$) to take COVID-19 vaccine more than those who had poor perception (Table 4.6).

Table 4.5: Results on Association between perceptions, knowledge and socio-demographics with Vaccination Uptake

Vaccine uptake				
Variable	Low	High	Chi Square value	P-value
Age (years)				
12-15 years	46 (45.5)	55 (54.5)	1.0133	0.603
16-18 years	152 (50.7)	148 (49.3)		
19-21 years	52 (52.0)	48 (48.0)		
Gender				
Male	117 (46.6)	134 (53.4)	2.1734	0.140
Female	133 (53.2)	117 (46.8)		
Educational Level				
Junior High School	96 (48.0)	104 (52.0)	1.2968	0.730
Senior High School	79 (52.7)	71 (47.3)		
College/University	42 (52.5)	38 (47.5)		
Other	33 (46.5)	38 (53.5)		
Type of residence				
Urban	58 (48.3)	62 (51.7)	0.1550	0.694
Rural	192 (50.4)	189 (49.6)		



Vaccine-Related Knowledge

Poor Knowledge	215 (78.5)	59 (21.5)	197.4022	<0.001
Good knowledge	35 (15.4)	192 (84.6)		

Perceptions of COVID-19 Vaccines

Poor Perception	230 (68.1)	108 (32.0)		
Good Perception	20 (12.3)	143 (87.7)	136.8500	<0.001

(Source: Data Analysis, 2023)

Table 4.6: Determinants of Vaccine Uptake

Variable	Odds Ratio (OR)	Confidence Interval (CI)	P-value
Vaccine-Related Knowledge			
Poor Knowledge (Ref)			
Good knowledge	2.60	3.87-6.82	<0.001
Perceptions of COVID-19 Vaccines			
Poor perception (Ref)			
Good perception	5.23	9.05-12.63	<0.001
Age (years)			
12-15 (Ref)			
16-18	0.69	0.39-1.24	0.220
19-21	0.72	0.35-1.48	0.373
Gender			
Male (Ref)			
Female	0.82	0.51-1.32	0.409



Educational Level

Junior High School/Other (Ref)

Senior High School	1.17	0.70-1.98	0.548
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College/University	0.80	0.41-1.55	0.509
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Type of residence

Rural (Ref)

Urban	1.55	0.91-2.63	0.109
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(Source: Data Analysis, 2023)

4.7 Chapter Summary

Chapter Four delves into the study's key findings, examining perceptions of COVID-19 vaccines, their safety, efficacy, and significance. The study employs frequencies, percentages, and mean values to analyse participants' attitudes and behaviours. Results reveal positive sentiments toward vaccination, notable concerns, and varying motivations. The chapter also explores correlations between knowledge, vaccination uptake, and perceptions, highlighting the interplay between understanding, behaviour, and attitudes. Comparisons with relevant literature enrich the discussion, emphasizing both confirmations and contradictions with existing research.



CHAPTER FIVE

DISCUSSION

5.0 Introduction

This chapter is profound discussion and interpretation of the results unfurled in Chapter Four. A comparative analysis with existing literature unveil similarities, differences, and points of convergence or divergence. The implications of the findings will be meticulously explored, considering their significance and relevance to the overarching research objectives. In addition, this chapter will transparently address any encountered limitations or challenges during the research journey, contributing to a more holistic understanding of the study's context and outcomes.

5.1 Extent of COVID-19 Vaccine-Related Knowledge among Adolescents in Bole District Following the COVID-19 Pandemic

The study examined the level of understanding on COVID-19 vaccines among teenagers in the Bole District. The findings revealed a range of different viewpoints within the group of participants. The quantitative results revealed varying levels of trust in knowledge, grasp of the appropriate age for vaccination, preferred sources of information, comprehension of vaccine advantages, and experiences with adverse effects. The qualitative data gained from focus group discussions provided additional insights into the complexities of information acquisition, prevalence of myths, levels of confidence, worries, sources of trustworthiness, and obstacles to accessing information.

The study found that adolescents had a modest level of trust in their knowledge about the COVID-19 vaccine. Specifically, 45.9% of participants expressed different levels of



confidence. This is consistent with the discoveries made by Abbas et al. (2021), who uncovered a diverse range of beliefs and misconceptions regarding COVID-19 vaccines within a population in Sindh, Pakistan. Nonetheless, the diverse degrees of trust among the participants in the study emphasise the intricate nature emphasised by Acheampong et al. (2021) in their analysis of vaccination hesitancy in Sub-Saharan Africa, highlighting the necessity for focused educational programmes to tackle uncertainty.

