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ASSESSMENT OF ADHERENCE TO COVID-19 PREVENTION PROTOCOLS IN SELECTED CHURCHES IN THE BOLGATANGA MUNICIPALITY

BY

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THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF SCIENCE IN PUBLIC HEALTH MONITORING AND EVALUATION (MSC) DEGREE

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DECLARATION

I declare that this thesis is an original report from my research work carried out as part of the requirements for the award of MSc Public Health Monitoring and Evaluation from the University Ghana, Legon.

SIGNATURE …… ……. DATE …15-11-2022……

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(STUDENT)

15- 11-2022

SIGNATURE …… DATE …….

DR. BAATIAMA LEONARD

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DEDICATION

I dedicate this work to the Almighty God and my family, most especially my lovely husband Abaane Donatus Nbonibe, my children Abaane MacDonatus Ayinbono, Abaane Zephaniah Ayinemizaah, Abaane Evan Ayine-Ganebah and Abaane Evangeline Ayinpoka, my lovely mother Akuribire Juliana and my late father Agandaa Roland.

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ABSTRACT

Background: Following the outbreak of the COVID-19 pandemic, the WHO recommended four key prevention protocols among several others: use of a face mask, physical/social distancing, use of hand sanitizer, and hand washing. Despite this, there were growing concerns about the lack of adherence to these recommended prevention protocols in public spaces and by individuals, leading to the significant spread of the virus. These recommended protocols are especially important for congregations such as churches where the risk of exposure is high. This study, therefore, aimed to assess adherence to the COVID-19 prevention protocols in selected churches in the Bolgatanga Municipality of the Upper East Region of Ghana.

Method: This was a cross-sectional study conducted in selected churches and church members in the Bolgatanga Municipality of the Upper East Region of Ghana. Both an observational checklist and a structured questionnaire were used to collect data using stratified simple random sampling to recruit 438 church members into the study. Between August 2021 and October 2021, 33 churches were included in the study. Descriptive statistics were carried out with relative frequency analysis using SPSS version 25. Bloom's Cut-off point of 80% and above was used to categorize Knowledge, Attitude and Practice (KAP) levels. The level of adherence was measured by the proportion of respondents who consistently observed all four protocols for the past five Sundays. Chi-square and binary logistics (both bivariate and multivariate) regression analysis were used to identify determinants and their level of influence on adherence.

Result: It was observed that 97%, 69.7%, 69.7%, and 63.6% of the churches had hand sanitizers, handwashing facilities, face masks, and seats arranged a meter apart, respectively. Also, 96.9%, 86.6%, 82.6%, 64.8%, and 56.8% of the respondents reported having access to hand sanitizers,

handwashing facilities, face masks, and seats arranged a meter apart during worship sessions. Despite 65% of the respondents having good knowledge levels and 48% having a good attitude, 80.5% of the respondents had good practice of the protocol. The study revealed that only 26.8% of worshipers consistently adhered to all the recommended protocols for the past five worship sessions. The number of preventive facilities a respondent had access to, the denomination, attitude, age, place of residence, and occupation, consistently and statistically significantly determine adherence.

Conclusion: Adherence to COVID-19 prevention protocols was low among worshipers thereby increasing the risk of infection should there be an exposure. Urgent efforts are needed by policymakers, law enforcement urgencies, church authorities and worshipers to improve the adherence to COVID-19 protocols in Ghana.

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LIST OF ABBREVIATIONS

COVID-19	Coronavirus disease 2019
SARS-CoV-2	severe acute respiratory syndrome coronavirus 2
UER	Upper East Region
GDP	Gross Domestic Product
PPE	Personal Protective Equipment
WHO	World Health Organization
GHS	Ghana Health Service
MOH	Ministry of Health
PHEIC	Public Health Emergency of International Concern
KAP	knowledge, attitude and practice
IPC	Infection Prevention and Control
UNDP	United Nations Development Programme
UNICEF	United Nations International Children's Emergency Fund
IMF	International Monetary Fund
USA	United State of America

DEFINITION OF TERMS

Level of adherence: Respondent practicing all four recommended protocols (Hand washing, face mask-wearing, social distancing and hand sanitizing) consistently for five major worship sessions. (operational)

Major worship session: Sunday worship session.

Physical distancing: keeping at least a 1-meter distance

Physical contact activities: activities that require body contact with objects in the church.

Hand hygiene practices: both hand washing and hand sanitizing

CHAPTER ONE

INTRODUCTION

1.1. Background

The coronavirus disease (COVID-19) caused by SARS-COV-2 (WHO b, 2020) is one of the emerging respiratory diseases and is believed to have originated from animals (WHO, 2020f). The elderly and immune-compromised persons are said to be most at risk of severe disease. Originally believed to be zoonotic, it has now spread from person to person, resulting in widespread community transmission. Its common signs and symptoms include fever, runny nose, cough, sore throat, and headache (Ghana Health Service, 2020).

Transmission is particularly enhanced by congregations of people, especially in enclosed environments. In such an environment, there is an increased risk of coming into contact with infected people and contaminated surfaces. In such a crowded congregation, the risk of transmission via droplet spray is high (WHO, 2020h, 2020o).

To control this emerging pandemic, the WHO recommends the use of fabric face masks, physical distancing, cough etiquette, and hand hygiene for the general public (WHO, 2020h, 2020o, 2021c; WHOa, 2020). In particular, churches as gathering points are advised to adhere to these protocols (WHO, 2020k). COVID-19 since its emergence in Wuhan, China in December 2019 is now a pandemic with cases in every country except Turkmenistan and the People's Republic of Korea as of March 12, 2021 (Deloitte, 2020; Kim et al., 2020; WHO, 2020p; *WHO Coronavirus (COVID-19) Dashboard | WHO Coronavirus Disease (COVID-19) Dashboard*, 2021) with Ghana recording its first two cases of COVID-19 on March 12, 2020 (MOH, 2020). As of February 23, 2022, 426,624,859 people were infected with 1666103 active cases globally, 8303144 infected in

Africa, and 159006 infected in Ghana with 968 active cases and corresponding 5899578 deaths globally, 169288 deaths in Africa, and 1442 deaths in Ghana (WHO, 2022).

This pandemic comes with several consequences: the individual bears direct physical and psychological trauma, aftermath complications, the direct monetary cost of care and losses from time off work, social stigma, and loss of life.

The impact of the pandemic can be felt in every aspect of human life. It has increased populations' vulnerability to mental illness (Xiong et al., 2020), food and nutrition security (Carducci et al., 2021), and non-communicable diseases (Thakur et al., 2020). Healthcare systems have also been disrupted globally, leading to a reduced and widened equity gap in access to quality healthcare globally (Lynch & Pusey-Murray, 2021; Moynihan et al., 2021; WHO, 2020e; *COVID-19 Continues to Disrupt Essential Health Services in 90% of Countries*, 2021). The lockdown reduced financing, and the change in the mode of delivery of education has led to reduced access, equity, and quality of education (*The Impact of COVID-19 on Education – Recommendations and Opportunities for Ukraine*, 2021; Tuffour et al., 2021). Social consequences also resulted from the restriction of recreational and socio-cultural activities (Abid Haleem & Raju, 2020).

At the upstream, the pandemic has caused micro and macroeconomic recession (Deloitte, 2020) resulting in inflation, low income and high cost of living (Asante & Mills, 2020; Diwambuena et al., 2020; Ebrahimy et al., 2020; The Economic Context of Ghana - Economic and Political Overview - Nordea Trade Portal, 2021; Rajeshni Naidu-Ghelani, 2020). According to Kaye and colleagues, it will cost the world 3 trillion and lead to negative growth of not less than 8% (Deloitte, 2020; Kaye et al., 2021). Even though Africa is one of the least affected continents in terms of prevalence and fatalities, it could be the biggest bearer of the economic impact (African Union, 2020; Grace, 2020; OECD, 2020). Ghana has received its share of the impact of COVID-19.

Baffour and colleagues report of the severe impact of the pandemic on Ghana's educational system (Tuffour et al., 2021). The Ghanaian economy has also been hit hard. Ghana's estimated GDP growth target of 6.8% tumbled to 2.6% in 2020 (Deloitte, 2020). Aduhene & Osei-Assibey (2021) report that 42, 000 jobs were lost within a couple of months of the pandemic. This occurred amid rising food prices (Asante & Mills, 2020) leading to food insecurity (Bukari et al., 2021). The overall effect was increased poverty and a lower standard of living (Bukari et al., 2021).

Since the insurgence of COVID-19, WHO and other global health stakeholders have taken steps to promote the observance of the COVID-19 prevention and control protocols. The preventive protocols were issued by WHO (WHO, 2020m, 2020j). The mobilization of other global organizations such as the International Monetary Fund(IMF), United Nations International Children's Emergency Fund(UNICEF), United Nations Development Programme(UNDP), etc. and the distribution of both funds and resources to facilitate the observance of these protocols was critical (*World Bank Group Supports Ghana To Boost Its COVID-19 Response*, 2020; *The Government of Ghana, the Embassy of Denmark and UNICEF Launch a Partnership to Support the COVID-19 Response*; *WHO Assures Government of Ghana of UN's Continuous Collaboration in the Fight against COVID | WHO | Regional Office for Africa*, 2021). These funds enabled poorer countries to provide water for WASH and purchase vaccines. It also enabled local production of sanitizers and face masks, and to carry out behaviour change communication (*World Bank Group Supports Ghana To Boost Its COVID-19 Response*, 2020; World Bank, 2021). Also, the strong fight against the infodemic by WHO (WHO, 2021a) facilitated public adoption of the preventive protocols.

The Ghana government, following the Public Health Act, 2012 (Act 851) and the Ghana - Imposition of Restrictions Act, 2020 (Act 1012), made it mandatory for all churches to adhere to

these protocols in their gatherings (MOH Ghana, 2020; President of Ghana, 2020a; *Update No.10: President Akufo-Addo Addresses the Nation - YouTube*, 2020). In Particular, the wearing of a face mask was declared mandatory (MOH Ghana, 2020; FULL TEXT: Akufo-Addo's 11th Address to the Nation on Measures to Fight Coronavirus, 2020). There is currently no cure for the disease and vaccine penetration is still very low (Ghana Health Service, 2020). Even in the presence of a vaccine, adherence to the COVID-19 prevention protocols is unavoidable. This, therefore, calls for action both at the church as a collective unit and at the individual level as members of the unit.

Cohen and Colleagues have argued that while legislation is a vital tool for the adoption and adherence to healthy behaviours, they require other complimentary actions to make them work effectively (Cohen et al., 2000). Models such as the knowledge, attitude, and practice model, a health behaviour change model which was introduced by Nancy Schwartz in her article published in the journal of nutrition education, stress the need for the nurse to have proper knowledge, attitude, and practice in order to provide better health care to their patients (Schwartz, 1976). It is presumed that knowledge, attitude, and practice influence each other and that knowledge and attitude have a direct effect on preventive practices (Rav-Marathe et al., 2016; Gimenez-Sanchez et al., 2001; Bansal et al., 2015). Poor health, inefficient use of health care, a decline in the disease screening rate, and maladaptive disease preventive behaviour are said to be due to lower KAP levels (C. et al., 2015).

Therefore, KAP plays a key role in health prevention and promotion (Szymona-Pałkowska et al., 2016). Thus, the basic way to prevent COVID-19 infection is by improving the community's knowledge, attitude, and practices toward COVID-19 prevention protocol (Olum et al., 2020). Also, one's level of knowledge can affect one's attitude (C, 2021). According to Mersha et al., (2021), shortage of PPE (face masks and gloves) and scarcity of hand cleaning facilities (alcohol

hand sanitizer) are the main barriers to healthcare workers not practicing preventive measures for COVID-19.

1.2. Problem Statement

Since the inception of COVID-19, it has infected millions of humans and led to numerous mortalities. Ghana, after its first 2 cases recorded on the 12th of March 2020 (MOH, 2020), has since risen to 159,006 confirmed cases, with 968 active cases and 1442 deaths as of the 26th of February 2022 (WHO, 2022). The Upper East Region, as of December 26th 2021 had recorded 1531 confirmed cases, with 35 active cases and 56 deaths. The region, however, has a test positivity rate of 15.2% and a case fatality rate of 3.7% as of December 26th, 2021(Ghana Health Service Upper East Region, 2021). These suggest a higher infection, severity, and mortality rate in the region. Bolgatanga Municipality has the highest burden of COVID-19 cases in the Upper East Region compared to other districts in the region. The Municipality since the onset of the pandemic has recorded 605 confirmed cases, representing 39.51% of all cases in the region (Ghana Health Service upper East Region, 2021) as of December 26th, 2021, and also recorded 20 new cases, which is 60.71% of the total new cases in the Upper East Region as of December 26th, 2021.

With the increasing number of cases, the Ghana Health Service adopted the WHO preventive measures and prevention protocols including hand hygiene, masking up (respiratory hygiene), and physical distancing, as the prevailing measures to combat the disease. In furtherance to this, the government implemented different interventions to promote adherence to these protocols, such as government absorption of water bills for all Ghanaians, purchase and distribution of hand sanitizers, liquid soap and other PPEs, e.g. face masks, closure of public gatherings such as funerals, festivals, and lockdown of schools, etc. (President of Ghana, 2020b; The President of Ghana, 2020a). Yet the adoption of these prevention and control protocols is said to be very low

in some parts of the country (Bonful et al., 2020); Okyere et al., 2020) despite the emergence of a more rapid-spreading and virulent variant virus circulating in the Ghanaian community. However, people will not be able to adopt and adhere to these protocols if they do not have adequate knowledge to induce the positive attitude required for action (Green & Tones, 2010; Schwartz, 1976). Theoretically, these three constructs are in a logical relationship such that knowledge leads to a positive attitude which then leads to desired behaviour (Muleme et al., 2017; Rav-Marathe et al., 2016). Health education directly or indirectly via knowledge and attitudes contributes to enabling people to adopt and adhere to preventive behaviours (Rav-Marathe et al., 2016). Cultural norms and access to Personal Protective equipment can influence one's practices toward COVID-19 protocols (C, 2021).

In Ghana, studies assessing KAP and adherence have been carried out in hospitality and shopping centres. Dabi et al (2021) reported 100% knowledge of prevention protocols, 95% availability of hand washing facilities, 95% availability of hand sanitizers, 90% availability of face masks and 90% wearing of face masks in local restaurants in the Ho Municipality. Fielmua et al (2021) study in shopping centres in Wa however, reported very poor adherence to COVID-19 prevention with only 8.7% of customers washing their hands and 15.8% wearing masks.

However, the researcher could not find any study assessing KAP and adherence in religious settings, especially in churches where people congregate for longer times the Bolgatanga Municipal, a cosmopolitan, business and administrative centre of the Upper East Region of Northern Ghana and Ghana as a whole.

Several questions need to be answered. Are equipment and infrastructure put in place to support the adherence to COVID-19 protocols among churches in the Bolgatanga Municipality available? What are the knowledge, attitude, and practices of church members towards COVID-19 prevention

protocols? What is the level of adherence of church members towards COVID-19 prevention protocols? What are the determinants of adherence to the COVID-19 prevention protocols among church members? This study, therefore, seeks to assess the level of adherence to COVID-19 prevention protocols among selected churches in the Bolgatanga Municipality of the Upper East Region of Ghana. It is only through research that information of such nature can be ascertained, hence the need for the study.

1.3. Justification Of the Study

COVID-19 remains a menace to the world, the nation, and Bolgatanga Municipality. The uniqueness of the disease, along with its uncertainties, makes it critical for health authorities to plan proper strategies to prepare and manage the public (C, 2021). Public adherence to COVID-19 prevention protocols is key as a measure to control it (Ferdous et al., 2020). With the high number of cases, it is therefore important that the level of adherence be studied among the public to guide these efforts. Studies on adherence to COVID-19 prevention protocols are generally limited in the Ghanaian contexts, and this is more particular in public spaces such as churches which attract a mass gathering of the populace, predisposing them to COVID-19 infection if proper prevention measures and adherence to the protocols are not enforced.

Therefore, I find it important to conduct this study, whose findings will add to the scientific knowledge of COVID-19, social and behavioural aspects, which will contribute to the efforts towards developing health promotion and public health interventions to improve adherence to COVID-19 prevention protocols, thus combating the disease in the Bolgatanga Municipality and the nation as a whole.

1.4. Main Objective

To assess adherence to COVID-19 prevention protocols in churches in the Bolgatanga Municipality.

1.5. Specific Objectives

1. To assess the availability and accessibility of equipment and infrastructure put in place to support adherence to COVID-19 prevention protocols in churches in the Bolgatanga Municipality.
2. To assess the knowledge, attitude, and practices of church members towards COVID-19 prevention protocols.
3. To determine the level of adherence of church members towards COVID-19 prevention protocols.
4. To examine the determinants of adherence to the COVID-19 prevention protocols among church members.

1.6. Research questions

1. What is the level of availability and access to equipment and infrastructure put in place to support adherence to COVID-19 prevention protocols in churches in the Bolgatanga Municipality?
2. What is the level of knowledge, attitude, and practices of church members towards COVID-19 prevention protocols?
3. What is the level of adherence of church members towards COVID-19 prevention protocols?
4. What are the determinants of adherence to the COVID-19 prevention protocols among church members?

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

This section presents previous works on adherence to COVID-19 prevention protocols in general and within the context of church environments. It covers the epidemiological burden of COVID-19 globally, regionally, and within the study contexts. It also examines the literature on COVID-19 prevention protocols, levels of adherence to the prevention protocols, and measures such as logistics, equipment, and infrastructure put in place to support adherence to COVID-19 prevention protocols. Work on people's knowledge, attitude, and practices towards COVID-19 prevention protocols, adherence to COVID-19 prevention protocols, and determinants of adherence to COVID-19 prevention protocols were also explored.

2.2. The epidemiological burden of COVID-19

COVID-19, an emerging severe acute respiratory syndrome, is an infection that was first reported on December 31, 2019, in China and declared a public health emergency of international concern (PHEIC) on January 30, 2020 (WHO, 2020i). Mild conditions are commonly characterized by fever, cough, and fatigue, while common manifestations of severe disease are dyspnea, high temperature (38℃ or more), loss of appetite, pressure, pain in the chest, and confusion. Other less common symptoms of both mild and severe diseases have also been reported.

From the emergence till May 11, 2021, about **158.6 million** cases have been detected with over 3.3 million deaths (*WHO Coronavirus (COVID-19) Dashboard | WHO Coronavirus (COVID-19) Dashboard With Vaccination Data*, 2021) globally. However, some studies assert that the detected cases are just one-tenth of the prevailing seropositive (Havers et al., 2020; Stringhini et al., 2020). This fits well into the tip-of-iceberg phenomenon in epidemiology. All countries except

Turkmenistan and the People's Republic of Korea have officially recorded cases (*WHO Coronavirus (COVID-19) Dashboard | WHO Coronavirus (COVID-19) Dashboard With Vaccination Data*, 2021). The Americas, Europe, and Southeast Asia are the three WHO regions with the highest number of cases (*WHO Coronavirus (COVID-19) Dashboard | WHO Coronavirus Disease (COVID-19) Dashboard*, 2021). World Health Organization data analysis indicates that both men and women have about an equal risk with a ratio of 1.03:1, more males in 0-9, 60-69, and 70-79 year age bands are infected and more women in the 20-29 year and 80+ year age bands are also infected (WHO, 2020a).