The Bole District survey revealed a notable level of doubt in determining the proper age group for vaccination, as 52.09% of participants expressed uncertainty regarding the correct age range. The uncertainty observed in this study aligns with the results of Efendi et al. (2022), who discovered sociodemographic variables that impact the level of COVID-19 vaccine compliance among teenagers in Indonesia. Nevertheless, the current study's moderate degree of understanding differs from Li et al. (2021) comprehensive analysis, which highlighted protection, and effectiveness of COVID-19 vaccinations in teenagers, indicating more substantial grasp in that area.

The participants' dependence on healthcare experts or reliable sources for information corresponds to the study's moderate mean score of 2.50. The results of Cai et al.'s (2021) study align with this, as they underscored the favourable sentiments Chinese teenagers have about COVID-19 vaccines, with a particular emphasis on the influence of healthcare providers in creating these beliefs. Nevertheless, the participants' dependence on healthcare experts contradicts the results of Rehati et al. (2022) in Chinese urban areas, where vaccine reluctance was detected among teenagers even before the vaccines were accessible. The variation in vaccine distribution and public opinion may be attributed to contextual disparities.

The finding displayed a range of awareness levels concerning the advantages of COVID-19 vaccinations, with 30.13% of participants considering themselves partially to entirely



misinformed. This discovery aligns with Wang's (2022) study on vaccine hesitation among adolescents in sub-Saharan Africa, indicating that insufficient understanding contributes to hesitancy. However, the study's moderate degree of comprehension is different from Adjaottor et al. (2022) study, which predicted COVID-19 stress and vaccination acceptability among adolescents in Ghana. This highlights the complex nature of attitudes towards vaccination.

The Bole District study indicated a significant percentage of participants (39.92%) not experiencing any side effects, indicating a moderate level of overall experience with side effects. This is consistent with Lv et al. (2021), which highlighted the safety of COVID-19 vaccinations in children and adolescents. Nevertheless, the current study's moderate degree of expertise differs from the results of Rehati et al. (2022), who discovered vaccine hesitation among Chinese teenagers prior to the availability of vaccines, suggesting diverse attitudes and experiences.

The focus group conversations yielded qualitative insights that offered nuanced perspectives on concerns and uncertainty. The participants' reference to misunderstandings related to vaccination-induced virus or DNA modification aligns with the existing body of work on vaccine misinformation (Abbas et al., 2021). In addition, barriers to accessing information, such as limited internet connectivity and the spread of misinformation, correspond with the issues raised by Efendi et al. (2022) and Abbas et al. (2021), underscoring the importance of tailored communication techniques in various settings.

To summarise, the findings of the Bole District study regarding the awareness of COVID-19 vaccines among adolescents are consistent with certain features of previous research. These findings highlight the significance of healthcare providers, the varying degrees of confidence, and the widespread presence of misinformation. Nevertheless, differences in levels of understanding, lack of certainty regarding age-specific details, and encounters with adverse



reactions introduce subtle aspects that are not completely reflected in the existing literature. This highlights the necessity for interventions and communication strategies that are specific to the context and tailored to the distinct dynamics of the study population.

5.2 Attitudes of Adolescents in Bole District towards the COVID-19 Vaccination

Campaign

The study on adolescents' perspectives regarding the COVID-19 vaccination drive in Bole District reveals a multifaceted situation shaped by several elements, as indicated by the numerical results displayed in Table 4.3. These observations enhance our comprehension of the intricate dynamics underlying the vaccine campaign, providing clarity on the attitudes, perceptions, and levels of acceptance among participants.

Approximately 49.9% of the participants conveyed favourable sentiments on the vaccination effort, with 19.96% expressing an elevated level of positivity and 29.94% expressing a moderate level of positivity. Conversely, 34.12% of respondents expressed negative emotions, with 13.97% indicating a slightly unfavourable sentiment and 20.15% indicating a negative sentiment. The average score of 2.63 indicates an optimistic feeling, highlighting the range of different opinions among the people. This discovery aligns with the wider body of research on vaccination hesitancy, as demonstrated by Acheampong et al. (2021), who investigated the understanding and opinions regarding COVID-19 immunisations among adult individuals in Ghana. The diverse emotional reactions observed among participants underscore the necessity of customised communication tactics to effectively address distinct concerns and cultivate favourable attitudes.

The value of immunisation was clearly visible, as 49.89% of individuals acknowledged its importance. 23.95% of respondents saw it as highly significant, while 25.94% considered it to be very important. However, 30.13% of respondents indicated a lower level of significance,



with 20.15% considering it completely unimportant and 9.98% perceiving it as only mildly essential. The relatively significant overall relevance, as showed by the mean score of 3.01, highlights the acknowledgement of vaccination's role in promoting public health. This discovery is consistent with Alhassan et al. (2021) study in Ghana, which examined the reluctance of adults to receive vaccines. The study highlights the significance of comprehending public attitudes to shape effective vaccination campaigns.

The participants' endeavours to promote participation in the vaccine campaign demonstrated a modest level of encouragement, with 35.92% actively or passively engaged. This comprised 15.96% of those who actively promoted others and 19.96% who mentioned but did not actively promote. Nevertheless, a significant proportion of 44.1% had refrained from providing encouragement to others, while an additional 20.15% expressed uncertainty regarding their actions. The discovery underscores the importance of comprehending the social processes that shape vaccination attitudes, as elucidated by Fan et al. (2021) among university students in mainland China. Key Informant 1's reference to the influence of family dynamics is consistent with existing research on the effects of family conversations on vaccination choices (Daniel Jolley, 2014; Bird & Bogart, 2005).

Regarding the level of trust in effectively managing the transmission of the virus by vaccination, the findings indicated a varied scenario, with 41.91% expressing assurance and 46.09% lacking assurance. The average score of 2.65 indicates a modest level of confidence. This highlights the importance of implementing focused educational initiatives to improve trust in scientific knowledge, as emphasised by Key Informant 1. This is consistent with research conducted by Uscinski (2020) and van Prooijen and Douglas (2018), which examined the elements that influence the acceptance of conspiracy theories. These studies highlight the significance of countering disinformation in order to foster trust in vaccination efforts.



The overall desire to participate in awareness efforts was relatively positive, with 37.92% of individuals indicating their willingness. This consisted of 13.97% who were definitely willing and 23.95% who were possibly willing. Nevertheless, 42.1% of the participants expressed hesitancy, with 30.13% indicating a definite unwillingness and 11.97% indicating a probable unwillingness. The range of viewpoints, as evidenced by the average rating of 2.95, underscore the necessity for focused communication tactics, specifically targeting apprehensions over the rapidity of vaccine creation, as emphasised by Key Informant 4. This is consistent with Wolff's (2021) research, which utilised the Theory of Planned Behaviour to investigate individuals' intentions to receive the COVID-19 vaccine. The study highlights the need of addressing perceived risks in vaccination efforts.

Key informants had specific worries and fears about COVID-19 vaccination, including apprehension about potential side effects and the impact of disinformation. These qualitative observations are consistent with the existing body of research on the influence of conspiracy ideas (Bierwiazzonek et al., 2020; Imhoff & Bruder, 2014) and the necessity of effective communication to address concerns connected to vaccines (Abrams et al., 2021).

The study's findings regarding adolescents' views towards the COVID-19 vaccination programme in Bole District offer a comprehensive insight into the complex aspects that influence perceptions and acceptance. Combining numerical findings with qualitative observations improves the level of understanding, highlighting the significance of customised communication tactics to tackle various issues and promote favourable attitudes towards vaccination.

5.3 Perceptions Held by Adolescents in Bole District Regarding the Safety, Efficacy, and Significance of COVID-19 Vaccines in the Post-Pandemic Period

The study on the views of COVID-19 vaccines among adolescents in Bole District provides a detailed understanding of their attitudes and beliefs. The findings are summarised in Table 4.4. This assessment, which is a component of Objective three, explores various variables including perceived safety, efficacy in providing protection, fundamental motivations for vaccination, comprehension of long-term impacts, and conviction in the pivotal significance of vaccinations.

Regarding the perception of safety, the results emphasise a wide array of viewpoints among the participants. 19.96% of the respondents saw the vaccines as highly safe, while 23.95% deemed them somewhat safe. However, a significant 28.14% expressed a strong belief that the immunisations were very harmful. This variant results in a mean score of 2.61 and a standard deviation of 0.79. The intricacies pertaining to safety perceptions align with the findings of Adane et al. (2022), underscoring the significance of comprehending and resolving issues among healthcare professionals in Ethiopia.

When evaluating the efficacy of vaccines in providing protection, it was found that 25.94% of participants perceived them as highly successful, 23.95% considered them to be moderately effective, and 26.14% claimed that they were not beneficial at all. The discrepancy in viewpoints is seen in the average score of 2.62 and a standard deviation of 0.82. These are aligned with studies conducted by Bagateli et al. (2021) in Brazil, emphasising the importance of using focused communication techniques to tackle vaccine reluctance among parents.

The motivations for vaccination were found to be varied, with 29.94% of individuals seeking to safeguard their own health, 15.96% intending to safeguard the health of others, and 19.96% desiring a restoration of normalcy in their lives. Nevertheless, 14.17% of individuals conveyed



ambiguity over their major purpose. The complex interplay between individual and societal factors influencing vaccination decisions is seen in the average score of 2.89 and a standard deviation of 0.92. The findings highlight the importance of using customised communication strategies, as emphasised in the research on vaccination hesitancy in Ghana (Acheampong et al., 2021; Alhassan et al., 2021).