COVID-19 disease is caused by the SARS-Cov 2, a member of the coronaviruses responsible for earlier emerged acute respiratory syndromes, and the virus is postulated to have originated from bats, thereby making it a zoonosis (WHO, 2020f). Compared to the influenza virus, SARS-Cov-2 is said to be less transmissible and also causes less symptomatic and severe disease (WHO, 2020b).

The disease has multiple modes of transmission, including direct and indirect contact with infectious secretions, airborne, especially in healthcare settings and fomites (WHO, 2020d), but the most common one is direct person-to-person (McIntosh et al., 2021). While all positive cases can transmit the virus, symptomatic cases are said to be the most infective source (McIntosh et al., 2021; WHO, 2020o). Direct person-to-person contact transmission is enhanced by closer proximity (less than 1 meter) to infectious people and in a crowded and enclosed environment(McIntosh et al., 2021). Churches as places of congregation have been identified as places where many have been infected (WHO, 2020k).

As a communicable disease, the recommended measures for prevention and control follow the three key principles: elimination or removal of the source or cause of infection; breaking the chain of transmission; and protecting the susceptible (Merrill, 2017). The WHO recommends the early

detection and isolation of cases, the identification, and quarantine of contacts, and most recently, vaccination to protect the general population from SARS-COV-2(WHO, 2020c, 2020o). Hand hygiene, respiratory etiquette, use of masks, social distancing within the community, and effective infection control. Prevention and control measures in healthcare settings constitute measures to break the chain of transmission (WHO, 2020c, 2020o). Last but not least, environmental control measures include cleaning and disinfecting surfaces likely to be contaminated with viruses and ensuring effective ventilation of enclosed places used for gatherings (WHO, 2020c, 2020o). In addition, modification of religious observance such as avoidance of physical contact with religious objects, laying of hands, etc., is recommended (WHO, 2020k).

2.3. The intervention of focus of the study

The COVID-19 prevention and control measures of focus in this study included hygiene (i.e hand washing and use of hand sanitizers), social distancing (i.e. maintaining at least a meter away from other people during sitting and processing for church activities) and wearing a mask during church services. With no treatment at hand, these measures were very crucial in rolling back the pandemic. These measures have been assessed to offer protection about 40% - 60% protection(Gozdzielewska et al., 2022). Wearing of mask reduced the risk of falling sick with COVID-19 by 60% and observing physical distancing mitigated the risk by 25% (Talic et al., 2021). The mandatory masking-up policy also reduced hospitalization in young adults by 5.9% and slowed case growth by 1% among early adopters and 0.44% among late adopters. They have also been reported to be cost-effective with incremental cost-effectiveness ratios (ICERs) of 83.32 ($1.13) for a combined effect of masking and hand hygiene, 8.07($0.77) for hand hygiene only, and, 76.36 ($1.03) for Masking only (Bagepally et al., 2021). Therefore, adherence to these

protocols in congregations will contribute to curbing COVID-19. The benefits of these measures may have been already harvested in Ghana since no cluster of cases nor sub-outbreak was associated with the religious congregations.

2.4. Equipment and infrastructure put in place to support the adherence to COVID-19 prevention protocols

The availability of essential infection prevention control(IPC) logistics together with targeted behaviour change communication is vital to reducing the risk of COVID-19 transmission in the treatment centres (Ashinyo et al., 2021). In Ghana, there have been legal instructions and repeated calls by the president to managers of public places to ensure the provision of facilities to enable public adherence to hand hygiene and social distancing and to also ensure that all accessing their services are in face masks (*Update No.10: President Akufo-Addo Addresses the Nation - YouTube*, 2020; FULL TEXT: Akufo-Addo's 11th Address to the Nation on Measures to Fight Coronavirus, 2020; Address To The Nation By The President Of The Republic, Nana Addo Dankwa Akufo-Addo, On Updates To Ghana's Enhanced Response To The Coronavirus Pandemic, On Sunday, 3rd January 2021, 2020).

To support adherence to the COVID-19 prevention protocols, Ghana's President, in one of his addresses on COVID-19, instructed public establishments to ensure the supply of necessary resources and enforce the observance of these protocols by persons accessing the premises (The President of Ghana, 2020). These places include recreational centres, entities of the hospitality industry, marketplaces, and banks. They should observe enhanced hygiene procedures by providing, among others, hand sanitizers, running water, and soap for handwashing. Also, the Ministry of Transport should work with the transport unions and private and public transport

operators to ensure enhanced hygienic conditions in all vehicles and terminals by providing, amongst others, hand sanitizers, running water, and soap for handwashing (President of Ghana, 2020b).

Indeed, the condition for the reopening of religious gatherings was for them to ensure an adequate supply of logistics and ensure strict compliance with the COVID-19 protocols (Address To The Nation By The President Of The Republic, Nana Addo Dankwa Akufo-Addo, On Updates To Ghana's Enhanced Response To The Coronavirus Pandemic, On Sunday, 3rd January 2021, 2020).

A study by Dabi et al. (2021) revealed a 95% availability of handwashing apparatuses at entrances or receptions at hotels in the HO municipality and a provision of hand sanitizers at 95%. While the provision of handwashing apparatus had 100% compliance at local restaurants, with a 95% provision of hand sanitizers. But the provision of handwashing apparatus (80%), provision of sanitizers at vantage points (80%), at drinking bars.

A study by Bonful et al. (2020) to assess compliance with the COVID-19 infection prevention recommendation in selected transport stations in Ghana revealed the majority (80%) of 36 stations in Accra have at least one veronica bucket with flowing water and soap, but the number of washing places at each station was not adequate, while almost all stations (93%) did not have alcohol-based hand sanitizers for public use. The functioning of these hand washing stations will demand increased volumes of water usage(Rahman Zuthi et al., 2022). The free supply of water to the populace by the state, even though it was largely geared towards economic mitigation, was timely and should have an impact on hand hygiene(Address To The Nation By President Akufo-Addo On Updates To Ghana's Enhanced Response To The Coronavirus Pandemic - The Presidency, Republic of Ghana, 2020).

2.5. Knowledge, Attitude, and Practices Towards COVID-19 Prevention Protocols

The KAP model has remained one of the key theories in health-related behaviour research in several fields (Green et al., 2015). It has been built on the assertion that knowledge alone is not enough to cause the desired behaviour and will require tailored communication that registers positive perceptions in the minds of the target group compelling enough to elicit the desired behaviour (Ashinyo et al., 2021; Green et al., 2015). According to Szymona-Pałkowska et al. (2016) adequate and appropriate knowledge, attitude, and practice are key in public health regarding health prevention and promotion. Improving the community's knowledge and positive attitude toward COVID-19 prevention protocols to help them adopt them is therefore the basic way to prevent COVID-19 infection (Olum et al., 2020).

Knowing the knowledge level of a target group on COVID-19 is crucial as it enables the identification and subsequent addressing of knowledge gaps to elicit positive attitudes (Ashinyo et al., 2021; Bakanauskas et al., 2020). According to Iqbal and Younas, one's perception can influence one's knowledge (Iqbal & Younas, 2021) while according to Haftom et al (2020) and Zhu and Colleagues (2015), one's knowledge can be influenced by misinformation and beliefs(Haftom et al., 2020; Zhu & Xie, 2015), while Ferdous et al. (2020) say knowledge is influenced by access to information and health education. The outbreak itself, perhaps by its weight on human life, was also found to motivate knowledge gain(Rahman Zuthi et al., 2022).

A study by P & J (2020) evaluating factors influencing adherence to recommended COVID-19 prevention measures in Siaga, Kenya among small-scale retailers revealed low levels of KAP where only 12.2% had good knowledge, only 7% had a good attitude, and 14.4% had the desired practices towards the fight against COVID-19. However, there was appreciable knowledge of COVID-19 protocols (100%) at hotels, local restaurants, and drinking bars according to a study by

Dabi et al (2021), and 83.2% of knowledge according to Tawiah et al (2021) in a study on socio-demographic factors associated with people's knowledge, their attitude, as well as their practices for the prevention of COVID-19 among Ghanaians, with 88.2% of positive attitude and 69.2% of good preventive practices. Also, a study by Iqbal & Younas (2021) evaluating the level of knowledge of the general public, their attitude, as well as their practices towards COVID-19 in Pakistan revealed an overall knowledge score of 73.7% whiles 74.5%, 68.8%, and 71% practiced social distance, mask-wearing, and hand sanitizer use, respectively. Another study by Zhong et al. (2020) on COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: A quick online cross-sectional survey reported high KAP levels with an overall correct rate of 90% knowledge, 96.4%, and 98.3% practicing social distance and mask-wearing respectively.

A study by Azene et al. (2020) which evaluated adherence levels and factors influencing them among Gondar city residents in North West Ethiopia towards COVID-19 mitigation measures reported an adequate knowledge prevalence of 50.7%, 57.5% favourable attitude toward COVID-19, and 52.2% favourable practices toward preventive measures similar to a study on knowledge, attitude and practices of healthcare workers regarding the use of face masks to limit the spread of the new coronavirus disease, which reported 56.4% knowledge on the wearing of a mask (Kumar et al., 2020). There was, however, a better level of knowledge, attitude, and practice reported in a study among university students in Vietnam in which health faculties had a majority of respondents reporting a higher (89.7%) level of good knowledge on face mask use, 72.8%, and 76.5% of positive attitude and good practice respectively (Duong et al., 2021). The difference seen here could be a result of the type of respondents, as university students are more likely to have access

to information compared to residents of a city, but for the healthcare workers, their failure to pay attention to prevailing information could be the reason.

Another study by Gao et al. (2020) revealed high KAP levels, knowledge of 91.2%, 98.0% positive attitude, and 96.8% good practice, and another study focusing on physical distancing behaviour among Africans also reported high knowledge of 85% (Bicalho et al., 2021). However, Okello et al. (2020) in their cross-sectional survey in Uganda, even though they also reported very high (93.9%) levels, revealed a low positive attitude prevalence of 51.3% and lower adherence of 48.3%. On the other hand, Natnael et al. (2021) reported a lower adequate knowledge prevalence of 69.8% compared to Okello et al. (2020). Their positive attitude and good practices on frequent hand hygiene among taxi drivers were better at 67.6% and 66.4%, respectively. An online study in China revealed 85.2%, 92.9% and 84.4% prevalence for good knowledge, good attitude and appropriate practices respectively(Yang et al., 2021), which reported better KAP levels compared to a study to assess knowledge, attitude and practices towards COVID-19 among adults in Bangladesh which revealed that overall, 61.2% had adequate knowledge, 78.9% had a positive attitude towards COVID-19 and only 51.6% had a good practice (Banik et al., 2020) likewise a study by Ferdous et al. (2020) on the COVID-19 outbreak in Bangladesh reported 48.3%, 62.3%, and 55.1% knowledge, positive attitude, and more frequent practices regarding COVID-19 prevention, respectively. However, there were equally good levels reported in a study by Azlan et al. (2020) on public knowledge, attitude, and practices towards COVID-19: A cross-sectional study in Malaysia which reported an 80.5%, 83.1%, 83.4%, and 87.8% overall correct rate of knowledge, positive attitude, social distance practice, and hand hygiene, respectively. The Practice of face mask wearing was, however, low (51.2%).

2.6. Adherence to COVID-19 Prevention Protocols

Understanding the level of adherence to and satisfaction with personal preventive measures is essential for the containment of the COVID-19 epidemic in the long term (Amodan et al., 2020). Adherence to public health instructions for COVID-19 is important for controlling the transmission and the pandemic's health and economic impact. Understanding the characteristics of people who do not comply with COVID-19-related public health measures is essential for developing effective public health campaigns in the current and future pandemics (Nzaji et al., 2020).

A cross-sectional study evaluating the effectiveness of these preventive measures found adherence to these measures to offer protection(Talic et al., 2021; Youssef et al., 2022).

Hand hygiene is considered an effective measure to prevent and control the spread of diseases (WHO, 2009; Assab & Temime, 2016). Both alcohol-based hand rubs and handwashing with soap and water are critical approaches to preventing and controlling healthcare-associated infections that are effective in combating enveloped viruses like Ebola and coronaviruses (Adhikari et al., 2020).

Hand hygiene seems to have risen as the pandemic progressed where early studies reported lower adherence compared to later studies even though the settings of the studies brought a lot of variances. Some studies reported a universal (95% or more) prevalence of handwashing (Amodan et al., 2020; Faria de Moura Villela et al., 2021; Shewale et al., 2021), and one reported 93% (Afful et al., 2020). One study assessing non-adherence reported as high as 91.3% non-adherence(Fielmua et al., 2021). A lower adherence level has been reported in previous studies for hand sanitization. 94.8% of people use alcohol-based hand sanitizers in a study in Ghana (Afful et

al., 2020), 77% adherence was reported in a study in India (Shewale et al., 2021), and 74.5% was reported by Saab and colleagues (Saab & Domiati, 2021). Apanga & Kumbeni (2021) reported hand washing /sanitization rates of 31.7%.

Enforcement of preventive measures, such as wearing a mask, prevents the spraying of droplets and their inhalation, thereby reducing transmission. In the United State of America(USA), enforcement of mask use and other preventive measures reduced cases by 75% in about a month (CDC, 2021; Gandhi & Marr, 2021). Studies assessing mask use reported mixed results. While some studies reported good adherence levels of more than 80% (Afful et al., 2020; Dabi et al., 2021; Tong et al., 2020), Block et al.(2020) reported an intermediate level of 65% and others reported poor adherence of less than 50% (Amodan et al., 2020; Apanga & Kumbeni, 2021; Faria de Moura Villela et al., 2021).

According to Durante et al. (2021), observing physical distancing has the potential to reduce COVID-19 cases by 60%. A physical distance of not less than 1 meter apart is recommended (Jones et al., 2020). However, Tan et al. (2021) assert that social or physical distancing is a costly activity for Christians, which might be a stumbling block to it being adhered to in churches. Previous studies reported varying adherence levels, with Shewale et al.(2021) reporting good coverage of 81%. Block et al. (2020) reported an intermediary coverage of 67%, while other studies reported poor coverage ranging from 22%- 49.2% (Afful et al., 2020; Apanga & Kumbeni, 2021).

Studies that assessed overall adherence to the recommended protocols among the general public also reported varying results. Azene et al. (2020) reported the highest adherence of 51%, Yehualashet et al. (2021) reported 44.1%, and Abeya et al. (2021) reported as low as 8.3%.

2.7. Determinants of Adherence to COVID-19 Prevention Protocols

Public adherence to COVID-19, prevention protocols is key as a measure to control it and adherence is affected by one's knowledge, attitude, and practice toward COVID-19 (Ferdous et al., 2020).

Public knowledge, attitude and practices toward a disease are likely to influence adherence, and public knowledge is important in tackling pandemics (Chirwa, 2020). Also, assessing people's knowledge, attitudes, and practices towards the COVID-19 virus deepens insights into determinants of adherence to COVID-19 prevention and control guidelines (P & J, 2020).

According to Amodan et al. (2020), those who obtained COVID-19 information from healthcare workers and from village leaders or those who were worried about their health were likely to adhere to the preventive measures positively, while staying with siblings reduced the odds of high adherence. Satisfaction with preventive measures was also associated with increased adherence. Also, many Africans did not wear masks because it was uncomfortable or because they did not even think that it was necessary (Ahmed et al., 2020). However, more sensitization regarding the importance of face mask use in containing the COVID-19 pandemic is needed, as well as subsidies and free masks for those who may not be able to afford them (Amodan et al., 2020).

According to a study by Apanga & Kumbeni(2021), knowledge of COVID-19 symptoms and transmission via contaminated surfaces and objects was associated with wearing a face mask. Pregnant women who knew that avoiding the touching of eyes, nose, and mouth could prevent COVID-19 and knowledge of the virus being transmitted via contaminated objects and surfaces were associated with handwashing and hand sanitizing, whiles knowledge of COVID-19 transmission via contaminated surfaces and objects was also associated with social distancing.

They stated that knowledge of COVID-19 symptoms, transmission, and preventive measures may play an important role in the practice of preventive measures against COVID-19 among pregnant women. Other studies find that people with adequate knowledge are more likely to adhere than those with poor knowledge (Nzaji et al., 2020; Yehualashet et al., 2021). However, other studies did not find an association between knowledge and adherence (Bante et al., 2021). This could be due to dilution by the infodemics of COVID-19 (García-saisó et al., 2021; Global Infectious Hazard Preparedness & WHO, 2021).

A study by Nzaji and colleagues outlined that non-respect of public health measures for COVID-19 can be predicted by never studied, primary education level, unemployed status, female gender of head of households, not attending lectures/discussions about COVID-19, not being satisfied with the measures taken by the ministry of health, not being regularly informed about the pandemic, and bad knowledge about COVID-19 (Nzaji et al., 2020). But Faria de Moura Villela et al (2021) revealed older age, being female, having at least an undergraduate degree, being a health worker, having comorbidities, not living in a rural area/village, not being a student, not working in the private sector, and not smoking as factors independently associated with higher overall adherence. Whereas other studies suggest that sex, level of information exposure, attitude towards COVID-19 preventive measures, and risk perception of COVID-19 were risk factors which significantly influenced the adherence of the community towards COVID-19 mitigation measures. Some studies also reported that people's occupations or employment status influenced their adherence (Abeya et al., 2021).

2.8. Methods in COVID-19 Implementation Research

Amidst the pandemic, the Government of Ghana following the recommendations from the World Health Organization decreed that all churches are required to fully implement the preventive and control measures to be able to operate(WHO, 2020k). Each of these preventive control measures had standards to follow to ensure efficiency and effectiveness(WHO, 2021c). This study sought to assess compliance with the President of Ghana directive which demanded that, churches should ensure the availability and access to needed resources for congregants to support adherence, the proportion of congregants adopting it and dose practice measured by adherence to these measures. By measuring the fidelity, reach and dose recommended practices, this could be viewed as a process evaluation(Dixon & Bamberger, 2022), but, can also fit into implementation research. KAP studies formed part of the WHO-recommended process evaluation(WHO, 2021b).

While a mix of both qualitative and quantitative method are usually recommended for these type of studies(Limbani et al., 2019; MEASURE Evaluation, 2012; Schneider et al., 2009), it is not uncommon to see one of them being used(Scott et al., 2019). A review of studies reveals that while few studies employed mixed methods(Supriyati et al., 2022), the majority of studies assessing KAP on COVID-19 prevention and control measures employed quantitative methods (Abd Elhameed Ali et al., 2021; Abeya et al., 2021; Ahmadi et al., 2022; Ahmed et al., 2020; Apanga & Kumbeni, 2021; Bante et al., 2021; Kanligi et al., 2022). While the reason for the over preference for quantitative is not immediately known, the ease associated with the analysis, questionnaire administration, possibility of self-administration and above all the objectivity of their findings as well as the ability to obtain representative findings for generalization could be accounting for this. All the studies reviewed used a cross-sectional study design with either a structured questionnaire or interview guide(Abd Elhameed Ali et al., 2021; Abeya et al., 2021;

Ahmadi et al., 2022; Ahmed et al., 2020; Apanga & Kumbeni, 2021; Bante et al., 2021; Datta, 2004; Herbert et al., 2022; Kanligi et al., 2022; Kasemy et al., 2020). According to USAID, the KAP surveys are methodological quantitative but relevant questions could be (USAID, 2011).