An analysis of the long-term impacts data revealed that a substantial portion, specifically 32.13%, reported feeling entirely uneducated. This result leads to a decrease in the mean score to 2.26 and a decrease in the variability of scores as indicated by a standard deviation of 0.77. These findings are consistent with the research conducted by An et al. (no date) and Aram et al. (no date), which highlight the influence of online search behaviour and views on vaccine acceptance.

Regarding the conviction in the vital importance of vaccines, there were different opinions, with 23.95% strongly agreeing and 26.14% strongly disagreeing. The mean score of 2.62 and the standard deviation of 0.84 highlight the intricate nature of viewpoints on the significance of vaccines in managing the pandemic. The results align with previous studies on parental vaccine hesitancy in Brazil (Bagateli et al., 2021) and emphasise the significance of focused vaccination efforts in developing regions (Alhassan et al., 2021).

To summarise, the study's findings shed light on the complex web of views and attitudes among adolescents in Bole District surrounding COVID-19 immunisations. The examination of pertinent literature emphasises the crucial requirement for tailored communication strategies and focused public health campaigns to tackle the complex factors influencing vaccination acceptance and hesitancy. This study provides useful insights into the larger comprehension of public views regarding COVID-19 vaccines, thus enhancing the existing research on vaccine hesitancy and its determining factors.



5.4 Correlation between the Levels of COVID-19 Vaccine-Related Knowledge and the Continued Vaccination among Adolescents in Bole District

Objective Four of the study considered the correlation between COVID-19 vaccine-related knowledge and the sustained engagement in vaccination among adolescents in Bole District. Adolescents who reported to have good knowledge were more likely (OR=9.99, CI=9.05-15.63, $p<0.001$) to take COVID-19 vaccine more than those who had poor knowledge in Bole District. This signifies that as vaccine-related knowledge increases, there is a substantial and statistically meaningful inclination towards higher vaccine uptake rates. The significance of the correlation as observed, reinforces the credibility of this correlation, indicating that it is unlikely to have occurred by chance.

Acheampong et al. (2021), focusing on vaccine hesitancy in sub-Saharan Africa, particularly in Ghana, provides insights into the knowledge and attitudes of adults toward receiving COVID-19 vaccines. Although the study targets adults, the general theme of addressing hesitancy aligns with our findings. It stresses the need for tailored approaches to enhance vaccine acceptance, resonating with the importance of knowledge highlighted in our study.

Efendi et al. (2022) conducted a nationwide survey in Indonesia, emphasizing the role of knowledge, attitude, confidence, and socio-demographic factors in COVID-19 vaccination adherence among adolescents. This study's findings mirror the focus of our research, showcasing the significance of knowledge in shaping vaccination behaviours.

Moreover, Li et al. (2021) conducted a systematic review on the safety, immunogenicity, and efficacy of COVID-19 vaccines in children and adolescents. While not directly addressing knowledge and vaccine uptake correlation, the study contributes to the broader understanding of vaccine-related factors in this demographic. Our findings complement this literature by



specifically examining the correlation between knowledge and sustained vaccination engagement among adolescents.

Abrams et al. (2021) address vaccine hesitancy in young people with allergies, emphasizing the importance of tailored strategies to address specific concerns. Although not directly correlating knowledge and vaccine uptake, their insights highlight the need for nuanced approaches, resonating with our emphasis on customizing communication tactics based on knowledge levels.

In summary, our study's correlation findings between knowledge and vaccine uptake among adolescents in Bole District align with and complement existing literature on vaccine hesitancy, knowledge, and attitudes. The cited studies collectively underscore the importance of understanding community-specific factors, tailoring strategies, and addressing hesitancy to promote successful COVID-19 vaccination campaigns. As we navigate the complex landscape of vaccine-related decision-making, these insights contribute to the growing body of knowledge aimed at informing targeted public health initiatives and communication strategies for effective vaccination promotion.

5.5 Relationship between Adolescents' Perceptions of COVID-19 Vaccines and Vaccination Behaviour within the Context of the Post-COVID-19 Era in Bole District

Objective Five of this study seeks to unravel the intricate correlation between adolescents' perceptions of COVID-19 vaccines and their vaccination behaviour in the post-COVID-19 era in Bole District. Adolescents who reported to have good perception were more likely (OR=5.23, CI=9.05-12.63, $p < 0.001$) to take COVID-19 vaccine more than those who had poor perception. This implies that changes in vaccination behaviour are proportionally associated with shifts in perceptions among adolescents in Bole District. The statistical reliability of this correlation is affirmed by the p-value of 0.000, signifying a significant positive correlation



between the two variables. These findings align with existing literature that explores the complex interplay between perceptions and vaccine-related behaviours. Leveraging insights from the cited literature, we delve into the broader context of adolescents' vaccination attitudes and behaviours.