CHAPTER THREE

METHODS

3.1. Introduction

This section describes how the research was conducted from start to finish. It defined the target population, the sampling process, the sample size, the variables, the indicators of the research, the instrument for data collection, data management and evaluation, and ethical issues.

3.2. Research design

This is a cross-sectional study involving quantitative methods to evaluate adherence to COVID-19 prevention protocols and the factors associated with adherence among church members in Bolgatanga Municipality. A cross-sectional study design was used because it is most appropriate in addressing the study objectives. The study was carried out in churches through face-to-face interviews led by the researcher using a structured questionnaire and personal observation using an observational checklist at the Bolgatanga Municipality.

3.3. Study area

The study was carried out in selected churches in the Bolgatanga municipality. The municipality is the capital of 15 districts of the Upper East region. It can be found between latitudes 10°30' and 10°50' North and longitudes 0°30' and 1°00' West with an area of 326 km². It is one of the most densely populated districts in the region with a population density of 394.2/km²(City Population, 2020). According to the Municipal Health Directorate, the municipality had a population of 130,091 based on the 2021 projected population. Also, according to the 2010 population and housing census, Christianity formed the dominant religion (57.6%) of all religious affiliations in the municipality, with 35.2%, 13.8%, and 5.3% being the Catholic population, Pentecostal/Charismatic population, and Protestant population, respectively, representing a total

percentage of 54.4% of the three denominations. Based on 57.6% of the 2021 population, the Christian population is 74933.

The people are mainly peasant farmers, with few farming vegetables like tomatoes in commercial quantities during the tomato farming season. A handful of the women also deal in basketry, and this accounts for as much as 57% of the labour force; trade and commerce account for 19%, manufacturing (mainly handicrafts) 11.92%, community and social services 7.4%, and others like mining, construction, and utility services. Bolgatanga Municipality has the second highest burden of COVID-19 cases in the Upper East Region. The municipality since the onset of the pandemic has recorded 605 confirmed cases, representing 39.51% of all cases in the region (Ghana Health Service Upper East Region, 2021) as at December 26, 2021, and also recorded 20 new cases, which is about 60.71% of the total new cases in the Upper East Region.

3.4. Study population

The study had two categories of population: church members and churches in the Bolgatanga municipal. The study population included people aged 18 and above, both sexes, worshipping in the following denominations in the Bolgatanga Municipality: The St. Cyprian's Anglican Church, The Church of Pentecost, Ebenezer Methodist Church, Assemblies of God Ghana, Presbyterian Church of Ghana, and the Catholic Church. The churches were chosen because most people within the region tend to congregate more in higher numbers and for longer hours, a situation which exposes them to the risk of COVID-19.

3.5. Inclusion and exclusion criteria

The following inclusion criteria were used:

1. Only individuals attending the selected churches within the Municipality were included in the study.
2. Church attendees 18 years and above who were of sound mind were included in the study.
3. Those who did not consent to the study were excluded
4. Churches within the Bolgatanga Municipality that were initially selected but permission was not granted were excluded.

3.6. Definition of study variables

According to Vitolins and colleagues, gold standards for defining adherence do not exist, but what will be termed satisfactory or appropriate adherence depends on the situation (Vitolins et al., 2000). Most studies assessing adherence to COVID-19 among the general public employed Likert scales with either 4 or 5 ranked options ("never," "..., always"), with the last two options often used as points for defining adherence (Amodan et al., 2020; van Loenhout et al., 2021).

The main dependent variable used in this study was adherence to COVID-19, which was uniquely defined and measured in this study. A worshipper was classified as having adhered if he/she consistently observed all four recommended protocols for the past five (5) major worship sessions, and this is an operational definition for this study. Emphasis was placed on observing all four (4) protocols based on the fact that masking and physical/social distancing were mandatory per both the WHO recommendations and Ghana government directives for the resumption of religious activities and the fact that higher benefits would be derived if handwashing and use of hand sanitizers were complementary rather than substitutionary. Consistency was also emphasized here because any breakage in observation of any of the protocols could expose the entire congregation

to the SARS-CoV-2 infection. A major worship session was defined as Saturday worship for those whose Sabbath fell on that day, and Sunday worship for everyone else. According to Kjellsson et al.(2014), five (5) major worship sessions implied a recall period of 35 days, yielding a recall accuracy of 98.4%. This was preferable since it provokes thorough reflection than just seeking simple rank orders like never, sometimes, often, as used in other studies etc. All other variables used in this study are defined in table 3.1 below.

Table 1: Definition of variables used in this study

VARIABLE NAME	TYPE OF VARIABLE	OPERATIONAL DEFINITION	SCALE OF MEASUREMENT
Age groups	Independent	Age into 10 years at the time of data collection	Ordinal
Sex	Independent	Sex of the respondent	Binary
District of residence	Independent	District of residence of the respondent	Nominal
Type of residence	Independent	Type of residence of the respondent	Nominal
Educational status	Independent	Having formal education	Ordinal
Employment status	Independent	Whether the respondent is employed	Binary
Type of employment	Independent	The type of employment of the respondent	Nominal
Denomination	Independent	The category of the church that each respondent attends, catholic church, protestant, Pentecostal and others	Nominal

Level of adherence	Dependent	A number of times out of 5 previous worship sessions a respondent observed the protocols; hand washing, use of hand sanitizers, wearing of face mask and observing physical distance	Continuous, ordinal
Level of knowledge	Independent	Knowledge of respondents on COVID-19 prevention protocols: hand washing, use of hand sanitizers, wearing of face mask and observing physical distance	Ordinal (quintiles)
Level of attitude	Independent	The respondent stands/thought on adherence to the recommended protocols: hand washing, use of hand sanitizers, wearing of face mask and observing physical distance	Ordinal
Practice of COVID-19 protocols	Independent	At least one-time practice of the protocols: hand washing, use of hand sanitizers, wearing of face mask and observing physical distance	Binary
Availability of equipment and infrastructure needed to practice the protocols	Independent	Availability of water and soap, hand sanitizer, face mask, health education and sitting arrangement in the church to ensure physical distance is observed	Ordinal
Access to equipment and infrastructure needed to practice the protocols	Independent	Access water and soap, hand sanitizer, face mask, health education and sitting arrangement in the church to ensure physical distance is observed	Ordinal

Knowledge on computer	Independent	able to use a computer including a smartphone to search for information online	Binary
English literacy	Independent	Ability to speak and understand English	Binary

3.7. Sample size determination:

A. Determination of the Sample Size of Christians was calculated using Taro Yamane's 1967 formula

as; $n = \frac{N}{(1+Ne^2)}$

Where,

n=sample size (Christians)

N= Total population of Christians under study =74933

E= Margin of error = 0.05

$$n = \frac{74933}{(1 + 74933(0.05^2)}$$

n=398

But allowing for a 10% loss and rounding up lower decimals to obtain full human beings after distribution for each denomination, the sample increased to 439.

B. Determination of the number of churches to use

In all, the researcher was able to identify 36 churches based on available information and approached the leadership for permission to conduct the study. The leadership of 33 churches granted the researcher permission and were included, while the leadership of the remaining three (3) churches refused and were excluded.

C. Determination of the sample size of church members under each category (denomination)

The sample size of 438 was distributed to the denominations by proportion to size based on the 2010 denomination distribution of these three denominations. This was also to ensure a fair representation of the entire Christian population.

Catholics

Sample size for catholic $= \frac{percentage\ of\ catholics}{total\ percentage\ of\ 3\ denominations} \times sample\ size = \frac{35.2}{54.3} \times 438 = 284$

After cleaning sample size =271

Protestants

Sample size for protestant $= \frac{percentage\ of\ Protestants}{total\ percentage\ of\ 3\ denominations} \times sample\ size = \frac{5.3}{54.3} \times 438 = 43$

Pentecostals/Charismatics

Sample size for Pentecostal $= \frac{percentage\ of\ Pentecostal/charismatics}{total\ percentage\ of\ 3\ denominations} \times sample\ size = \frac{13.8}{54.3} \times 438 = 112$

3.8. Sampling methods and procedures

Stratified Simple random sampling was deployed in this study. Firstly, churches were grouped according to denominations: Catholic, Pentecostal/charismatic, and Protestant, which formed the first strata, as categorized in the 2010 population and housing census. Using the numerical strength of each denomination as a basis, the sample for the study (number of church members) of 439 was distributed proportionately among the denominations (stratum) as follows: Catholic = 284; Pentecostal/charismatic = 112; protestant = 43. The number of respondents assigned to each denomination (stratum) was also distributed proportionately to size among the churches selected from that stratum. In each church, the list of members was obtained, and church members' names were then extracted from the list of inclusion and assigned a number. Simple random sampling was used to select respondents in each church until the number required in each church was obtained by generating random numbers within the size of each congregation using the "RANDBETWEEN" formulae in excel. Based on the generated numbers, the respondents who were assigned similar numbers to the computer-generated numbers were selected for the study.

3.9. Data collection

Data were collected via face-to-face administration of a structured questionnaire based on self-report by the respondent, and observation of the availability of basic facilities for implementation of COVID-19 protocols was done using an observational checklist. Six(6) field assistants supported the face-to-face administration of the questionnaires. Both the checklist and the structured questionnaire were designed with the Kobocollect application installed on android phones. The questionnaire had five (5) sections. Section 1 consisted of socio-demographic characteristics; section 2 on accessibility to available equipment and infrastructure necessary for

protocol implementation; section 3 on the KAP on prevention protocol; section 4 on level of adherence to COVID-19 prevention protocols; and section 5 on determinants of adherence to the protocols. The questionnaire was administered in English and Gurune.

Data were collected from all 439 respondents, giving a response rate of 100%, of which 13 respondents' data sets which had irreparable missing data were deleted, leaving 426 cases for analysis. Also, out of an estimated number of 36 churches, only 33 granted permission for the study.

Below is a table with details of the churches used for the study

Table 2:Churches studies

CHURCHES	DENOMINATION CATEGORY
Sacred Heart Cathederal Parish	Catholic
Yikene outstation	
Our Lady of Africa parish	
Kalbeo outstation	
Sherigu outstation	
Holy Spirit Outstation	
St. Kizito Outstation	
Christ The King outstation	
ST. Joseph parish	
Yebongo outstation	
Sumbrungu outstation	
Yariga-Akasore outstation	
Yorobiisi outstation	
Miracle centre (kugadone) congregation	Pentecostal /Charismatic (Assemblies of God Ghana
Victory (Pubaka) Congregation	
Revelation (Sangardens congregation	
Centuory of Glory (Kalbeo) congregation	
Holy ghost temple congregation	
Redemption centre congregation	

Madanator(Anatim-Tankwidi) congregation	
Bolga District congregation	Pentecostal /Charismatic (Church of Pentcost)
Estate District congregation	
Pentecost internation Worship centre congregation	
Bukere congregation	
Sumbrungu congregation	
Dorungu congregation	
The St. Cyprian's Anglican Church	Protestant (The St. Cyprian's Anglican Church)
Ebenezer Methodist Church Bolga congregation	Protestant (Methodist Churches)
Nyorkoko congregation	
Yikene NO.1 congregation	
Presbyterian church Bolga congregation	Protestant (Presbyterian Church of Ghana)
Yorogo congregation	
Yipaala(Famous) congregation	

3.10. Quality control

To ensure quality, only six(6) people who were well-versed in Kobocollect and had knowledge of the use of Android phones were hired, trained, and supported in collecting the data. After designing the data collection tool, it was pretested at Bolga East District, a district that was carved out of Bolgatanga Municipality and shares boundaries with the study area (Bolgatanga Municipality) and all necessary corrections were made before the real data collection process began. Data debriefing sessions were held regularly with data collectors to ensure quality and sufficient data were collected and analyzed.

3.11. Data processing and analysis

Data were first downloaded into Microsoft Excel and the necessary cleaning was done using Excel. SPSS version 25 software was used for the analysis. Descriptive statistics were carried out on the socio-demographic data and also used to measure objectives one (1), two (2), and three. Relative frequency analysis was carried out throughout to describe the size of each category or choice or option of variable after categorizing all continuous variables. The proportions of churches observed as well as the proportion of respondents who reported having access to recommended resources were used to assess the availability of recommended resources. KAP was measured by the proportion of respondents with knowledge of COVID-19 prevention protocols, falling into each category of personal feeling or opinion about the protocols and having carried out the protocols. Bloom's cut-off point of 80% and above was used to categorize the KAP level as "good"(Faria de Moura Villela et al., 2021; Kaliyaperumal, 2004; Jones et al., 2020). The level of adherence was measured by the proportion of respondents who consistently observed all the protocols for the past five Sundays. Chi-square and binary logistics (both bivariate and multivariate) regression analysis were used to identify determinants and their level of influence on adherence.

3.12. Ethical consideration

Ethical clearance was sought from the Ghana Health Service Ethics Review committee with approval number GHS-ERS 033/06/21 and based on their approval, the researcher proceeded with the study.

-Inform consent

Formal permission was obtained from the heads of the various churches before the study started. Informed consent was also obtained from the participants. Each participant was made to read or

read and interpreted in language that they understand the information sheet. Participants were then allowed to ask for clarification. They were then made to sign or thumbprint a consent form indicating their willingness to participate in the study.

-Privacy and confidentiality

Data collected from the study were used for the purpose for which it was collected. To ensure confidentiality, codes were used to identify participants instead of names. Data were also kept under lock and key to avoid access by unauthorized people. Members of the research team were also trained properly and advised to be responsive and respect all participants that were included in the study.

CHAPTER FOUR

MONITORING AND EVALUATION ISSUES OF THE STUDY

4.1. Introduction

Monitoring and evaluation are essential in guiding the implementation of any health intervention to achieve its aims or objective and consequently its goal. The three types of evaluation are the process, outcome or impact. Effective Monitoring and evaluation recommend the used of an appropriate approach or model. One of the popular models in health intervention evaluation is the logic model. The logic model and conceptual framework were used in this study. The element of the logic model includes the inputs, activities, output, outcome and goal. In this study inputs were assessed by the Availability of infrastructure needed to adhere to COVID-19 prevention protocols, outputs were assessed by access to these resources or infrastructure, outcome by the KAP as well as adherence to these protocols.

4.2. The Goal of Covid-19 Prevention Protocols

Target 3.4 of the Sustainable Development Goals demands the World authorities to act to protect lives and health in other to ensure the wellbeing of people amid pandemics(United Nations, 2019). The declaration of COVID-19 as a disease of public health concern meant the world needed to identify and implement all appropriate response measures in attempts to combat the pandemic (WHO, 2020l, 2020g). In the absence of a vaccine, the WHO, as an immediate effort, recommended hand hygiene, physical distancing, cough etiquette, avoidance of touching one's face, and the rational use of personal protective equipment in community settings (WHO, 2020m, 2020j). These protocols, even though WHO was hesitant with some of them, evidence later backed them, therefore, compliance to was crucial in the prevention and control of the pandemic.

4.2.1. Face Mask Wearing

Despite the WHO's initial reluctance to endorse the use of face masks, the world health organization eventually issued a directive for the rational use of masking-up in community settings (WHO, 2020m). evidence later backed the effectiveness of masking up in the prevention and control of the pandemic(Talic et al., 2021; Wang et al., 2021)Food vendors and sellers at markets, commercial vehicle drivers and attendants, commuters on public transportation, and people in public and commercial centres, facilities, and buildings, including but not limited to offices, bars, workshops, restaurants, sports arenas, salons, shopping malls, churches, clinics, and hospitals, and all facilities accessible to the public, whether private or public, were initially targeted in Ghana (MOH Ghana, 2020). Procedures for wearing and removing a mask include

- Carry out effective hand hygiene before donning the mask.
- A donned mask must cover one's mouth and nose and chin.
- Desist from touching the donned mask to avoid contaminating your hands.
- Efforts should be made not to touch the front part of the mask during removal.

How to change and dispose of a mask,

- A mask must not be worn for more than 12 hours.
- A damp or soiled mask should be changed immediately.
- Re-useable masks should be shocked in soap or bleach-lathered water immediately after removal for at least 5 minutes before washing and drying for reuse.
- A mask meant for single use should never be re-used. Also, N95 masks should not be used more than 3 times.

- All used masks should be disposed of in a closed bin for onward processing or be burnt in a safe environment. Hands must also be washed immediately after disposal of the mask(MOH Ghana, 2020).

4.2.2. Physical Distancing

This refers to all measures aimed at keeping infectious and susceptible people at least 1 meter apart to reduce the risk of transmission of COVID-19 (WHO, 2020c). Since it is difficult to differentiate between the infectious and the susceptible, it is required that everyone maintain a 1-meter distance in all instances, most especially in public spaces. Measures are usually implemented to promote the observance of this protocol, including lockdowns, proscription of mass gatherings, including religious ones, work from home, and takeaway transactions in the food industry, among others (Bicalho et al., 2021; Jones et al., 2020; WHO, 2020c).

4.2.3. Hand Hygiene

This includes all measures that prevent the picking of germs, including the COVID virus from all contaminated surfaces and the transfer of them to the mucous membranes of susceptible hosts for the prevention and control of infectious diseases (WHO/UNICEF, 2021). This can be achieved by regular washing of hands and /or regular use of hand sanitizers containing at least 70% alcohol-based (WHO/UNICEF, 2021). Hand hygiene is so critical in the fight against COVID-19 that the Ghana government issued a directive requiring public places and service providers such as financial institutions, recreational centres, shopping centres, transport providers, and hospitality facilities to provide logistics and ensure hand hygiene observance during their usage. The Ministry of Local Government and Rural Development and its decentralized establishments were mandated to also enforce this directive at marketplaces (Address To The Nation By The President Of The

Republic, Nana Addo Dankwa Akufo-Addo, On Updates To Ghana's Enhanced Response To The Coronavirus Pandemic, On Sunday, 3rd January 2021, 2020).

4.3. Practical Considerations and Recommendations for Religious Leaders and Faith-Based Communities in The Context of Covid-19

Leaders of religious bodies and faith-based organizations should only hold gatherings after paying attention to the following conditions:

- Participants at such gatherings should maintain at least a meter distance apart throughout the meeting period.
- Participants can avoid physical contact with possible contaminated religious objects during the performance of rites.
- Ensure hygiene practice, especially regular hand hygiene, among participants throughout the gathering period. This can be achieved by providing hygiene facilities and logistics as well as enforcing their usage.
- Carry out regular disinfection of the church, including all surfaces of the worship (WHO, 2020k).

4.4. The objective /Outcome Variables.

The directive by the President of the republic of Ghana demanded strict adherence to these preventive protocols before the resumption of church services. This implied 100% adherence in both numbers and recommended steps to the protocols(President of Ghana, 2020a). Despite this directive by the president being a decree and therefore punishable, adequate knowledge and information that brought about a positive attitude was necessary for practice and possibly

adhering to these protocols. The KAP was therefore seen as preceding outcomes to the ultimate outcome measured by adherence.

4.5. Output measurement

In this study, the output variable measured was access to recommended facilities and logistics necessary for the adoption and adherence to the recommended protocols during worship. This was measured by asking respondents to report on whether they have access to these facilities and logistics or not.