Efendi et al. (2022) conducted a nationwide survey in Indonesia, emphasizing the role of knowledge, attitude, confidence, and socio-demographic factors in COVID-19 vaccination adherence among adolescents. While the focus of our study is on perceptions and behaviour, Efendi et al.'s work aligns with the broader theme of understanding factors influencing vaccine-related decisions among adolescents. Fan et al. (2021) extended the Theory of Planned Behaviour to explain the intention to take up COVID-19 vaccination among Chinese university students. Although not directly correlating perceptions and behaviour, their study contributes to the understanding of factors influencing vaccination intentions, which is foundational to vaccination behaviour.

Imhoff and Bruder (2014) and Uscinski (2020) explore conspiracy mentality as a political attitude and why people believe in conspiracy theories, respectively. While not directly linked to perceptions of COVID-19 vaccines, these studies provide valuable context on how broader attitudes may shape specific health-related beliefs and behaviours. Van Prooijen and Douglas (2018) delve into the basic principles of belief in conspiracy theories. Although their work doesn't directly align with our focus, it contributes to the broader understanding of the psychological underpinnings that might influence individuals' perceptions and, consequently, their behaviours related to vaccination.

In conclusion, the correlation findings between perceptions and vaccination behaviour among adolescents in Bole District resonate with and complement existing literature on vaccine hesitancy, intention, and psychological factors influencing vaccination-related behaviours. As



we strive to comprehend the multifaceted nature of adolescents' decision-making regarding COVID-19 vaccines, these insights contribute to a more comprehensive understanding, offering guidance for tailored public health strategies and communication initiatives aimed at promoting positive vaccination behaviours in this critical demographic.



CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

The chapter concludes with practical recommendations designed to inform policy, public health strategies, and future research endeavours. This contributes to the discourse on adolescent vaccination in the post-COVID-19 era, shaping meaningful implications for both local and global contexts.

6.1 Summary

The study assessed the knowledge levels of adolescents in Bole District regarding COVID-19 vaccines post-pandemic. The findings showed a moderate understanding among participants. While respondents demonstrated awareness of safety measures associated with vaccination, there were gaps in practising vaccination beyond individual protection. Notably, adolescents expressed confidence in the safety of the vaccines, indicating a positive trend. However, the study emphasizes the necessity for targeted educational interventions to enhance comprehensive knowledge regarding COVID-19 vaccines, ensuring a more informed community.

Objective 2 aimed to explore the prevailing attitudes of adolescents in Bole District towards the COVID-19 vaccination campaign. Results depicted a mixed landscape of sentiments within the community. Approximately 49.9% of participants expressed positive feelings, often attributing positivity to the perceived protective nature of vaccination. Conversely, negative sentiments were reported, showcasing a nuanced perspective. Some participants demonstrated mixed feelings and questioned the necessity of vaccination. Addressing these concerns



becomes crucial for fostering positive attitudes and enhancing overall campaign receptivity. Strategies aimed at providing accurate information and addressing concerns could contribute to a more favourable outlook.

Objective 3 delved into the perceptions of adolescents in Bole District regarding the safety, efficacy, and significance of COVID-19 vaccines in the post-pandemic period. Diverse perceptions were identified, with varying degrees of acceptance and hesitancy within the community. While some perceived vaccines as safe and effective, others expressed reservations, highlighting the broader concept of vaccine hesitancy. Key informant interviews underscored the influence of family discussions, emphasizing the need for targeted communication strategies addressing safety concerns and correcting misinformation. The study signals the importance of tailored interventions to address specific concerns and foster accurate perceptions.

The study aimed to explore the correlation between knowledge levels and vaccine uptake among adolescents in Bole District. Positive correlations were identified, indicating that higher knowledge levels were associated with both initiating and sustaining vaccine uptake. The results complemented theoretical models like the Health Belief Model, highlighting how information plays a critical role in influencing behaviours related to health. Comprehensive educational initiatives emerged as crucial for promoting vaccine uptake within the community. This underscores the significance of knowledge-building initiatives to bolster sustained vaccination efforts.

Objective 5 aimed to understand the relationship between adolescents' perceptions of COVID-19 vaccines and their vaccination behaviour in the post-COVID-19 era in Bole District. A moderate positive correlation was identified, suggesting that favourable perceptions were associated with a higher likelihood of vaccination. The findings emphasized the significant



impact of attitudes and beliefs on shaping vaccination behaviour within the community. Tailored interventions addressing specific concerns and fostering positive perceptions were deemed essential for promoting vaccine uptake among adolescents in Bole District. The study underscores the need for targeted strategies to shape positive perceptions and enhance vaccination behaviour in the post-pandemic landscape.