4.6. Inputs

The president of Ghana particularly demanded the religious authorities to ensure the continuous supply of resources to enable congregants to comply with protocols. The availability of these recommended facilities during worship was measured as an input variable by observing them.

4.7. Type of Evaluation

The study is a process evaluation of the implementation of COVID-19 prevention protocols in the quest to curb the COVID-19 pandemic. It seeks to assess if church members adhere to the COVID-19 prevention protocols during worship sessions.

Table 3:Definition of indicators

Indicators	Numerator	Denominator	Indicator description
Proportion of churches with hand sanitizers available	Number of churches with hand sanitizer	Total number of churches assessed	Churches with hand sanitizers available to aid in adherence to COVID-19 prevention protocols out of a lot of churches assessed
Proportion of churches with available facilities to support	Number of churches with facilities to support physical distance	Total number of churches assessed	churches with siting arrangements to aid in the physical distance out of a lot of churches assessed

physical distance			
Proportion of churches with available hand washing facilities	Number of churches with available hand washing facilities	Total number of churches assessed	churches with water and soap to aid in hand washing out of a lot of churches assessed
Proportion of churches with face masks available	Number of churches with face mask	Total number of churches assessed	churches with face masks available to aid members in wearing masks out of a lot of churches assessed
Proportion of respondents who had access to face masks	Number of church members(respondents) who had access to face mask	The total number of church members assessed	Church members who had access to face masks out of a lot of church members interviewed
Proportion of respondents who had access to a hand washing facility	Number of respondents who had access to hand washing facility	The total number of church members assessed	Church members who had access to a hand-washing facility out of a lot of church members interviewed
Proportion of respondents who had access to hand sanitizers	Number of respondents who had access to hand sanitizers	The total number of church members assessed	Church members who had access to hand sanitizers, out of a lot of church members interviewed
Proportion of respondents who had access to facilities to support physical distance	Number of respondents who had access to facilities to support physical distance	The total number of church members assessed	Church members who had access to facilities to support physical distance out of a lot of church members interviewed
Proportion of respondents who had good knowledge of the COVID-19	Number of respondents who had good knowledge of the COVID-19 prevention protocols	The total number of church members assessed	Church members who had Knowledge of COVID-19 prevention protocols: hand washing, use of hand sanitizers, wearing of face mask and observing physical distance out

19 prevention protocols			of a lot of church members interviewed
Proportion of respondents who had a good attitude towards COVID-19 prevention protocols	Number of respondents who had a good attitude towards the COVID-19 prevention protocols	The total number of church members assessed	Church members' stands/thoughts on adherence to the recommended protocols: hand washing, use of hand sanitizers, wearing of face mask and observing physical distance out of a lot of church members interviewed
Proportion of respondents who practiced COVID-19 prevention protocols	Number of respondents who practiced the COVID-19 prevention protocols	The total number of church members assessed	Church members with at least one-time practice of the protocols: hand washing, use of hand sanitizers, wearing of face mask and observing physical distance out of a lot of church members interviewed
Proportion of respondents who adhered to COVID-19 prevention protocols	Number of respondents who adhered to the COVID-19 prevention protocols	The total number of church members assessed	Church members who practiced all, four protocols; hand washing, use of hand sanitizers, wearing of face mask and observing physical distance for all five past worship sessions out of a lot of church members interviewed

4.8. Conceptual Framework and Logic Model

The conceptual framework below is based on the KAP model, which was introduced by Nancy Schwartz in her article. Schwartz emphasized the importance of nurses having the necessary knowledge, attitude, and practice to provide better health care to their clients (Schwartz, 1976). Thus, KAP can also influence adherence to COVID-19 prevention protocols. One's knowledge of the COVID-19 prevention protocols can influence one's attitude, and attitude can influence practices towards the protocols. Also knowledge can influence adherence and one's attitude can

also influence adherence. The availability and access to equipment and infrastructure needed to adhere to the COVID-19 prevention protocols can also influence one getting access to the prevention protocols and access to the prevention protocols can influence one's adherence to the COVID-19 prevention protocols. The level of adherence to the protocols can affect the prevalence of COVID-19 and, subsequently, mortalities, but the researcher does not intend to measure that.

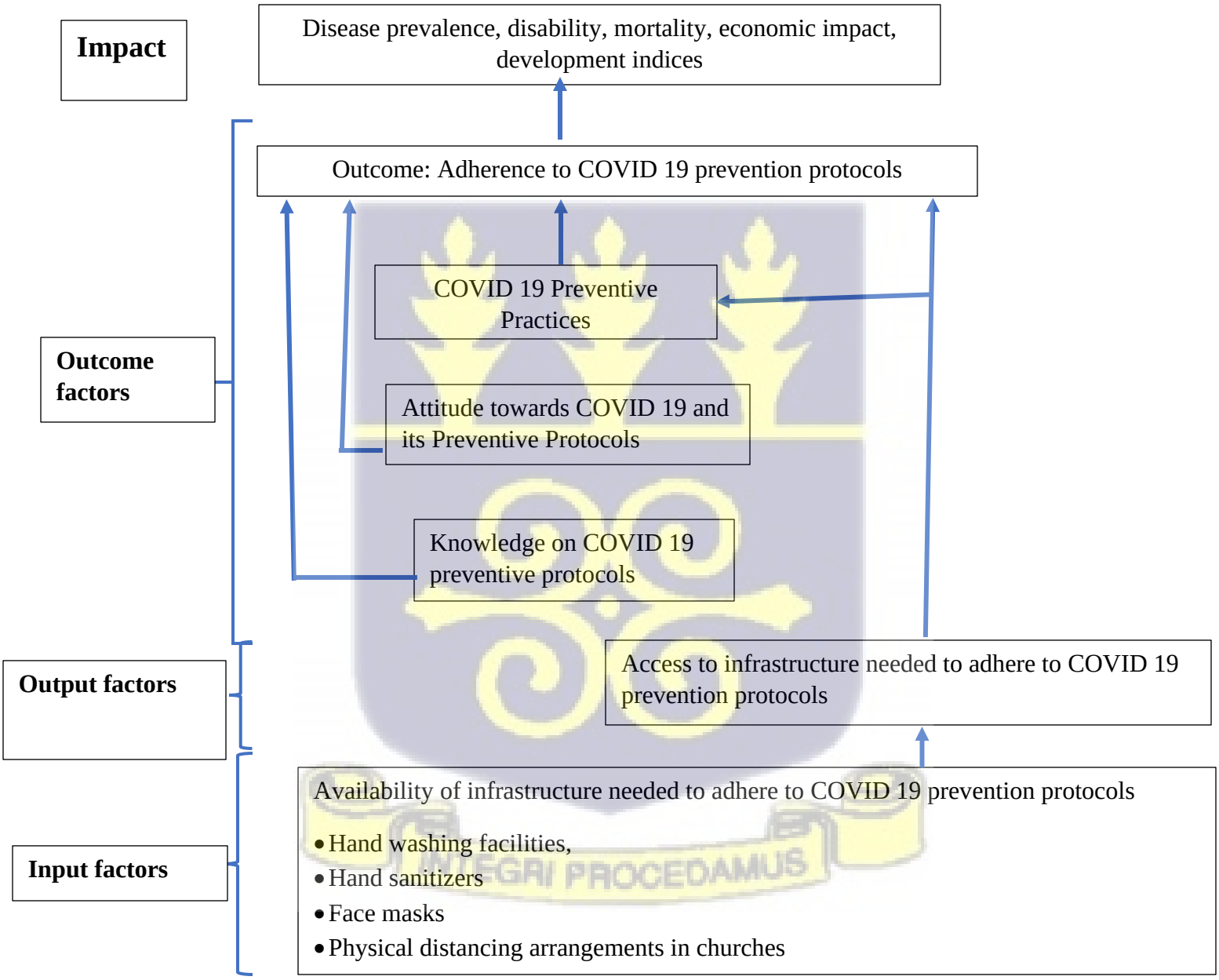

Figure 1:Conceptual Framework on adherence to COVID-19 prevention protocols

LOGIC MODEL ON ADHERENCE TO COVID-19 PREVENTION PROTOCOLS AMONG SELECTED CHURCHES IN BOLGATANGA MUNICIPALITY

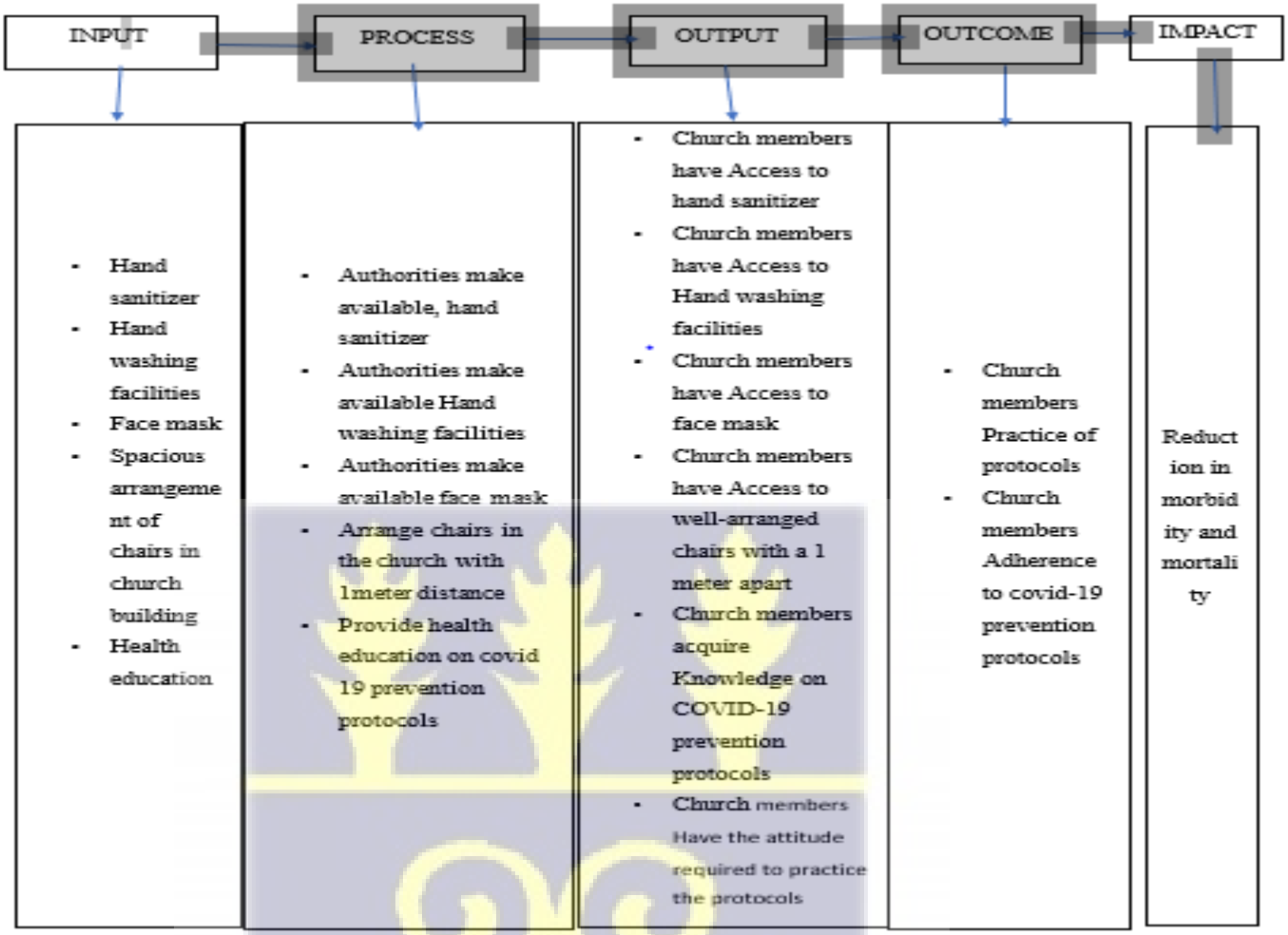

Figure 2: Logic model on adherence to covid-19 prevention protocols among selected churches in Bolgatanga Municipality

CHAPTER FIVE

RESULTS

5.5. Introduction

This chapter presents the results of the study, which sought to assess adherence to the implementation of the COVID-19 prevention protocols among selected churches in the Bolgatanga Municipality. It presents a descriptive analysis of the results on the sociodemographic variables of respondents, the availability and access to COVID-19 preventive facilities and arrangements, and the respondents' knowledge, attitude, practices, and adherence concerning the recommended COVID-19 control and prevention protocols in churches. Following that, inferential statistics on the association between these factors and adherence to COVID-19 prevention protocols in churches are presented.

5.6. Sociodemographic Characteristics of respondents

Table 4 showed that 86.4% of the respondents were residents of Bolgatanga municipality, 12.4% were from Bolgatanga East and only 1.2% were residents in other districts of the Upper East Region. Over half of the participants (54.9%) were within the 18-29 age group and only 4.5% of the age group was above 50 years of age. The findings also showed that 53.5% of the respondents were females and 88.3% could speak English. The highest (63.6%) religious denomination among respondents was Catholics, while Charismatic/Pentecostal and Protestants represented 26.3% and 10.1%, respectively.

Table 4:Demographic characteristics of respondents

Characteristics	Categories	Frequency	%
District of Residents	Bolgatanga Municipal	368	86.4
	Bolgatanga East	53	12.4
	Other Districts	5	1.2
Age group	18 – 29	231	54.9
	30 – 49	173	40.6
	≥50	19	4.5
Gender	Male	198	46.5
	Female	228	53.5
Spoken English	Does not Speak	50	11.7
	Speak	376	88.3
Employment status and Job Type	Unemployed	181	42.5
	Artisan	19	4.5
	Trading	101	23.7
	Public/Civil Servant	98	23.0
	Farming	21	4.9
	Others	6	1.4
Educational Status	No Form of Education	27	6.3
	Non-Formal	10	2.3
	Basic Education	90	21.1
	Second Cycle	132	31.0
	Tertiary	167	39.2
Ability to obtain information from the internet	Yes	340	79.8
	No	35	8.2
	Not Applicable	51	12.0
Denomination of Respondents	Catholicism	271	63.6
	Charismatic/Pentecostal	112	26.3

Protestants	43	10.1

With regards to the educational status of respondents, the majority (91.4%) of the respondents had some level of formal education, out of which 21.1%, 31.0% and 39.2% had basic education, Second cycle education, and tertiary education, respectively. Also, 6.3% of the respondents had no form of education and 2.3% had non-formal education. 79.8% of the respondents had the ability to obtain information from the internet, while 8.2% were not able.

OBJECTIVE 1: To assess the availability and access to facilities and infrastructure put in place to support the adherence to COVID-19 prevention protocols among church members in the Bolgatanga Municipality.

5.7. Availability of facilities and arrangements observed at churches

The survey showed that hand sanitizers were available in 97.0% of the churches visited on the day of the survey, as shown in **Table 5.** Also, 69.7% of the churches had Veronica buckets, 69.7% had face masks, 63.6% had seats arranged about 1 meter apart to ensure physical distancing, and 54.5% of the churches were observed to have arrangements put in place to ensure physical distance during movements and rites. All the churches had at least one form of hand hygiene resource. Worshipers with personal sanitizers were observed in 24 (72.7%) of the churches.

Among the catholic churches surveyed, it was revealed that all the churches had sanitizers for public use, 72.7% of the worshipers were observed to be using personal sanitizers on the day of the survey, 61.5% of the churches surveyed were observed to have masks for use during worship, 46.2% of the churches had seats or sitting arrangement made to ensure physical distancing and 53.8% of the churches had veronica buckets. As shown in **Table 5,** the availability and accessibility of resources and infrastructure to support adherence to COVID-19 safety protocols.

Table 5:Availability of COVID-19 preventive measures and facilities in churches(N=33)

Preventive Facility / Arrangement	**Number (%) of Churches with Facility**			**Total(N=33)**
	Catholic(N =13)	Protestants (N=7)	Pentecostal/ Charismatic(N=13)	
Type of facilities / Arrangement observed during the worship session				
Facemask for use during worship sessions	8 (61.5)	4(57.1)	11(84.6)	23 (69.7)
Hand sanitizer for sanitizing	13 (100)	7 (100)	12 (92.3)	32 (97.0)
Personal hand sanitizer	10 (76.9)	5 (71.4)	9 (69.2)	24 (72.7)
Seats or sitting arranged to ensure physical distancing	6 (46.2)	4 (57.1)	11 (84.6)	21 (63.6)
Veronica Buckets/hand washing	7 (53.8)	5 (71.4)	11 (84.6)	23 (69.7)
Any hand hygiene resources	13(100)	7(100)	13(100)	33(100)
Arrangements to ensure physical distance during movements and rites	6 (46.2)	4(57.1)	8(61.5)	18(54.5)

On the other hand, among the protestants, all 7 churches assessed had hand sanitizers available for use by church members with the least being Facemask for use during worship sessions (57.1%) and Seats or sitting arranged to ensure physical distancing (57.1%). The Pentecostal/ Charismatic churches were also observed to have put in significant measures to ensure adherence to COVID-19 safety protocols. For example, it was found that 92.3 % of the church's congregants had hand sanitizer. Among all the churches across the different religious denominations, the Pentecostal / Charismatic churches had the highest percentage (30.8%) of having all 6 facilities available to facilitate adherence to COVID-19 prevention protocol. The Protestants performed better in the area of 5 of the facilities being available with 30.85 and the Catholic churches only performed better in the area of 4 of the facilities being available with 38.5%.

5.4. Church members' access to services and facilities to support adherence to COVID-19 prevention protocols during worship

The study showed that about 413 (96.9) of the respondents had access to public sanitizer (sanitizer provided by the Church), 369 (86.6%) had access to handwashing facilities, 360 (84.5%) had personal hand sanitizers, 352 (82.6%) had access to face masks, 276 (64.8%) said sitting arrangements were made to ensure physical distancing and the least facility accessed by respondents was physical distancing during movement (56.8%). As shown in Table 6, there was near-universal access to one form of hand hygiene resource (handwashing facility or hand sanitizer).

Among Catholics, 261(96.3%) of respondents reported having access to hand sanitizer, 222(81.9%) had access to handwashing facilities, 216 (79.6%) had personal sanitizers, 206 (76.0%) had access to nose masks, 145 (53.5%) said they are able to observe physical distancing during activities involving movements and 143 (52.8%) reported sitting arrangement made to observe physical distancing. Among the 43 protestants, 42 (97.7%) reported having access sanitizers provided by the church and 38 (88.4%) had their personal sanitizers. 37 (86.0%) reported having access to handwashing facilities and face masks. 30 (69.8%) reported that sitting was arranged to ensure physical distancing and 18 (41.9%) reported they were able to maintain physical distancing during movement.

Table 6: Distribution of church members based on their access to COVID-19 prevention facilities by denomination (N=426)

Recommended Facilities / Arrangements	Denomination			Total(N=426)
	Catholicism(N=271)	Protestants(N=43)	Pentecostal / Charismatic (N=112)	
Hand Washing Facility	222 (81.9)	37 (86.0)	110 (98.2)	369 (86.6)
Public (provided by Church) Sanitizer	261 (96.3)	42 (97.7)	110 (98.2)	413 (96.9)
Personal hand sanitizer	216 (79.7)	38 (88.4)	106 (94.6)	360 (84.5)
Any hand hygiene resource	269(99.3)	43(100)	112(100)	422(99.5)
Physical Distancing During Movement	145 (53.5)	18 (41.9)	79 (70.5)	242 (56.8)
Physical Distancing Sitting	143 (52.8)	30 (69.8)	103 (92.0)	276 (64.8)
Face Mask	206 (76.0)	37 (86.0)	109 (97.3)	352 (82.6)

Having access to hand hygiene facilities was universal in all the denominations. Having access to a face mask (97.3%), Physical Distancing during sitting (92.0%) and movement (70.5%) was most common in Pentecostal/Charismatics churches followed by Protestants with 86% for face mask, 69.8% for physical distancing in sitting arrangement but 41.9% for physical distancing arrangement during processions. Catholic churches had the least arrangement to ensure physical distancing during sitting by second during movement. Details are shown in table 6 above.

Table 7: Number of recommended facilities and arrangements respondents reported having access to during worship sessions by Denominations

Total Number of items respondents had access to	Recorded Denomination [N (%)]			Total
	Protestant	Charismatic / Pentecostal	Catholicism	
1	0 (0)$_a$	0 (0)$_a$	7 (2.6)$_a$	7 (1.6)
2	3 (7.0)$_a$	3 (2.7)$_a$	14 (5.2)$_a$	20 (4.7)
3	5 (11.6)$_a$	2 (1.8)$_b$	53 (19.6)$_a$	60 (14.1)
4	8 (18.6)$_a$	5 (4.5)$_b$	61 (22.5)$_a$	74 (17.4)
5	13 (30.2)$_a$	27 (24.1)$_a$	61(22.5)$_a$	101 (23.7)
6	14 (32.6)$_a$	75 (67.0)$_b$	75 (27.7)$_a$	164 (38.5)

Total	43 (100)	112 (100)	271 (100)	426 (100)

The majority (38.5%) of the respondents had access to all six facilities, while 1.6% had access to just one (1) of the recommended facilities. Again, Pentecostal / Charismatic Churches had the highest proportion (67.0%) of worshipers reporting to have had access to all six facilities. Catholics had the least proportion (27.7%) of worshippers having access to all the recommended facilities. On the other hand, more (27.2%) Catholics had less or up to 3 facilities followed by Protestants.

OBJECTIVE 2: To assess the knowledge, attitude and practices of Church members towards COVID-19 prevention protocols

5.5. Knowledge, attitude and practices of Church members towards adherence to COVID-19 prevention protocols

5.5.1. Knowledge

As displayed in **Figure 3**, knowledge of each of the COVID-19 preventive protocols was quite high, with 97.7%, 97.4%, and 96.5% of the respondents having knowledge of regular hand sanitizing, regular use of masks, and regular handwashing respectively. Also, 89.7% and 75.5% had knowledge of observing physical distancing of at least 1 meter and avoidance of physical contact activities during worship sessions as recommended COVID-19 preventive protocols, respectively.

Overall, 65.3% of the respondents had good knowledge of 17 knowledge items of the COVID-19 preventive protocols they were assessed on. 62.9% of the respondents had good knowledge of 3 knowledge items of hand sanitization, 79.6% had good knowledge of 3 knowledge items of handwashing, 62.0% had good knowledge of 6 knowledge items on hand hygiene in general, which

is a composition of both hand washing and hand sanitization, 71.4% had good knowledge of 8 knowledge items on masking up and 33.6% had good knowledge of 3 knowledge items on physical distancing. It's all based on Bloom's Cut-off point for knowledge.

On how to effectively use the mask, 99.3% were aware of the need to ensure that a mask must cover the mouth; 98.4% knew it must cover the nose, and 58.0% knew it must cover the chin too. 79.3% knew that the mask must be washed with soap and water before use for reusable masks as shown in table 6, 83.6% knew that one must avoid touching the mask once it is worn, 81.7% knew

that one's hands must be clean before touching or wearing a mask, and 93.9% knew that one should use a clean mask at the beginning of the day.

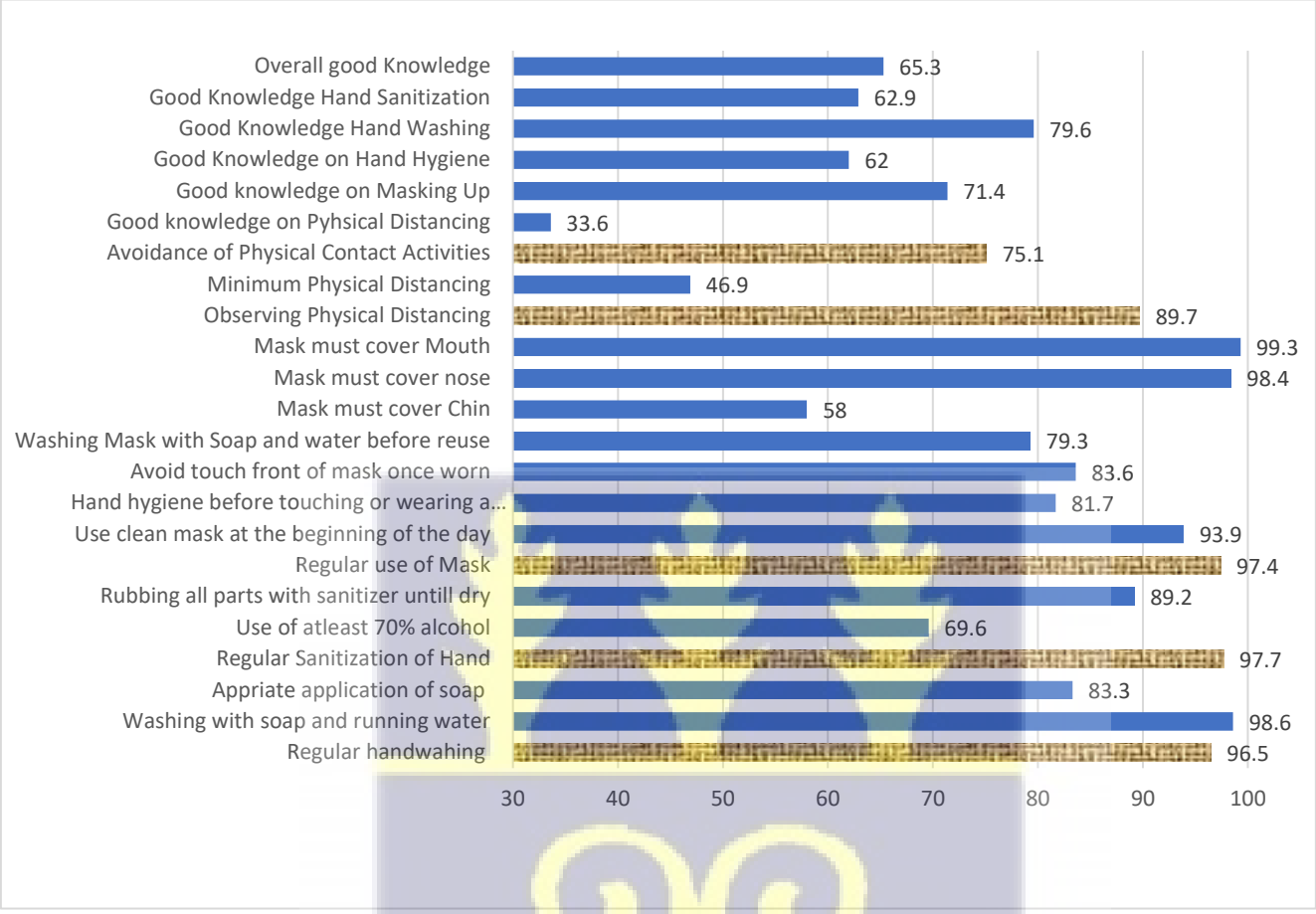

Figure 3:Percentage of respondents with knowledge on preventive protocols and how effective they should be carried out

On how to effectively carry out hand washing, 98.6% of the respondents knew that for effective washing of the hands, they must be washed with soap and running water, and 83.3% knew that the soap must be applied to all parts of the hand.

To make hand sanitizing effective, 89.2% of the respondents knew that hand sanitizer must be rubbed on all parts of the hand until it is dry, and 69.6% knew that you have to use sanitizer with at least 70.0% alcohol. On effective physical distancing, 46.9% of the respondents knew that one should maintain a minimum physical distance of 1 meter apart.

Number of COVID-19 prevention protocols and ways of their effective practices respondents had knowledge on

As demonstrated in Table 7, 72.5%, 14.8%, 10.1%, 1.6%, and 0.4% of the respondents knew all the WHO five (5) key preventive protocols, four (4) protocols, three (3) protocols, two (2) protocols, and one (1) protocol respectively. Every respondent had at least some knowledge of one (1) of the protocols. On effective masking practices of which the researcher assessed respondents using 7 effective practices as recommended by WHO, 37.1%, 34.5%, 19.2 %, 5.9% and 2.1% of the respondents had knowledge of all seven (7), six (6), five (5), four (4), three (3), and two (2) respectively. Every respondent had knowledge of at least two (2) ways of effective masking.

Table 8:Distribution of Respondents by the number of COVID-19 prevention protocols and ways by which they can effectively be carried out respondents had knowledge on(N=426)

Number	Five Key Preventive Protocols; N (%)		Effective masking Practices; N (%)		Effective hand hygiene Practices; N (%)		Quintiles of knowledge score	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
1	4	0.4	0	0	11	2.6	92	21.6
2	7	1.6	9	2.1	26	6.1	52	13.4
3	43	10.1	5	1.2	120	28.2	138	32.4
4	63	14.8	25	5.9	93	21.8	97	22.8
5	309	72.5	82	19.2	176	41.3	42	9.9
6			147	34.5				
7			158	37.1				

On effective hand hygiene practices as per WHO recommendations, in which the researcher used five (5) effective hand hygiene practices to assess respondents, 41.3%, 21.8%, 28.2%, 6.1%, and 2.6% of the respondents had knowledge of all of the five (5), four (4), three (3), two (2), and one

(1) effective hand, respectively. Every respondent had knowledge of at least one (1) of the ways for effective hand hygiene. A majority (60.3%) of the respondents were in the last three highest quintiles of knowledge score.

5.5.2. Attitude towards COVID-19 and its prevention activities

As displayed in table 8, the majority of the respondents (51.6%) agree that following the COVID-19 protocol will protect them and other church members from getting COVID-19 and 50.0% agree that they are at risk of getting COVID-19. 48.6% of the respondents completely agree that COVID-19 can kill its patients, and 37.6% agree that COVID-19 can kill its patients.

Table 9:Distribution of respondents' attitudes towards COVID-19 and its prevention(N=426)

Attitude	**-2**		**-1**		**0**		**1**		**2**	
	Freq.	**%**	**Freq**	**%**	**Freq.**	**%**	**Freq.**	**%**	**Freq.**	**%**
How do you agree that COVID-19 has a natural cause	29	6.8	48	11.3	34	8.0	189	44.4	126	29.6
How do you agree that COVID-19 can develop into a severe disease	19	4.5	13	3.1	41	9.6	212	49.8	141	33.1
How do you agree that a severe disease causes a lot of suffering	16	3.8	11	2.6	28	6.6	210	49.3	161	37.8
How do you agree that COVID-19 can lead to serious complications in life	18	4.2	14	3.3	53	12.4	191	44.8	150	35.2
How do you agree that COVID-19 can kill its patients	16	3.8	10	2.3	33	7.7	160	37.6	207	48.6
How do you agree that you are at risk of COVID-19	21	4.9	17	4.0	35	8.2	213	50.0	140	32.9
How do you agree that other church members are at risk of COVID-19	21	4.9	15	3.5	38	8.9	208	48.8	144	33.8
How do you agree that following COVID-19 protocol will protect you and other church members	16	3.8	12	2.8	31	7.3	220	51.6	147	34.5
How do you agree that you can follow the protocols	18	4.2	11	2.6	34	8.0	207	48.6	156	36.6

How do you agree that the church has provided facilities and arrangements to enable the observation of protocols	18	4.2	10	2.3	31	7.3	209	49.1	158	37.1

Quintile of total attitude score

Quintile	1st		2nd		3rd		4th		5th	
Re-recalibrated attitude score class width	0 -27		28 – 30		31 -33		34 - 37		38 – 40	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Distribution of respondents	80	18.8	115	27.0	70	16.4	73	17.1	88	20.7

-2 = Completely Disagree, -1 = Disagree 0 = Neutral/Don't Know, 1 = Agree and 2 = Completely Agree

About 29.6% of respondents completely agree that COVID-19 has a natural cause; 44.4% agree, 6.8% completely disagree, and 11.3% disagree. The majority (27%) of respondents were in the 2nd quintile, with scores ranging from 28-30, while the 3rd quintile, with a class range of 31-33 had the least proportion (16.7%) of respondents.

Overall Attitude of Respondents

Based on Figure 4, 48% of respondents had a good attitude towards COVID-19 preventive protocols and 52% had a poor attitude based on Bloom's Cut-off point for attitude.

Figure 4:Overall attitude of respondents toward COVID-19 preventive protocol

5.5.3. Practices of Respondents towards COVID-19 prevention protocols

From Figure 5, 98.1%, 91.5%, 97.2%, and 81.2% of the respondents regularly use hand sanitizer, regularly wash their hands during worship sessions, regularly use facemasks during worship sessions, and observe physical distance during worship sessions, respectively. On the effective practice of hand sanitizing, 88.3% and 60.8% ensured all parts of the hands are applied with sanitizer when sanitizing the hands and used sanitizers with at least 70% alcohol respectively.

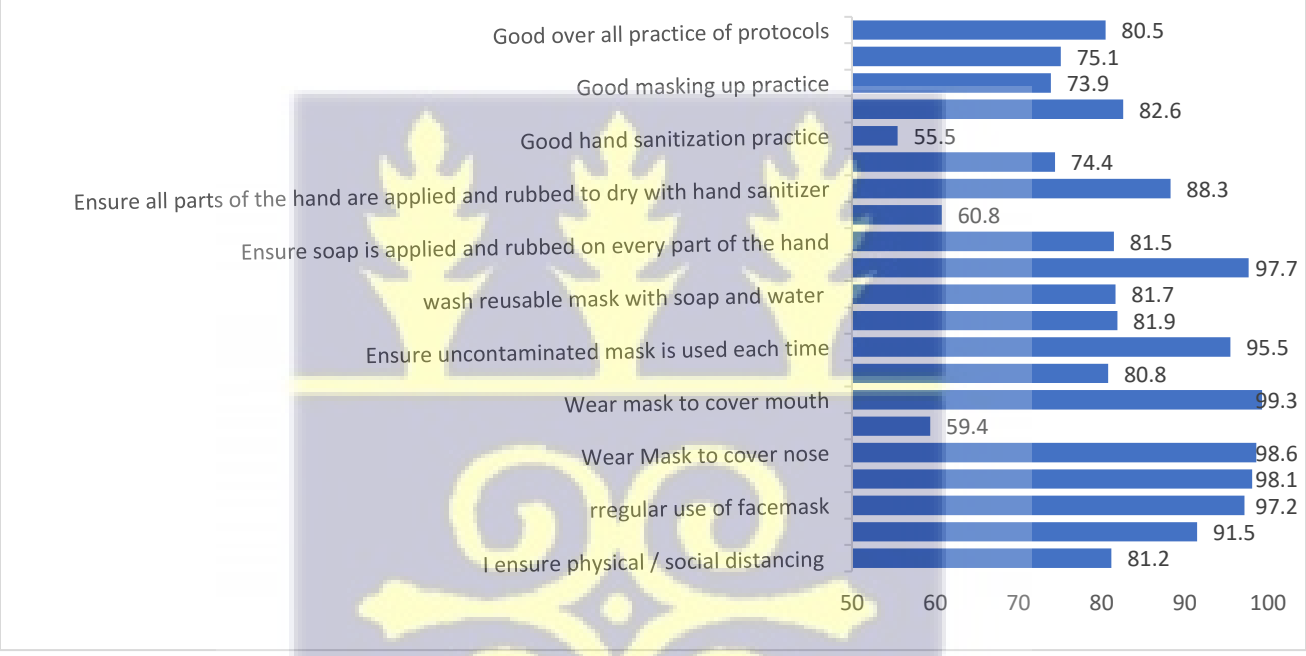

Figure 5:Percentage of respondents who practice COVID-19 preventive protocols and ensured the effective practice

On effective hand washing, 97.7% and 81.5% ensured hands are washed with soap and water and soap is applied and rubbed on every part of the hand during worship sessions respectively.

Findings from the survey showed that when it comes to effective mask-wearing and use, 81.9%, 81.7%, 95.5%, and 80.8% avoid touching the mask once it is worn, wash the reusable mask with soap and water, wear a clean mask at the beginning of the day, and ensure the hands are clean before touching or wearing a mask, respectively. 99.3% of the respondents wear masks to cover their mouths whilst those who wear masks to cover their noses represent 98.6%. Wearing a mask to cover the chin was, however, low (59.4%). Overall, 80.5% of the respondents had good practice based on 15 items on the practice of the COVID-19 prevention protocols they were assessed on, with 75.5%, 73.9%, 82.6%, 55.5%, and 74.4% of the respondents having good practice on physical distancing, masking up, hand hygiene (overall performance for both hand sanitization and hand washing), hand sanitization, and handwashing, respectively.

Table 10: Knowledge, attitude and Practice Adequacy by Denominations

KAP	Categories	Denomination			Total	X^2	P-Value
		Catholicism	Charismatic / Pentecostal	Protestants			
Knowledge Adequacy	Inadequate	110 (40.6)$_a$	22(19.6)$_b$	17(39.5)$_a$	149 (35.0)	15.73	0.000
	Adequate	161 (59.4)$_a$	90 (80.4)$_b$	26 (60.5)$_a$	277 (65.0)		
Attitude Adequacy	Inadequate	141(52.0)$_a$	58(51.8)$_a$	21 (48.8)$_a$	220 (51.6)	0.15	0.953
	Adequate	130(48.0)$_a$	54 (48.2)$_a$	22 (51.2)$_a$	206 (48.4)		
Practice Adequacy	Inadequate	45 (16.6)$_a$	2 (1.8)$_b$	4 (9.3)$_{a, b}$	51 (12.0)	16.84a	0.000
	Adequate	226 (83.4)$_a$	110 (98.2)$_b$	39 (90.7)$_{a, b}$	375 (88.0)		

The Bonferroni adjusted z-tests in table 9 show that knowledge on COVID -19 preventive protocols is statistically significantly higher (≈30% more) among Charismatic/Pentecostals compared to both Catholics and Protestants. Also, adequacy of practice is significantly higher

among Charismatics / Protestants was also higher (≈15% more) than Catholics but not protestants. The study revealed no significant difference in attitude adequacy.

OBJECTIVE 3: To assess the level of adherence of Church members towards COVID-19 prevention protocols.

5.6. Levels of adherence of Church members to COVID-19 prevention protocols in Church

This section presents data on adherence measured by the number of times within the last five worship sessions a respondent practiced the preventive protocols in **Table 12**. In this study, adherence was measured based on the consistency of practice of all the protocols for five worship sessions. Respondents were then grouped into those who adhered and the non-adherence groups based on the number of worship sessions respondents practiced all the protocols consistently for the last five worship sessions.