6.2 Conclusions

The study revealed a moderate level of COVID-19 vaccine-related knowledge among adolescents in Bole District. While a significant portion demonstrated awareness, a noteworthy proportion exhibited gaps in understanding. This suggests the need for targeted educational interventions to enhance knowledge levels, ensuring a more informed adolescent population regarding COVID-19 vaccines.

Adolescents generally exhibited positive attitudes towards the COVID-19 vaccination campaign. A substantial percentage expressed willingness to participate, reflecting a favourable disposition towards vaccination. However, the presence of vaccine hesitancy signals the importance of addressing specific concerns. Tailored communication strategies and community engagement initiatives may prove instrumental in fostering more positive attitudes and mitigating hesitancy.

The study found diverse perceptions among adolescents about the safety, efficacy, and significance of COVID-19 vaccines. While a significant proportion perceived vaccines as safe and effective, a considerable number expressed reservations. These findings underscore the complex nature of vaccine-related perceptions, emphasizing the necessity for nuanced public health messaging that addresses precise concerns and builds trust.



A positive correlation between COVID-19 vaccine-related knowledge and vaccine uptake was observed among adolescents. This underlines the pivotal position of knowledge in persuading vaccination behaviour. Strengthening awareness through targeted educational initiatives may contribute to increased vaccine acceptance and uptake among adolescents.

The study identified a moderate positive relationship between adolescents' perceptions of COVID-19 vaccines and their vaccination behaviour. While positive perceptions were associated with higher vaccination rates, addressing concerns expressed by those with more negative perceptions becomes crucial. Tailoring interventions to address specific perceptions can contribute to a more favourable vaccination landscape.

6.3 Recommendations

- 1) The Ministry of Health as a policy making institution should develop and implement a comprehensive and targeted educational programs aimed at enhancing COVID-19 vaccine-related knowledge among adolescents. This can be achieved through collaboration with educational institutions, community leaders, and youth organizations, ensuring the dissemination of accurate and accessible information to address existing knowledge gaps.
- 2) Ghana Health Service, responsible for policy implementation, should focus on community engagement and communication strategies tailored to address vaccine hesitancy especially adolescents as a target group. This involves actively involving community leaders, Opinion leaders and local health practitioners in disseminating information, fostering a positive attitude towards vaccination, and dispelling myths and misconceptions. The implementation of mobile vaccination clinics in schools and communities can also facilitate and increased access to vaccines.



- 3) The government should organize training for health practitioners on effective communication strategies to engage and address adolescent concerns. This includes refining interpersonal communication skills, employing empathy, and utilizing age-appropriate educational materials.
- 4) The MOH should establish youth-friendly vaccination centers with trained personnel in adolescent health can contribute to a more positive vaccination experience.
- 5) It is recommended to MMDCs, NGOs that future research should explore in to geographically and diverse populations including the adolescents country wide.



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APPENDICES

APPENDIX A: BUDGET/ TIMELINE

Date	Activity	Resources needed	Qty	Unit Cost	Total Cost
1/02/2023	Design of data collection tools (Questionnaire)	Pens Laptop	1box 1	GhC50 GhC3,000	GhC50 GhC3,000
4/02/2023	Pre-testing of Questionnaire	- Data collector	1	-	-
10/02/2023	Printing of questionnaire	Printer A4 sheets	1 2 rims	GhC 5,000 GhC120.00	GhC 5,000 GhC 240.00
10/02/2023	Photocopy of questionnaire	Photocopier machine	200	GhC 1	GhC200
15/02/2023	Training of data collectors	Data collectors Water Snack Per diem Pens Audio Recorder	7 2crates 7 7 - 3	- GhC 25 GhC 30 GhC50 - GhC700	- GhC50 GhC210 GhC350 - GhC2,100
17/02/2023 to	Data collection	Transport	5 bikes (renting	GhC 50 per day ×5days	GhC1,250





22/02/2023		Fuel	)		GhC1,608
		Water		GhC1,608	GhC125
		Snack	120 ltrs	GhC25	GhC700
			5crates	GhC20 per	
		Lunch	7	day ×5days	GhC1,050
		Per diem		GhC30 per	GhC2,450
			7	day ×5days	
		Miscellaneous	7	GhC70 per	GhC1,000
				day×5days	
			-	-	
1/03/2023	Data analysis	-	-	-	-
to					
30/05/2023					
15/06/2023	Data Presentation	-	-	-	-
Total					GhC11,310.50p

APPENDIX B: DATA COLLECTION INSTRUMENT I

FOCUS GROUP DISCUSSION GUIDE

Objective: To assess the knowledge, attitude, and uptake of COVID-19 vaccines among adolescents in the aftermath of the pandemic in Bole District.