Table 11:Number and percentage of Respondents who observed Recommended Protocols consistently for the last five worship sessions

Religious Denomination	Adherence to All four protocols		Handwashing Adherence		Hand Sanitizer Adherence		Masking Adherence		Physical Distancing Adherence		Total
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	
Protestant(N=43)	41 (95.3)	2 (4.7)	37(86.0)	6(14.0)	30(69.8)	13(30.2)	37(86.0)	6(14.0)	37(86.0)	6(14.0)	43(100)
Charismatic / Pentecostal(N=112)	87(77.7)	25 (22.3)	72 (64.3)	40(35.7)	67(59.8)	45(40.2)	70(62.5)	42(37.5)	70(62.5)	42(37.5)	112(100)
Catholicism(N=271)	184 (67.9)	87 (32.1)	158(58.3)	113(41.7)	108(39.9)	163(60.1)	100(36.9)	171(63.1)	151(55.7)	120(44.3)	271(100)
Total	312 (73.2)	114 (26.8)	267(62.7)	159(37.3)	205(48.1)	221(51.9)	207(48.6)	219(51.4)	258(60.6)	168(39.4)	426(100)

Overall, adherence to the protocols was 26.8% and non-adherence was 73.2%. Meaning 26.8% of the respondents practiced all four protocols for all five major worship sessions. Adherence to the use of hand sanitizer was the highest (51.9%), masking up was 51.4%, hand washing was lowest

at 37.3% and physical distance was 39.4% as shown in Table 11. Adherence also differed according to participants' religious denomination. Adherence to the protocols was highest among the Catholics (32.1%), among the charismatic/Pentecostal (22.3%) and among the protestants was the least (4.7%).

Table 12: Correlation between knowledge, attitude and practice toward adherence

		1	2	3	4
1	Total Adherence Score	-			
2	Total Practice Score	.202**	-		
3	Total attitude Score	.227**	-.009	-	
4	Total Knowledge Score	.196**	.674**	.111*	-

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

Table 13:T-test to ascertain relationship between knowledge, attitude and practice

Categorizing variable		Mean Dif	95%CI of Diff		t	df	P-Value
			Lower	Upper			
Adequacy of Knowledge groups	Ad. Att. – Inad. Att	1.34	-.39	3.07	1.52	424	0.129
	Ad. Pract.- Inad. Pract.	2.16	1.024	3.27	12.52	424	.000
	Ad. Adhere – Inad. Adhere	2.15	1.03	3.27	3.77	424	0.000
Adequate Attitude Group	Ad. Pract. – Inad. Pract.	0.08	- 0.30	0.46	0.27	424	0.670
	Ad. Adhere – Inad. Adhere	1.50	0.43	2.58	2.75	424	0.006
Adequacy of Practice groups	Ad. Adhere – Inad. Adhere	4.49	2.88	6.11	5.47	424	0.000

Knowledge score had a weak correlation with attitude ($r = 0.2$, $p < 0.01$) and adherence ($r = 0.11$, $p < 0.05$) but a strong correlation with practice ($r = 0.67$, $p < 0.01$). Attitude had weak correlation

with adherence (r = 0.23, p < 0.01) but had no association with practice (r = 0.01, p > 0.05). finally, practice also had a poor correlation with adherence (r = 0.20, p < 0.01). An independent T-test showed that the mean attitude score of congregants with adequate knowledge was not statistically significantly more than the mean score of those with inadequate knowledge; mean difference = 1.34 (95%CI: -0.39, 3.07), t = 1,52, p = 0.129. However, congregants with adequate knowledge had higher mean practice score of 2.16 (95%CI: 1.02, 3.27), t = 12.52, p < 0.001 and adherence scores of 2.15 (95%CI: 1.03, 3.27), t = 3.77, p < 0.001. Congregants with good attitude higher /*/ mean adherence score of 1.50 (95%CI: 0 .43, 2.58), t = 2.75, p = 0.006. There was no statistically difference in mean practice scores between congregants with good or poor attitudes; 0.08 (95%CI: -0.30, 0.46), t = 0.27, p = 0.670). Congregants with adequate practice also had higher adherence scores with a mean difference of 4.49 (95%CI: 2.88, 6.11), t = 5.47, p < 0.001.

OBJECTIVE 4: To assess the determinants of adherence to the COVID-19 prevention protocols among church members.

5.7. Determinants of adherence to the COVID-19 prevention protocols among church members

These sessions sought to assess the determinants of adherence to COVID-19 preventive protocols. Results from the chi-square test of association, bivariate, and multivariate logistics regressions are presented below in Tables 14, 15 and 16 respectively.

Table 14:Determinants of adherence to the COVID-19 prevention protocols

Variable	Adherence Status		Total	X^2	p-value
	No.	Yes			
Knowledge of COVID-19 and its preventive protocols					
Inadequate	128(85.9)	21(14.1)	149(100)	18	< 0.001
Adequate	84(66.4)	93(33.6)	277(1000		

Ability to obtain information from the internet					
No	20 (57.1)	15 (42.9)	35 (100)	10.54	< 0.01
Yes	247 (72.6)	93 (27.4)	340 (100)		
Not Applicable	45 (88.2)	6 (11.8)	51 (100)		
The Attitude of respondents towards COVID-19 and its preventive measures					
Poor Attitude	175(79.5)	45(20.5)	220(100)	9.23	< 0.01
Good Attitude	137(66.5)	69(33.5)	206(100)		
Christian Denomination					
Protestant	41 (95.3)	2 (4.7)	43 (100)	15.80	< 0.001
Charismatic	87 (77.7)	25 (22.3)	112 (100)		
Catholicism	184 (67.9)	87 (32.1)	271 (100)		
Age Categories					
18 – 29	156(66.7)	78(33.3)	234(100)	14	< 0.01
30 – 49	144(83.2)	29(16.8)	173(100)		
≥ 50	12(63.2)	7(36.8)	19(100)		
Number of Preventive Facilities respondents have access to during worship sessions					
≤ 3	84(96.6)	3(3.4)	87(100)	34.23	< 0.001
4	56(75.7)	18(24.3)	74(100)		
5	68(67.3)	33(32.7)	101(100)		
6	104(63.4)	60(36.6)	164(100)		
Educational Status					
None	24(88.9)	3(11.1)	27(100)	9.61	> 0.05
Non-Formal	7(70.0)	3(30)	10(100)		
Basic Education	74(82.2)	16(17.8)	90(100)		
Second Cycle	92(69.7)	40(30.3)	132(100)		
Tertiary	115(68.9)	52(31.1)	167(100)		
Employment and Job Type					
Unemployed	116(64.1)	65(35.9)	181(100)	27.27	< 0.001
Artisan	15(78.9)	4(21.1)	19(100)		
Trading	86(85.1)	15(14.9)	101(100)		
Public/Civil Servant	78(79.6)	20(20.4)	98(100)		
Farming	16(76.2)	5(23.8)	21(100)		

Others	1(16.7)	5(83.3)	6(100)		
English literacy					
No	44(88.0)	6(12.0)	50(100)	6.3	< 0.01
Yes	268(71.3)	108(28.7)	376(100)		
Gender					
Male	148(74.4)	50(25.3)	198(100)	0.43	> 0.05
Female	164(71.9)	64(28.1)	228(100)		
Marital Status					
Never Married	113(66.1)	58(33.9)	171(100)	13.31	< 0.01
Married	169(78.2)	47(21.8)	216(100)		
Widower	7(100)	0(0.0)	7(100)		
Widow	10(83.3)	2(16.7)	12(100)		
Separated	3(100)	0	3(100)		
Cohabiting	10(58.8)	7(41.2)	17(100)		
Types of Residence					
Rural	171(87.2)	25(12.8)	196(100)	36.33	< 0.001
Urban	141(73.2)	89(26.8)	230(100)		

A Chi-square test result in table 14 indicates that there is a statistically significant difference in the level of adherence between the various categories of the following variables: knowledge status, ability to obtain information from the internet, attitude towards COVID-19 and its preventive measures, Christian denomination, age, number of preventive facilities respondents have access to during worship sessions, employment and job type, English literacy, marital status, and types of residence, using a p-value < 0.05. However, the association between gender and adherence to COVID-19 preventive protocols was statistically significant.

Bivariate binary logistics regression on the determinants of adherence to COVID-19 prevention protocols

From **Table 15**, Catholics were 10 times more likely to adhere to COVID-19 prevention protocols during worship sessions with a crude odds ratio (COR) of 9.69 (95%CI:2.29, 40.99), p<0.01 as

compared to protestants. Also, Charismatics / Pentecostals were 6 times more likely to adhere to COVID-19 preventive protocols during worship sessions with a crude odds ratio (COR) of 5.89 (95%CI:1.33, 26.07), p<0.05 compared to protestants.

Respondents who lived in urban areas were 4 times more likely to adhere to COVID-19 prevention protocols during worship sessions, with a crude odds ratio (COR) of 4.32 (95%CI:2.63, 7.09), P<0.001 compared to those who live in rural areas.

Respondents in the 30 – 49 years age group were less likely [COR = 0.40 (95%CI: 0.25, 0.65), P<0.001] to adhere compared to those 18-29 years.

Respondents who understood and were able to speak English were about 3 times more likely [COR = 2.96 (95%CI: 1.22, 7.14), P<0.05] to adhere to COVID-19 prevention protocols during worship sessions compared to those who could not speak and understand English. There was over 3 times likelihood [COR = 3.62 (95%CI: 1.04, 12.55), P<0.05] of adherence among respondents with tertiary education compared to those who had no formal education.

Respondents in the commerce [COR = 0.31(95%CI: 0.17, 0.58), P<0.001] and Public/Civil Service [COR = 0.46(95%CI: 0.26, 0.82), P<0.01] had 0.69 and 0.54 respectively less likely to adhere compared to those who are unemployed. Also, there was nearly 9 times more likelihood [COR = 8.92 (95%CI: 1.02, 78.03), P<0.05] of adherence for respondents in other occupations compared to those who were unemployed.

Table 15:Bivariate binary logistics regression between various factors and adherence to COVID-19 prevention protocols

Variable	Logistic regression	
	COR (95%CI)	p-value
Knowledge of COVID-19 and its preventive protocols		
Inadequate	Ref	
Adequate	2.66(1.70, 4.16)	< 0.001
Ability to obtain information from the internet		
No	Ref	

Yes	0.50(0.25, 1.02)	0.057
Not Applicable	0.18(0.06, 0.53)	< 0.01
The Attitude of respondents towards COVID-19 and its preventive measures		
Poor Attitude	Ref	
Good Attitude	1.96(1.27, 3.03)	< 0.01
Christian Denomination		
Protestant	Ref	
Charismatic	5.89(1.33, 26.07)	< 0.05
Catholicism	9.69(2.29, 40.99)	< 0.01
Age Categories		
18 – 29	Ref	
30 – 49	0.40(0.25, 0.65)	< 0.001
≥ 50	1.17(0.44, 3.08)	0.76
Number of Preventive Facilities respondents have access to during worship sessions		
≤ 3	Ref	
4	9.00(2.53, 31.99)	< 0.01
5	13.59(3.99,46.22)	< 0.001
6	16.15(4.89,53.35)	< 0.001
Educational Status		
None	Ref	
Non-Formal	3.43(0.56, 20.91)	0.182
Basic Education	1.73(0.46, 6.45)	0.415
Second Cycle	3.48(0.99, 12.22)	0.052
Tertiary	3.62(1.04, 12.55)	0.043
Employment and Job Type		
Unemployed	Ref	
Artisan	0.48(0.15, 1.49)	0.203
Trading	0.31(0.17, 0.58)	< 0.001
Public/Civil Servant	0.46(0.26, 0.82)	<0.01
Farming	0.56(0.20, 1.59)	0.275
Others	8.92(1.02, 78.03)	0.048

English literacy		
No	Ref	
Yes	2.96(1.22, 7.14)	< 0.05
Gender		
Male	Ref	
Female	1.16(0.76, 1.78)	0.513
Marital Status		
Never Married	Ref	
Married	0.54(0.35, 0.85)	< 0.01
Widower	0.00	0.999
Widow	0.39(0.08, 1.8)	0.234
Separated	0.00	0.999
Cohabiting	1.36(0.49, 3.77)	0.550
Types of Residence		
Rural	Ref	
Urban	4.32(2.63, 7.09)	< 0.001

An incremental increase in the odds of adherence was observed after respondents had access to more than three COVID-19 preventive facilities. Respondents who had access to four (4) preventive facilities during worship sessions were 9 times more likely to adhere to COVID-19 prevention protocols during worship sessions with a crude odds ratio (COR) of 9.00 (95%CI:2.53, 31.99), P<0.01 compared to those who had access to three or less (≤ 3) preventive facilities. Respondents who had access to five (5) preventive facilities during worship sessions were over 13 times more likely to adhere with a crude odd ratio (COR) of 13.59 (95% CI:3.99, 46.22), P<0.001 compared to those who had access to three or less (≤ 3) number of preventive facilities. Respondents who had access to six (6) preventive facilities during worship sessions were 16 times

more likely [COR = 16.15 (95%CI:4.89, 53.35), P < 0.001, to adhere compared to those who had access to three or less (≤ 3) number of preventive facilities.

Respondents with adequate knowledge scores had nearly 3 times more likelihood of adherence [COR = 2.66 (95% CI:1.70, 4.16), p<0.001] compared to those with inadequate knowledge. Respondents with good attitude were 2 times more likely to adhere than those with poor attitude [COR = 1.96 (95%CI:1.27, 3.03), p< 0.01]. The ability to find information from the internet, unexpectedly, had 0.50 less likelihood [COR = 0.50 (95%CI: 0.25, 1.02), P<0.05] of adherence compared to the inability to find information from the internet.

Multivariate binary logistics Regression on the predictors of adherence to COVID-19 prevention protocols

Following the binary logistic regression, variables that reported a statistically significant association (age group, attitude, Christian denomination, occupation, place of residence, and the number of preventive facilities a respondent had access to) were used to conduct a multivariate logistic regression on the predictors of adherence to COVID-19 prevention protocols. From Table 16, Catholics were 13 times more likely to adhere to COVID-19 prevention protocols during worship sessions, with an adjusted odds ratio (OR) of 12.89 (95%CI: 2.70, 61.49), p<0.01 as compared to protestants. Also, Charismatics / Pentecostals were 6 times more likely to adhere to COVID-19 preventive protocols during worship sessions with an adjusted odds ratio (AOR) of 5.63 (95%CI: 1.12, 28.7049), p<0.05 compared to protestants. Respondents who lived in Urban areas were 2 times more likely to adhere to COVID-19 prevention protocols during worship sessions with an adjusted odds ratio (AOR) of 2.47 (95%CI:1.34, 4.58), P<0.01 compared to those who lived in rural areas.

Respondents in the 30-49 age group had a 0.66 less likelihood of adherence with an adjusted odds ratio (AOR) of 0.34 (95%CI: 0.16, 0.72), P<0.01 compared to those 18-29 years. Respondents who understood and were able to speak English were 2 times more likely to adhere to COVID-19 prevention protocols during worship sessions compared to those who could not speak and understand English, with an adjusted odds ratio (AOR) of 1.67 (95%CI: 0.30, 9.36), P>0.05. There were no odds of adherence among respondents with tertiary education, with an adjusted odd ratio (AOR) of 1.00 (95%CI: 0.12, 8.51), P>0.05. On the other hand, with regards to occupation, farmers were nearly 8 times more likely [AOR = 7.88 (95%CI: 1.29, 48.27), P<0.05] to adhere to the preventive protocols after adjusting for other variables compared to the unemployed.

Table 16:Multivariate logistics Regression between various factors and adherence

Variable	Logistic regression	
	AOR (95%CI)	p-value
Knowledge of COVID-19 and its preventive protocols		
Inadequate	Ref	
Adequate	1.33(0.67, 2.67)	0.417
Ability to obtain information from the internet		
No	Ref	
Yes	-	-
Not Applicable	-	-
The Attitude of respondents towards COVID-19 and its preventive measures		
Poor Attitude	Ref	
Good Attitude	1.81(1.05, 3.11)	< 0.05
Christian Denomination		
Protestant	Ref	
Charismatic	5.63(1.12, 28.70)	< 0.05
Catholicism	12.89(2.70, 61.49)	< 0.01
Age Categories		
18 – 29	Ref	
30 – 49	0.34(0.16, 0.72)	<0.01
≥ 50	0.58(0.12, 2.85)	0.498

Variable	Logistic regression	
	AOR (95%CI)	p-value
Number of Preventive Facilities respondents have access to during worship sessions		
≤ 3	Ref	
4	11.00(2.57, 47.04)	< 0.01
5	18.91(4.27, 83.75)	< 0.001
6	21.77(5.06, 93.66)	< 0.001
Educational Status		
None	Ref	
Non-Formal	1.00(0.25, 4.08)	0.995
Basic Education	0.87(0.35, 2.19)	0.769
Second Cycle	0.73(0.30, 1.79)	0.496
Tertiary	1.00(0.12, 8.51)	0.997
Employment and Job Type		
Unemployed	Ref	
Artisan	1.00(0.25, 4.08)	0.995
Trading	0.87(0.35, 2.19)	0.769
Public/Civil Servant	0.73(0.30, 1.79)	0.496
Farming	7.88(1.29, 48.27)	0.026
Others	10.63(0.45, 51.81)	0.143
English literacy		
No	Ref	
Yes	1.67(0.30, 9.36)	0.559
Gender		
Male	-	-
Female	-	-
Marital Status		
Never Married	Ref	
Married	1.35(0.64, 2.83)	0.436
Widower	0.00	0.999
Widow	0.87(0.089, 8.77)	0.905

Variable	Logistic regression	
	AOR (95%CI)	p-value
Separated	0.00	0.999
Cohabiting	1.24(0.31, 4.95)	0.763
Types of Residence		
Rural	Ref	
Urban	2.47(1.34, 4.58)	<0.01
Model statistics		
Number of observations	426	
Omnibus Test	137.04	0.000
Hosmer and Lemeshow test	3.35	0.910
-2 Log likelihood	357.85	
Cox & Snell R-square	0.28	
Nagelkerke R-square	0.40	
Model accuracy	80.8%	

Respondents in the commerce [AOR = 0.87(95% CI: 0.35, 2.19), P>0.05] and Public/Civil Service [AOR = 0.73(95% CI: 0.30, 1.79), P<0.01] had 0.13 and 0.27 less likelihood of adhering respectively compared to the unemployed.

Respondents who had access to four (4) preventive facilities during worship sessions were 11 times more likely to adhere to COVID-19 prevention protocols during worship sessions with an adjusted odds ratio (AOR) of 11.00 (95% CI:2.57, 47.04), P< 0.01 compared to those who had access to three or less (≤ 3) preventive facilities. Respondents who had access to five (5) preventive facilities during worship sessions were 18 times more likely to adhere with an adjusted odds ratio (AOR) of 18.19 (95% CI: 4.27, 83.75), P<0.001 compared to those who had access to three or less (≤ 3) number of preventive facilities. Respondents who had access to six (6) preventive facilities during

worship sessions were nearly 22 times more likely to adhere with an adjusted odds ratio (AOR) of 21.77(5.06, 93.66), P<0.001] compared to those who had access to three or less (≤ 3) number of preventive facilities. Knowledge was not statistical significant after adjusting for other variables with an adjusted odds ratio (AOR) of 1.33 (95% CI:0.67, 2.67), p>0.05. Respondents with good attitude scores were nearly 2 times more likely to adhere compared to those with poor attitudes [AOR = 1.81 (95% CI: 1.05, 3011), p< 0.05]. The ability to find information from the internet was eliminated during adjustment due to the high level of redundancy between it and the ability to speak English with Eigenvalues of 0.001 and 0.06 and variance proportions of 0.97 and 0.96, respectively, using linear regression.

CHAPTER SIX

DISCUSSION

6.1. Introduction

This chapter presents an overview of the findings of the study, a comparison of the findings of the study compared with other past studies, and study contributions. This chapter also provides information on the study implications, taking into consideration public health policy and practices, implications for monitoring and evaluation, and implications for further research. It also includes study limitations and strengths.

6.2. Overview of Key Findings of the Study

This study is one of the earliest studies that sought to assess adherence to COVID- 19 protocols and its determinants in churches in Ghana. Overall, it was observed that 97%, 69.7%, 69.7%, 63.6%, and 54.5% of the churches had hand sanitizers, handwashing facilities, face masks, seats arranged at a meter apart, and arrangements made to ensure physical distancing during movement and rites performance, respectively. Also, 96.9%, 86.6%, 82.6%, 64.8%, and 56.8% of the respondents reported having access to hand sanitizers, handwashing facilities, face masks, seats arranged at a meter apart, and arrangements made to ensure physical distancing during movement and rites performance, respectively, during worship sessions. Despite 65% of the respondents having good knowledge levels and 48% having a good attitude, 80.5% of the respondents had good practice of the protocol. Also, the study revealed that only 26.8% of worshipers consistently adhered to all the recommended protocols for the past five worship sessions. The number of preventive facilities a respondent had access to, the denomination, attitude, age, place of residence,

and occupation, consistently and statistically significantly determined adherence; knowledge, educational status, marital status, and English literacy lost their determination after adjustment for other variables, and gender showed no form of association.

6.3. . Comparison of study findings with other previous studies

6.3.1. Availability of equipment and infrastructure to support adherence in churches

As part of the conditions for re-congregating in churches for worship, religious authorities were required to ensure the availability of needed resources such as veronica buckets, hand sanitizers, etc. to enable worshippers to follow the COVID-19 protocols (Address To The Nation By The President Of The Republic, Nana Addo Dankwa Akufo-Addo, On Updates To Ghana's Enhanced Response To The Coronavirus Pandemic, On Sunday, 3rd January 2021, 2020). With hand sanitizers, almost every church, regardless of denomination, had universal availability and access to any hand hygiene resource. The portable, cheaper, acceptable, and ease-of-use nature of sanitizers in Ghana could be the main reason for their high availability. In addition to the provision by the church, it was observed that some worshippers in 24 (72%) churches had their personal sanitizers for use during worship.

The high availability of sanitizers leads to it being the most (97%) accessible facility reported by the respondents. Prior studies have also reported on access to COVID-19 preventive measures in public places and spaces similar to churches. For example, a previous study to assess the availability of hand sanitizers in hotels, local restaurants, and bars reported lower availability of such logistics to promote adherence to prevention protocols (Dabi et al., 2021). Another study carried out at lorry stations also reported that only 7% made similar provisions (Bonful et al., 2020). This implies that support to increase the churches' capacity to procure sanitizers will ensure continuous availability for hand hygiene during worship to contribute to limiting COVID-19

transmissions. Even though the availability of hand washing facilities was in 23 (69.7%) churches, access was very good. Access was generally higher in urban areas than in rural churches. Compared to previous studies carried out in other public places of congregation, Dabi *et al* (2021) and Bonful et al. (2020) reported higher availability. Any policy assisting rural churches to procure hand washing facilities, water and an accompanying soap supply will contribute to effective hand hygiene, which will limit transmission in those areas.

COVID-19 preventive resources in churches, compared with data from other studies in other public places suggest a decline in the supply of handwashing facilities. The policy demanding compulsory supply and use of these resources should have added monitoring and evaluation measures for effective decisions to ensure compliance.

6.3.2. Knowledge, Attitude and practices towards COVID-19 preventive protocols

-Knowledge of COVID-19 and its preventive protocols

Even though knowledge might not be enough, it remains the first and essential step for shaping attitudes and consequently adopting recommended behaviours (Green et al., 2015). This study therefore also sought to assess the knowledge of worshippers on COVID-19 preventive measures. This study revealed that overall, 65% of the respondents had good knowledge levels, with 46.9%–99.3% of the respondents having good knowledge of each preventive protocol. Adequacy of knowledge of the COVID-19 prevention protocols was highest (80.4%) among the Charismatics/Protestants and the least (59.4%) among the Catholics. Two previous studies in Ghana recorded a high prevalence of good knowledge among 100% and 83% of operators in the hospitality industry and the general population, respectively (Dabi et al., 2021; Tawiah et al.,

2021). Some studies elsewhere also recorded higher levels of good knowledge among 73%–93.9% of respondents (Gao et al., 2020; Iqbal & Younas, 2021; Okello et al., 2020; ng et al., 2021; Zhong et al., 2020). Other studies elsewhere reported lower levels of good knowledge among 50.7%–61.2% of respondents (Azene et al., 2021; Banik et al., 2020; Duong et al., 2021). The reduced knowledge levels compared to earlier studies in Ghana could be due to the dwindling euphoria of both the disease and health education. There is therefore a need to up and maintain the momentum of health education on COVID-19 and its preventive protocols. Poor knowledge of certain aspects of the protocol was observed, which could imply poor practice and adherence to those elements.

While the worshippers were aware of the preventive protocols, they were unsure of how to carry them out effectively. While almost every worshipper (96.5%) knew hand washing as a means of limiting transmission, a lesser proportion (79.6%) knew how to effectively carry it out. Similarly, while almost everyone (97.7%) knew hand sanitization as a means of prevention, only 62.9% knew how to effectively carry it out. A study among taxi drivers in Ethiopia reported that a little higher 69.8% of respondents had overall good knowledge (Natnael et al., 2021). This, therefore, reduced the overall effective hand hygiene to less than two-thirds of the respondents.

While there are unresolved arguments about the importance of mask use in the fight against COVID-19 (Picheta, 2020), there is ample evidence of its effectiveness in reducing COVID-19 community spread (CDC, 2021; Dost et al., 2021; Howard et al., 2021). However, the emphasis on this success is on the correct use of the mask (WHOa, 2020). This study revealed that while almost every worshipper (97.4%) knew that wearing a mask can protect the congregation against COVID-19, fewer (71.4%) worshippers knew how it could be worn effectively. A study among health workers reported a lower prevalence of good knowledge (Kumar et al., 2020). However, another study among university students in Vietnam found that health faculties had a majority of

respondents reporting a higher (89.7%) level of good knowledge of face mask use (Duong et al., 2021).

Physical distancing remains one of the strongly recommended preventive measures since it limits both direct and indirect exposure to the virus(WHO, 2020n). Yet social norms in Africa may not permit its effective adoption even though they may feel it is effective(Bicalho et al., 2021) In this study, the area of lowest knowledge was physical distancing. Even though 89.7% and 75.1% of the worshippers knew that observing physical distancing and avoiding contact during rites and movement during worship sessions were means to prevent the spread of COVID-19, only 46.9% knew the minimum distance of one-meter protocol. This reduced the overall knowledge of physical distancing to 33.6%. A related study reported much higher effective knowledge at 85% (Bicalho et al., 2021).

It is therefore clear that while knowledge of the recommended protocols may be high, worshippers in churches lack adequate knowledge to effectively carry them out. Health education efforts should therefore be tailored towards motivating worshippers to effectively carry out the preventive protocols. Again, there was no data on knowledge levels among worshippers for direct comparison within Ghana. A monitoring mechanism using a simple checklist carried out by health workers who are members could have been instituted to detect and respond to the knowledge gap.

-Attitude of respondents towards COVID-19 and its preventive protocols

This study revealed that the number of worshippers with a good attitude score in each attitude question was over 80%. However, only 48.4% had a good attitude score towards COVID-19, its prevention protocols based on bloom's Cut-off. There was however no significant difference in

attitude among the denomination. A similar study in Ghana reported a far higher positive attitude among 88.2% of respondents (Tawiah et al., 2021). Other studies carried out elsewhere also reported a higher prevalence of good attitudes among 62.3%–92.9% of respondents (Azlan et al., 2020; Banik et al., 2020; Ferdous et al., 2020; Okello et al., 2020; P & J, 2020; Yang et al., 2021) whilst another reported a far lower prevalence of 7.6% (P & J, 2020). The wide gap in attitude means worshippers may not follow the protocols or do so only under compulsion. The wide gap in attitude means worshippers may not follow the protocols or do so only under compulsion. This might lead to ineffective practices and/or poor adherence (inconsistent practice) to protocol, which will not produce the right results should the church be exposed to a source of infection. Efforts should therefore be made to regularly monitor attitudes and tailor messages to whip worshippers' inclinations towards adoption of the protocols.

-Practices of respondents of COVID-19 preventive protocols

This study, surprisingly, found 80.5% of worshippers with good practice despite the lower prevalence of good knowledge and attitude scores. Adequacy of practice was higher (98.2%) among the Charismatics/Pentecostals and also high (90.7%) among the protestants, with the least among the Catholics. This is even comparatively higher than in studies reporting higher levels of good knowledge and attitude (Duong et al., 2021; Ferdous et al., 2020; P & J, 2020). It is, however, lower than the overall practice reported in two studies carried out in China and Vietnam (Yang et al., 2021; Zhong et al., 2020). High practice is expected as it was a requirement from the state and enforced by church authorities (Address To The Nation By The President Of The Republic, Nana Addo Dankwa Akufo-Addo, On Updates To Ghana's Enhanced Response To The Coronavirus Pandemic, On Sunday, 3rd January 2021, 2020).

Even though there was universal masking up during worship, less than three-quarters carried it out effectively. The universal masking up is far higher than findings from previous studies in Ghana (Apanga & Kumbeni, 2021; Fielmua et al., 2021; Kumar et al., 2020). This universal masking up is expected as it is compulsory for participating in worship. Moreover, the visible nature of masking up makes it easy to monitor and, for that matter, enforce by church authorities. Thus, even though, worshippers may have been forced to wear masks, their poor attitude as well as the knowledge gap between it and its effective practice (97.4% versus 71.4%) may have made a significant proportion (23.3%) of them practice it ineffectively. Further studies may be required to ascertain this.

The most striking difference between practice and effective practice was seen with hand sanitization (98.1% vs 55.5%). The universal usage of hand sanitizers during worship sessions is expected as it is the most convenient, portable, dry quickly, and affordable option, therefore its preferability and availability (Saab & Domiati, 2021). The high gap between practice and effective practice could be due to the knowledge gap between the two (97.7% versus 62.9%) as well as the higher prevalence of poor attitudes. However, this was not assessed and would require further studies to ascertain the reasons.

Even though there was also a difference between regular hand washing and its effective practice, the gap was less (91.5% vs 74.4%). The prevalence of hand washing practiced in this study was far higher than what was reported among customers at shops in Ghana (Apanga & Kumbeni, 2021) but less than what was reported by Ferdous et al. (2020) elsewhere. However, the overall hand hygiene prevalence was very good. Comparatively, these were higher than the findings by Apanga & Kumbeni (2021) and Natnael et al(2021) but lower than the findings by Azlan et al. (2020).

Physical distancing practice was also very good with accompanying good, effective physical distancing. This is far greater than what was reported by another study among pregnant women in Ghana(Apanga & Kumbeni, 2021). Once again, the element of enforcement by church authorities following the directive from the president of Ghana(Address To The Nation By The President Of The Republic, Nana Addo Dankwa Akufo-Addo, On Updates To Ghana's Enhanced Response To The Coronavirus Pandemic, On Sunday, 3rd January 2021, 2020) plays an important role.

6.3.3. Adherence to COVID-19 preventive protocols

Even though the level of adherence to hand sanitization was a little over half of the respondents, it was the most adhered to protocol within the five previous worship sessions. Adherence to hand sanitization was highest (32.1%) among the Catholics and the least (4.7%) among the protestants. This could be due to the 100% availability of hand sanitizers among Catholics. Hand sanitization was expected to be the most well-known and practiced protocol since hand sanitizers were the most readily available resource. Two studies assessing this among the general public reported higher levels (Shewale et al., 2021; Tong et al., 2020). The generally easy and quick dry nature of hand sanitizers used could have made them the most preferred means of hand hygiene (Saab & Domiati, 2021). Also, it was observed that hand sanitizers were within arm's reach or being sprayed or dropped onto by ushers while entering and during the offertory, which made them the most adhered to.

The evidence of adherence to masking in the prevention and control of COVID-19 has been duly established (CDC, 2021; Gandhi & Marr, 2021; Howard et al., 2021). Adherence to effective mask use will therefore contribute to the prevention and control of the disease, especially in churches. This study found that masking up was the second most adhered-to protocol, with just a little over half the respondents. Adherence to mask-wearing was highest (63.1%) among Catholics and the

least (14.0%) was among protestants despite 61.5% facemask availability among Catholics which is the second highest in terms of availability of facemasks. Two previous studies carried out among the general public reported far higher adherence compared to the findings in this study (Block et al., 2020; Tong et al., 2020) while another study reported lower adherence (Faria de Moura Villela et al., 2021). The low adherence as recorded in this study is unexpected as masking is most visible for easy monitoring and, for that matter, could be enforced by church authorities.

Adherence to physical distancing has the potential to reduce COVD 19 cases by 60%(Durante et al., 2021). Physical Distancing in this study, even though with a little over a third of the respondents, was the third most adhered to protocol. Adherence to physical distancing was highest (44.3%) among the Catholics and the least (14.0%) among the protestants. Despite the least (46.2%) availability of arrangements to ensure physical distance during movement among the Catholics. A study among African Americans reported far higher prevalence levels at 65%(Block et al., 2020). While the low adherence could be because it was the least available, accessible and practiced protocol as reported earlier in this study, other factors such as weaning interest or urge due to relaxation of enforcement. Indeed, physical distancing is such a high social cost activity for Christians who are expected to show the highest level of love during worship(Tan et al., 2021). This level of adherence may therefore not be adequate to take full advantage of its benefits.

Handwashing was the least (37.4%) adhered to preventive protocol in this study, even though it was the third most practiced protocol and its facilities were the second most accessible during worship. This is comparatively lower than what was reported in studies carried out among the general public (Afful et al., 2020; Amodan et al., 2020; Dabi et al., 2021; Faria de Moura Villela et al., 2021; Shewale et al., 2021) but higher than what was reported among pregnant women (Apanga & Kumbeni, 2021). Perhaps the time required to practice handwashing, as well as the

general nature of getting one hand wet, could be a deterrent to adherence when compared to the use of sanitizers. Indeed, in churches where handwashing was observed, people had to line up outside for their turns to wash compared to the spraying or dropping of sanitizers by ushers while worshippers walked in.

Adherence to hand washing was highest (41.7%) among Catholics and the least (14.0%) among Protestants despite 53.8% availability of hand washing facilities among Catholics whiles 71.4% availability among the protestants.

A quarter of the respondents had adhered to all the protocols within the past five worship sessions. This finding was greater than what was reported by a study in Ghana among pregnant women (Apanga & Kumbeni, 2021) and another in the general public in Ethiopia (Abeya et al., 2021) but lower than another community study in Ethiopia (Yehualashet et al., 2021) The overall low levels of adherence witnessed in the study could partly be explained by the element pandemic fatigue(Petherick et al., 2021; World Health Organization. Regional Office for Europe., 2020) and the dying sense of the impact of the law. Also, the spirito-religious elements of causation and its accompanying supernatural protection from God as reported in other parts of the world may be playing a part in the minds of some worshippers (DeFranza et al., 2021) despite the suggested general support for Ghana's COVID-19 response by church authorities (Prempeh, 2021).

6.3.4. Determinants of adherence to COVID-19 preventive protocols

The number of preventive facilities that a respondent had access to had a dose-effect increase in odds of adherence after the third facility. This underscores the fact that even with adequate knowledge and supporting attitudes or even enforcement, appropriate resources are needed for the execution of health behaviours. This is in line with the theory of the role of the environment in the adoption of behaviours (Green et al., 2015; Green & Tones, 2010). A policy to ensure the supply

or enable worshippers to have access to facilities and PPE to promote adherence would not be a misplaced priority in the fight against COVID-19.

This study revealed a wide interdenominational difference in adherence. Catholics, despite being the least in terms of access to preventive facilities, odds of adherence were 13 folds of the protestants and over twice more than that of Charismatic / Pentecostals. These may reflect differences in the reception of scientific concepts, myths, and conspiracy theories about the disease within Christendom emanating from doctrinal differences (Plohl & Musil, 2021). It has been argued that more dogmatic Christians are less likely to adhere (Łowicki et al., 2022). This supports the finding of a study in the USA where adherence among protestants was the lowest (Hill et al., 2020).

The next prominent determinant of adherence was the occupation, where, after adjustment for all other variables, farmers had eight (8) times higher odds compared to the unemployed. Similarly, in a study conducted in Ethiopia among the general public, farmers had higher odds of adherence(Abeya et al., 2021).

Also, worshippers living in urban areas had over two (2) times the odds of adherence compared to those in rural areas. This finding has been corroborated by two studies carried out elsewhere (Amodan et al., 2020; Bante et al., 2021). Increased adherence in urban areas could be attributed to increased access to logistics, as demonstrated in this study, as well as the perceived element of credible law enforcement authority watching (Kao et al., 2021).

The findings of this study also corroborate the finding that people with a good attitude towards COVID-19 are more likely to adhere compared to those with a bad attitude (Amodan et al., 2020; Bante et al., 2021). Thus, the conviction that adherence will protect them, which is in line with one

of the golden rules of Christianity ("love your neighbour as yourself"), enhances adherence (Denford et al., 2021).

This study found that people in their middle age (30–49 years) were less likely to adhere to the COVID-19 prevention protocol. This, even though may corroborate the finding that people's age influences their adherence to recommended protocols, it is inconclusive with the finding that younger people are less likely to adhere more (Faria de Moura Villela et al., 2021).

This study unexpectedly found that knowledge of COVID-19 and its preventive protocols did not have a statistically significant influence on adherence after adjusting for other variables. This corroborated another study (Bante et al., 2021) but was contrary to the findings of three other studies(Apanga & Kumbeni, 2021; Nzaji et al., 2020; Yehualashet et al., 2021). This could mean that even though knowledge may have some influence, it could be overshadowed by other variables such as denomination and access to preventive resources. This seeks to underscore the fact that knowledge alone may not be enough for the adoption of behaviour (Green et al., 2015).

This study also found that the educational status as well as the spoken English status of the respondents did not determine their adherence, which was contrary to the findings in other studies that reported education increased the likelihood of adherence (Apanga & Kumbeni, 2021; Azene et al., 2021). While it is generally expected that people with higher education status and spoken English will generally adopt preventive behaviours, infodemics, particularly lay epidemiology and conspiracy theories, as well as the general uncertainty of COVID-19 science, may undermine their informed decision-making (García-saisó et al., 2021; Global Infectious Hazard Preparedness & WHO, 2021).