Introduction:

- Introduce the purpose of the focus group discussion.
- Explain the importance of understanding adolescents' knowledge about COVID-19 vaccines.

Questions:

1. What do you know about COVID-19 vaccines?
2. How did you acquire this knowledge? (e.g., school, media, healthcare providers)
3. What are the common myths or misconceptions you've heard about COVID-19 vaccines?
4. How confident are you in your knowledge about COVID-19 vaccines?
5. Are there any specific concerns or doubts you have regarding COVID-19 vaccines?
6. What sources of information do you find most reliable when it comes to COVID-19 vaccines?
7. Are there any barriers or challenges that prevent you from accessing accurate information about COVID-19 vaccines?



DATA COLLECTION INSTRUMENT II

Key Informant Interview Guide

Objective: To assess the attitudes of adolescents towards COVID-19 vaccination.

Introduction:

- Explain the purpose of the interview.
- Emphasize the importance of understanding adolescents' attitudes towards COVID-19 vaccination.

Questions:

1. What are your general attitudes towards COVID-19 vaccination?
2. What are the factors that influence your attitude towards COVID-19 vaccination?
3. Have you discussed COVID-19 vaccination with your family or friends? What were their attitudes?
4. Are there any specific concerns or fears you have regarding COVID-19 vaccination?
5. How confident are you in the safety and effectiveness of COVID-19 vaccines?
6. Have you experienced any barriers or challenges in accessing COVID-19 vaccination?



DATA COLLECTION INSTRUMENT III

QUESTIONNAIRE

Objective: To explore the perceptions of adolescents regarding the safety, efficacy, and importance of COVID-19 vaccines, and to examine the association between knowledge levels, perceptions, and vaccine uptake among adolescents.

Section 1: Demographics	
Q1. Age:	
Q2. Gender:	
Q3. Community:	
Q4. Ethnicity	
Q5. Educational level	
Section 2: Knowledge about COVID-19 Vaccines	
Q4. How well-informed do you consider yourself about	
COVID-19 vaccines?	
- Not informed at all	
- Slightly informed	
- Moderately informed	
- Very informed	
- Extremely informed	
Section 3: Perceptions about COVID-19 Vaccines	
Q5. Please rate your perception of the safety of	
COVID-19 vaccines:	





- Strongly disagree	
- Disagree	
- Neutral	
- Agree	
- Strongly agree	
Q6. Please rate your perception of the efficacy of	
COVID-19 vaccines:	
- Strongly disagree	
- Disagree	
- Neutral	
- Agree	
- Strongly agree	
Q7. Please rate the importance of COVID-19 vaccines in	
controlling the spread of the virus:	
- Not important at all	
- Slightly important	
- Moderately important	
- Very important	
- Extremely important	
Section 4: Vaccine Uptake	
Q8. Have you received the COVID-19 vaccine?	
- Yes	
- No	



Section 5: Association between Knowledge Levels, Perceptions, and Vaccine Uptake	
Q9. How would you rate your knowledge about COVID-19	
vaccines?	
- Very low	
- Low	
- Moderate	
- High	
- Very high	
Q10. Do you believe that COVID-19 vaccines are safe?	
- Strongly disagree	
- Disagree	
- Neutral	
- Agree	
- Strongly agree	
Q11. How likely are you to get vaccinated against	
COVID-19?	
- Very unlikely	
- Unlikely	
- Neutral	
- Likely	
- Very likely	



Objective: To examine the association between knowledge levels and vaccine uptake among adolescents	
Q1. I believe that receiving the COVID-19 vaccine is important for my health and well-being.	- Strongly Disagree
	- Disagree
	- Neutral
	- Agree
	- Strongly Agree
Q2. I have a good understanding of the benefits and risks associated with the COVID-19 vaccine.	- Strongly Disagree
	- Disagree
	- Neutral
	- Agree
	- Strongly Agree
Q3. I have received the COVID-19 vaccine.	- Strongly Disagree
	- Disagree
	- Neutral
	- Agree



	- Strongly Agree
Q4. I obtained information about the COVID-19 vaccine from reliable sources such as healthcare professionals.	- Strongly Disagree
	- Disagree
	- Neutral
	- Agree
	- Strongly Agree
Q5. I feel confident in the safety and effectiveness of the COVID-19 vaccine.	- Strongly Disagree
	- Disagree
	- Neutral
	- Agree
	- Strongly Agree
Q6. I believe that receiving the COVID-19 vaccine is necessary to protect vulnerable individuals in my community.	- Strongly Disagree
	- Disagree
	- Neutral
	- Agree