Similarly, gender did not influence their adherence status, contrary to the finding by other studies that males are usually less likely to adhere to COVID-19 protocols (Bante et al., 2021; Nzaji et al., 2020; P & J, 2020). Also, though married people were initially more likely to adhere compared to the never married, the association was lost after adjustment for other variables. Even though it has long been known that men usually take unnecessary risks, the fact that adherence was a requirement and enforced by church authorities could have left them with no choice but to obey. This could also explain why the un sustained marital differences in adherence.

The KAP model stipulates that knowledge leads to positive attitudes which will intend lead to practice and subsequent adherence (adoption) of the recommended protocol(Ashinyo et al., 2021; Green et al., 2015). In this study, knowledge was poorly associated with attitude such that attitude scores of congregants with adequate knowledge did not differ from those with inadequate knowledge. This finding differed from theory (Bakanauskas et al., 2020) and as well as empirical evidence corroborating this assertion(Zhu & Xie, 2015). Even though Knowledge was found to be strongly positively correlated with practice, its positive correlation with adherence was poor such that this association was lost after adjusting for other variables in the table 16. This observation correlated with the findings of Bante and colleagues (Bante et al., 2021) but contradicts the finding of several other studies (Apanga & Kumbeni, 2021; Nzaji et al., 2020; Yehualashet et al., 2021).

Despite attitude not being associated with practice (table), a good attitude had a higher likelihood of adherence to COVID-19. This corroborates the KAP theory appropriate attitude leads to the adoption of healthy behaviour(Green et al., 2015). Amodan and Colleagues and Bante and Colleagues early found that attitude increased the likelihood adherence (Amodan et al., 2020; Bante et al., 2021).

As expected, practice scores correlated with adherence scores, and congregants with adequate practice had higher adherence scores. Several reasons could explain for this. First, practice bring self-efficacy which enables adherence to preventive measures(Debella, 2022; Thartori et al., 2021). In summary, the findings of this study did not perfectly match the flow of the outcome factors of the conceptual framework. Knowledge did not strongly influence attitude but strongly influenced practice. Also, attitude did not influence adherence via practice but directly. The output factor access to COVID-19 prevention protocols was the dorminant determinant of adherence. The study found out that access to the COVID-19 prevention protocols had an influence on adherence to the prevention protocol. This corroborated with another study (Ashinyo et al., 2021) were the availability of essential infection prevention control(IPC) logistics together with targeted behaviour change communication was vital in reducing the risk of COVID-19 transmission in treatment centres. The announcement of these preventive protocols was contained in an executive instrument punishable by law. This could play a part in distorting this relationship.

6.4. Implications for study findings

6.4.1. Implication for public health policy and practices

COVID-19 has been a devastating pandemic in even the most resilient healthcare systems, affecting not only global health but also deepening the economic woes of most countries, particularly low- and middle-income countries (LMIC). The world is therefore leaving no stone unturned in the fight against diseases. Worship places and their related activities have been identified as high-risk zones (Vermeer & Kregting, 2020). Indeed, religious places and activities have been the spark points of the pandemic in some countries, such as South Korea, Bangladesh, etc. WHO has therefore made focused recommendations for its prevention during worship

sessions(WHO, 2020k). In addition, governments all over the world prescribed conditions necessary for the reopening of churches as means of reducing the risk of transmission in such places. While there are countless studies assessing the knowledge, attitudes, practices and adherence to COVID-19 preventive behaviours in other high-risk areas, evidence from churches is lacking. The findings of this study serve as such evidence and point out gaps and suggestions for public health practice.

This study also demonstrates a great difference in adherence between denominations, places of residence, and age groups. While the reason for the difference was beyond the scope of this study, resource availability and access gaps may have played a role. While this may not be true for the inter-denominational difference (as Catholics, even though with the highest gaps, had the vast majority of higher odds of adherence), it could be for the urban-rural gap since resource availability and access were higher for urban churches. This, therefore, suggests a needs-based target in order to address specific factors. This could also address the age and occupational group differences in adherence observed.

The low adherence in a very high-risk zone calls for urgent action in other to prevent and control the spread of even more virulent strains such as the omicron in circulation. This calls for urgent actions both in policy and practice to be able to fight the ongoing pandemic.

This study reveals that access to the resources necessary for carrying out the recommended protocols was an outstanding determinant of adherence. However, this study demonstrates resource availability and access gaps. These gaps ranged from 3% for hand sanitizers to 46% for arrangements necessary for observing physical distancing. Resource gaps were particularly high in Catholic churches, which may demand targeted action. Even though these recommendations were backed by an executive instrument, these gaps exist. This can easily be achieved by local

government decrees which can be enforced by using the staff of CHPS zones in which these churches are located if they are empowered by such decrees. These decrees have become necessary since executive instruments have expired. Even if decrees seem to be at the extreme, constant communication between health authorities and their church counterparts reminding them of the need to ensure the supply of these resources and arrangements would be of great help.

Second, this study demonstrates a knowledge gap regarding how the protocols could be carried out effectively. This could be the reason for the low prevalence of good attitudes as seen in this study. This would mean practice of these protocols, can even be riskier than if they were not carried out (WHOa, 2020). This can be addressed by increased exposure to appropriate health information through health education (Ferdous et al., 2020; Green et al., 2015). Innovative means using a certain approach to health promotion that would help address these gaps since these churches would have resource persons within them. By local-level policy, health staff in these churches could be tasked with carrying out health education, which will be monitored and supervised by health authorities. The Community Health Planning and Services (CHPS) program staff have a mandate over the health of worshippers in their zone and should be pressed to take on such supervisory roles.

6.4.2. Monitoring and evaluation implications

This study remains one of the early studies to provide knowledge on the situation of implementation and outcome of prevention and control of COVID-19 in churches, one of the high-risk places. The low level of adherence to protocols by respondents, as demonstrated by this study, calls into question our social and behaviour change communication efforts and serves as a wake-up call on what information needs to be communicated in this area.

6.4.3. Implication for further research

Generally, low adherence in high-risk places such as the church, as witnessed in this study, presents a worrying situation. A study to assess the impact of it on the transmission or incidence of COVID-19 would help inform the level of priority placed on health action in churches. Also, this study reports interdenominational, rural-urban, occupation, and age differences in adherence, which presents issues of equity. Because it is a cross-sectional study, it cannot provide a definitive explanation or solutions for these differences. Hence, equity studies would unravel further knowledge on this subject.

6.5. Study limitations and strengths

As a cross-sectional study, it lacked the capacity to establish a causal relationship and may also be prone to the effect of counterfactuals. Also, recall bias may interfere with response accuracy. However, efforts were made to reduce it by seeking information only within the first five worship sessions, which at a maximum is five weeks ago. This is likely to give an accuracy of 98.4% (Kjellsson et al., 2014). In addition, the self-reported data components may be subject to bias as there was no control over the respondents' decision to give false responses. This study used a quantitative data collection method and thus was unable to elicit participants' perspectives on what could be contributing to the low adherence to the preventive protocols.

This study prides itself on several strengths. First, this study insisted on consistent practice as adherence by eliciting continuous practice within the last five worship sessions. It also employed an observation component to ascertain the availability of the resources, which served as a means of validating the self-reported aspects of having access to those resources. It also used face-to-face

interviews, which allowed interviewers to clarify and validate responses that seemed ambiguous or contradictory, improving the validity of the responses.

CHAPTER 7

CONCLUSION AND RECOMMENDATIONS

7.1. Conclusion of the study

This cross-sectional study sought to assess the level and determinants of adherence to the recommended COVID-19 prevention and control measures among worshippers in churches. With regards to the availability of resources, hand hygiene resources were universal, and face masks were moderate. Arrangements to ensure observance of physical distancing during siting were moderate, while arrangements to ensure physical distancing during movements and performance of rights were poor. Access to hand hygiene resources was universal, face masks were very good, while access to arrangements for social/physical distancing was poor. Over 6 out of every 10 worshipers had good knowledge, nearly half had a good attitude, and 8 out of every 10 had good practices. About 3 out of every 10 worshipers adhered to all the protocols; 4 out of every 10 adhered to handwashing; half adhered to the use of hand sanitizer and mask use; and 4 out of 10 adhered to physical distancing. Adherence was largely determined by the number of preventive resources or facilities worshippers have access to, their denominations, rural-urban divide, their attitude, age group, and occupation. This low adherence called for improved social and behaviour change communication, improved availability and accessibility of preventive and control resources, especially in rural areas, and improved monitoring and supervision.

7.2. Recommendations

7.2.1. Recommendation for Public health policy and practice

1. Church authorities need to improve the availability and access to recommended personal protective equipment and logistics for worshipers.
2. The government or non-governmental organization should provide support to ensure adequate availability of resources as well as health authorities leveraging the public health laws of the country to enforce the provision of resources by the churches themselves towards ensuring continuous and adequate availability of the recommended resources would contribute to adherence.
3. The government should come out with affirmative action to bridge the rural-urban gap in access to resources and adherence to COVID-19 prevention and control protocols.
4. Health authorities such as the Ghana Health Service need to intensify behaviour change communications with a special focus on the middle-aged who had lesser odds of adherence. This should be structured enough to dispel myths, misconceptions and conspiracy theories.
5. Health authorities such as the Ministry of Health and Ghana Health Service, by way of policy, could employ a setting health promotion approach to take leverage of both the human, physical, and psychosocial capital of the churches to promote the general disease prevention approach by the government.

7.2.2. Recommendation for further research

1. Researchers should carry out further studies to identify factors accounting for the interdenominational and rural-urban differences in adherence to the COVID-19 prevention protocols in this study.

2. This was a cross-sectional study that could not provide definitive causal links between adherence and its factors. Hence, Researchers could carry out longitudinal (preferably prospective) or experimental studies to contribute to establishing such linkages and as well as, reduce recall bias.
3. Ghana Health Service could carry out regular rapid surveys or routine data collection to provide a means for monitoring and evaluation to ascertain if there is adherence to these protocols in various settings such as marketplaces, transport stations, schools etc. and the effect of adherence in relation to COVID-19 infection, whether cases are on the rise or decrease.
4. Researchers could also carry out Impact evaluation studies to determine the impact of low levels of adherence found in this study on the transmission of COVID-19.
5. Researchers could carry out a similar study and use qualitative data collection methods to elicit participants' perspectives on what could have contributed to the low adherence to the preventive protocols.

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APPENDICES

Appendix I: Data collection Tool (Questionnaire)

Questionnaire On Assessment of Adherence to Covid-19 Prevention Protocols Among Selected Churches in The Bolgatanga Municipality

A. Sociodemographic information

Please for the following section, record the exact response or information

BACKGROUND INFORMATION

1	What is your district of residents *(please write the number in the next box)?* Bolgatanga Municipal = 1, Bolgatanga East = 2, Bongo = 2, Nabdam = 3, Talensi = 4, KN west = 5, KN Municipal = 6, Others (specify)…… = 7
2	Which type of residence do you live in? *("1" = rural, and "2" = urban)*
3	In what month and year were you born? (mm / yyyy)
	Gender of respondent 1=male 2=female
4	What is your Denomination? *(Please, write the corresponding number of the chosen option):* Catholic = 1, Methodist = 2 Presbyterian = 3, Anglican = 4 Pentecost = 5 Assemblies of God = 6
5	What is your Marital status? *(Please, write the corresponding number of the chosen option):* Never married = 1, Married = 2, Divorced = 3, Widow = 4, Separated = 5 Living with partner= 6
6	What is the highest level of school you reached? *(Please, write the corresponding number of the chosen option):* None = 1, Preschool = 2, non-formal = 3, Primary = 4, middle = 5,

	JSS/JHS = 6, vocational/commercial = 7, SS = 8, SSS/SHS = 9, professional training colleges = 10, Polytechnic (HND) = 11, Graduate = 12, Postgraduate = 13
7	What work do you do for a living *(please, write the corresponding number of the chosen option):* Unemployed = 1, student = 2, farming= 3, artisan = 5, trading = 6, Public/Civil servant = 7, housewife = 8, Others (specify)……...…= 9
8	Do you speak and understand English: Yes = 1 and No = 0 hint: skip question 9 if the response to 8 is NO
9	Are you able to use a computer including a smartphone to search for information online? Yes = 1 and No = 0
10	How many times have you had health education/reminders / on COVID-19 and its preventive measures

B. Access to available equipment and infrastructure put in place to support the adherence to COVID-19 prevention protocols

NO.	QUESTION	Please tick (√)
1	Please, during worship sessions do you have access to (*tick as many as the respondent has mentioned*)	
a	Veronica Buckets/hand washing sinks to was hand before, during or after the sessions	☐
b	Hand sanitizer for sanitizing	☐
c	Your personal hand sanitizer?	☐
d	Own a facemask for use during worship sessions	☐
e	Seats or sitting arranged to ensure physical distancing	☐
f	An arrangement made to ensure physical distancing during activities that require movement or processing (offertory, communion, blessing, etc)	☐

C. Knowledge on COVID-19 Prevention Protocols

NO.	QUESTION	Please tick (√)
1	Please, can you mention means by which we as citizens can follow to help prevent and control COVID-19 (*tick as many as the respondent has mentioned*)	
a	Regular hand washing with soap and water	☐
b	Using hand sanitizer	☐
c	Using a facemask	☐
d	Physical / Social distancing	☐
e	Avoid handshaking, hugging, kissing and all forms of physical contact with pastors, religious objects and other members	☐
2	In wearing a facemask for protection against COVID-19 cover, what are the key things to take note of (*Tick as many as the respondent has mentioned*)	
a	Use a clean mask at the beginning of the day	☐
b	Clean your hand before touching or wearing a clean Mask	☐
c	Avoid touching the mask	☐
d	Wash the mask with soap and water at least once every day after use for a reusable mask	☐
e	The mask must cover the Mouth, Nose, Chin (*Please circle the parts mentioned*)	☐
3	In achieving hand hygiene to protect you against COVID-19, what are the key things to consider (*tick as many as you know*)	
a	You must wash your hands with soap and under running water	☐
b	The soap must be applied and rubbed on every part of the hand including the wrist.	☐
c	When using sanitizer all parts of the hand must be applied and rubbed until it is dry	☐
d	Use at least 70% minimum percentage of alcohol-based hand sanitizer to be effective against COVID-19	☐
e	Hand hygiene prevents other diseases in addition to covid-19	☐
4	Physical / Social Distancing	
a	What is the minimum distance we should always be apart to achieve effective social distancing (*Please write your answer in the space provided*)	

D. Attitude towards COVID-19 and the prevention protocols

NO.	On a scale from completely disagree to completely agree, how will you agree with the following…	1 Completely disagree	2 Disagree	3 Neutral	4 Agree	5 Completely Agree	88 Don't know
1	COVID-19 is a new disease with a natural cause	☐	☐	☐	☐	☐	☐
2	COVID-19 disease can develop into a severe disease	☐	☐	☐	☐	☐	☐
3	A severe disease comes with a lot of suffering	☐	☐	☐	☐	☐	☐
4	COVID-19 can lead to serious complications in life	☐	☐	☐	☐	☐	☐
5	COVID-19 can Kill its patients	☐	☐	☐	☐	☐	☐
6	I am at risk of COVID-19	☐	☐	☐	☐	☐	☐
7	Members of this church are at risk for COVID-19	☐	☐	☐	☐	☐	☐
8	Following the COVID-19 protocols will protect me and my church members	☐	☐	☐	☐	☐	☐
9	You can follow the COVID-19 protocol	☐	☐	☐	☐	☐	☐
10	The church has provided equipment and logistics for us to follow the protocols	☐	☐	☐	☐	☐	☐

E. Practices on COVID-19 prevention protocols

NO.	QUESTION	Please tick (√)
1	**Please, which of these COVID-19 preventive protocols have you been able to observe during worships sessions (*tick as many as the respondent has mentioned*)**	
a	Regular hand washing	☐
b	Using hand sanitizer	☐
c	Using a facemask	☐
d	Physical / Social distancing	☐
2	**In wearing a facemask for protection against COVID-19, what do you do to ensure you are really protected (*tick as many as the respondent has mentioned*)**	
a	I Use a clean mask at the beginning of the day	☐
b	I Clean my hand before touching or wearing a clean Mask	☐
c	I avoid touching the mask	☐
d	I Wash the mask with soap and water at least once every day after use for a reusable mask	☐
e	The mask must cover the Mouth, Nose, Chin (*Please circle the parts mentioned*)	☐
3	**In practicing hand hygiene to protect yourself against COVID-19, what are the key things you do to ensure you are really protected (*tick as many as the respondent has mentioned*)**	
a	I wash my hands with soap and under running water	☐
b	I ensure the soap is applied and rubbed on every part of the hand including the wrist.	☐
c	When using sanitizer, I ensure all parts of the hands are applied and rub until it is dry	☐
d	I use a hand sanitizer with at least 70% alcohol	☐
4	**Physical /social distance**	
a	In practicing social/physical distancing, are you always able to maintain at least a meter distance between you and other worshippers throughout the worship session	Yes ☐ / No. ☐

F. Adherence to COVID-19 prevention protocols

NO.	QUESTION	Please enter the number
1	In the last 5 major worship sessions	
a	How many times did you wash your hands with soap and water before entering the church?	☐
b	How many of these worship sessions did you sanitize your hands in the course of worship	☐
c	How many of them were you able to sit or position at least 1 m apart from other worshipers throughout the worship	☐
d	How many of them did you wear a face mask throughout the worship sessions?	☐

Appendix II: Data collection Tool (Observational checklist)

Observational Checklist to assess the availability of equipment's and infrastructure put in place to support the adherence to COVID-19 prevention protocols.

Denomination…… Catholic = 1, Methodist = 2 Presbyterian = 3, Anglican = 4

Pentecost = 5 Assemblies of God = 6

NO.	QUESTION	Please tick (√)
	Please observe during worship sessions if the following are available (*tick as many as the respondent has mentioned*)	
1	Veronica Buckets/hand washing sinks to was hand before, during or after the sessions	☐
2	Hand sanitizer for sanitizing	☐
3	personal hand sanitizer	☐
4	personal facemask for use during worship sessions	☐
5	Seats or sitting arranged to ensure physical distancing	☐
6	An arrangement made to ensure physical distancing during activities that require movement or processing (offertory, communion, blessing, etc)	☐

Appendix III: GHS Ethics Committee Approval Letter

ETHICAL REVIEW APPROVAL

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

In case of reply the number and date of this Letter should be quoted.

Research & Development Division
Ghana Health Service
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My Ref. GHS/RDD/ERC/Admin/App 1 21 340
Your Ref. No.

19th August 2021

Sheila Akanteele Agandaa
Department of Health Policy, Planning and Management
School of Public Health
P.O. Box LG 13,
Legon, Accra, Ghana

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol.

GHS-ERC Number	**GHS-ERC 033/06/21**
Study Title	Assessment of Adherence to COVID-19 Prevention Protocols among Selected Churches in the Bolgatanga Municipality
Approval Date	19th August 2021
Expiry Date	18th August 2022
GHS-ERC Decision	**Approved**

This approval requires the following from the Principal Investigator

- Submission of a yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months,
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report after completion of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.

You are kindly advised to adhere to the national guidelines or protocols on the prevention of COVID -19

Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol.

SIGNED.....
Dr. James Akazili
(Head, Ethics & Research Management Department)