	- Strongly Agree
Objective: To explore the relationship between perceptions about COVID-19 vaccines and vaccine uptake among adolescents	
Q7. I trust the scientific research and evidence supporting the safety and effectiveness of COVID-19 vaccines.	- Strongly Disagree
	- Disagree
	- Neutral
	- Agree
	- Strongly Agree
Q8. I have concerns about the potential side effects or long-term consequences of the COVID-19 vaccine.	- Strongly Disagree
	- Disagree
	- Neutral
	- Agree
	- Strongly Agree
Q9. I believe that misinformation or conspiracy theories have influenced people's perception of COVID-19 vaccines.	- Strongly Disagree



	- Disagree
	- Neutral
	- Agree
	- Strongly Agree
Q10. I have discussed COVID-19 vaccines with friends or family members to gather more information.	- Strongly Disagree
	- Disagree
	- Neutral
	- Agree
	- Strongly Agree
Q11. I am open to considering different perspectives and information about COVID-19 vaccines.	- Strongly Disagree
	- Disagree
	- Neutral
	- Agree
	- Strongly Agree
Q12. I believe that promoting vaccine uptake is essential for ending the COVID-19 pandemic.	- Strongly Disagree

	- Disagree
	- Neutral
	- Agree
	- Strongly Agree

Objective: To explore the relationship between perceptions about COVID-19 vaccines and vaccine uptake among adolescents.

Questions for the Questionnaire	
Q1. Please indicate your level of agreement with the following statement: "I believe that getting vaccinated against COVID-19 is important for my health and the health of others."	- Strongly Disagree
	- Disagree
	- Neutral
	- Agree
	- Strongly Agree
Q3. Please indicate your level of agreement with the following statement: "The opinions of my friends or peers strongly influence my decision regarding COVID-19 vaccination."	- Strongly Disagree
	- Disagree
	- Neutral





	- Agree
	- Strongly Agree
Q4. There are significant positive changes in my perceptions about COVID-19 vaccines since the vaccination campaigns started:	- Strongly Disagree
	- Disagree
	- Neutral
	- Agree
	- Strongly Agree
Q5. Please indicate your level of agreement with the following statement: "I am confident in the safety and effectiveness of COVID-19 vaccines."	- Strongly Disagree
	- Disagree
	- Neutral
	- Agree
	- Strongly Agree
Q6. Please indicate your level of agreement with the following statement: "I believe that COVID-19 vaccination is a crucial step in controlling the spread of the virus."	- Strongly Disagree
	- Disagree
	- Neutral



	- Agree
	- Strongly Agree
Q7. I always recommend COVID-19 vaccination to my friends or family is:	- Strongly Disagree
	- Disagree
	- Neutral
	- Agree
	- Strongly Agree
Q8. Please indicate your level of agreement with the following statement: "I believe that the benefits of COVID-19 vaccination outweigh any potential risks."	- Strongly Disagree
	- Disagree
	- Neutral
	- Agree
	- Strongly Agree
Q9. I feel well-informed about the COVID-19 vaccines and their potential side effects.	- Strongly Disagree
	- Disagree
	- Neutral

	- Agree
	- Strongly Agree
Q10. COVID-19 vaccination plays a crucial role in reducing the transmission of the virus in my community.	- Strongly Disagree
	- Disagree
	- Neutral
	- Agree
	- Strongly Agree



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Tamale, Ghana

Your Ref:

OFFICE OF THE REGISTRAR

1st SEPTEMBER, 2023.
Date

**CHIRADAM WOONI PROSPER,
UNIVERSITY FOR DEVELOPMENT STUDIES,
TAMALE.**

ETHICAL APPROVAL NOTIFICATION

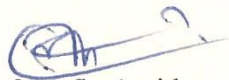
With reference to your request for ethical clearance on the research proposal titled "To Assess Knowledge, Attitude and update of Covid-19 Vaccination in the aftermath of Covid-19 among Adolescents in the Bole District" I write to inform you that the University for Development Studies Institutional Review Board (UDSIRB) found your proposal including the consent forms to be satisfactory and have duly approved same. The mandatory period for the approval is six (6) months, starting from 1st September, 2023 to February, 2024.

Subject to this approval, you are please required to observe the following conditions:

1. That the anonymity of the respondents shall be guaranteed as mentioned in the consent forms.
2. That you will acknowledge the source of the data collected in any publication related to this research.
3. That you will submit a field report and a copy of the research report to the UDSIRB.
4. That you may apply to the UDSIRB for any amendments relating to recruiting methods, informed consent procedures, study design and research personnel.
5. That you will strictly abide by the code of conduct of this University.

Please do not hesitate to refer any issue (s) that you may deem necessary for the attention of the Board.

Thank you.


Prof. Nafiu Amidu
Chairman, UDSIRB
Cc: file

