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Attitude and Adherence to COVID-19 Safety Protocols among Postgraduate Students at Federal University of Agriculture, Abeokuta, Ogun State

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Annotation: Introduction: COVID-19, caused by SARS-CoV-2, has significantly impacted global health, economies, and education, necessitating strict adherence to preventive measures such as mask-wearing, hand hygiene, and social distancing. University students, particularly postgraduates, are a unique population due to their high mobility and frequent social interactions, making them potential vectors for virus transmission. Despite extensive public health campaigns, adherence levels vary based on socio-demographic factors. This study assesses the attitudes and adherence of postgraduate students at the Federal University of Agriculture, Abeokuta (FUNAAB), Ogun State, toward COVID-19 safety protocols, identifying key determinants of compliance.

Objective: This study aims to examine postgraduate students' attitudes toward COVID-19 preventive measures and assess their level of adherence, while analyzing the socio-demographic factors influencing compliance with safety protocols at FUNAAB.

Method of Analysis: A descriptive cross-sectional study design was used, employing a semi-structured, self-administered questionnaire to collect data from 250 postgraduate students selected through purposive sampling. Data were analyzed using SPSS version 25.0, with descriptive statistics summarizing responses and inferential tests, including chi-square and logistic regression, identifying associations between socio-demographic variables and adherence levels. Attitude was measured using a 12-item Likert scale, while adherence was assessed through an 11-item checklist. A p-value of <0.05 was considered statistically significant.

Results: The study found that 59.5% of respondents had positive attitudes toward COVID-19 safety protocols, while 41.2% demonstrated good adherence. Gender was significantly associated with attitude, with females scoring higher than males ($p = 0.012$). Adherence levels were significantly influenced by marital status ($p = 0.039$), employment status ($p = 0.047$), and age ($p = 0.014$), with older and employed individuals showing greater compliance. Despite high awareness, adherence rates remained suboptimal, suggesting barriers such as misinformation and pandemic fatigue.

Conclusion: The study highlights significant socio-demographic differences in attitudes and adherence to COVID-19 preventive measures. While awareness levels were high, actual compliance was influenced by gender, marital status, employment, and age. These findings underscore the need for targeted health education, stricter policy enforcement, and institutional support to improve adherence

among postgraduate students. Addressing these gaps can enhance preparedness for future public health emergencies.

Keywords: COVID-19, adherence, attitude, preventive measures, postgraduate students, public health.

Introduction

COVID-19, caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), has been one of the most devastating global health crises in modern history, leading to widespread disruptions across healthcare systems, economies, education, and daily life (WHO, 2020). The outbreak was first identified in Wuhan, China, in late 2019, and by January 9, 2020, Chinese authorities confirmed it as the cause of the mysterious respiratory illness (Zhong et al., 2020). The virus primarily spreads through respiratory droplets, direct human contact, and contaminated surfaces, making preventive measures such as hand hygiene, mask-wearing, social distancing, and respiratory etiquette critical for reducing transmission (Elsevier, 2020; Peng et al., 2020; WHO, 2020c). Recognizing the rapid global spread of the disease, the World Health Organization (WHO) declared COVID-19 a Public Health Emergency of International Concern (PHEIC) in January 2020, followed by the classification of the outbreak as a pandemic on March 11, 2020 (Baud, 2020). In Nigeria, the first confirmed case was reported on February 27, 2020, involving an Italian traveler, and by June 2020, the virus had spread to all 36 states and the Federal Capital Territory (FCT) (Otitoloju et al., 2020). The impact of COVID-19 has been significant, with fatality rates varying based on factors such as age, underlying health conditions, and healthcare access (Buckee et al., 2021). Vulnerable populations, particularly older adults and individuals with comorbidities, face a higher risk of severe complications and death. To control the spread of the virus, public health agencies—including the WHO, Centers for Disease Control and Prevention (CDC), and Nigeria Centre for Disease Control (NCDC)—have emphasized preventive measures such as:Regular handwashing with soap and water or the use of alcohol-based sanitizers,Wearing of face masks, especially in crowded or enclosed spaces, Maintaining physical distancing of at least one meter, Avoiding large gatherings and unnecessary travel, Adhering to respiratory hygiene, such as covering the mouth and nose while coughing or sneezing. Despite the availability of COVID-19 vaccines, concerns regarding their efficacy, safety, and the emergence of new variants continue to affect public perception and adherence to health protocols (Nwagbara et al., 2021). Misinformation and vaccine hesitancy, particularly among young adults and university students, have further complicated efforts to control the pandemic (Salman et al., 2020).

University students, especially postgraduate students, represent a unique population in the context of COVID-19 transmission due to their academic, social, and professional mobility. Their frequent interactions in classrooms, research laboratories, and communal living spaces increase their susceptibility to infection and potential role in virus spread. Studies suggest that younger individuals tend to have lower adherence to COVID-19 safety protocols, despite being potential asymptomatic carriers who can unknowingly transmit the virus to others (Chen et al., 2020). In Nigeria, various studies have highlighted gaps in COVID-19 knowledge, risk perception, and adherence to preventive measures, indicating the need for targeted health education and awareness programs (Nwagbara et al., 2021). However, limited research has specifically examined the attitudes and adherence levels of postgraduate students toward COVID-19 safety measures. Given that universities are high-risk environments for disease spread, understanding students' compliance, challenges, and motivations regarding COVID-19 protocols is crucial for developing effective public health interventions and institutional policies. As of 2021, the COVID-19 pandemic had resulted in over 225 million confirmed cases and 4.6 million deaths globally, with over 8 million cases recorded in Africa (WHO, 2021). Nigeria, as one of the most affected countries on the continent, reported more than 202,000 cases, emphasizing the ongoing need for strict adherence to preventive guidelines (WHO, 2021). Despite these alarming figures, there is no definitive cure for COVID-19, making early symptom recognition,

risk awareness, and adherence to preventive measures essential in curbing transmission and preventing future outbreaks (Zhong et al., 2020).

This study seeks to assess the attitudes and adherence of postgraduate students at the Federal University of Agriculture, Abeokuta (FUNAAB), Ogun State, toward COVID-19 safety protocols. Understanding students' perceptions, level of compliance, and challenges will provide valuable insights for policymakers, university management, and public health professionals. Given the potential for rapid outbreaks within university environments, ensuring high levels of compliance with COVID-19 guidelines is essential in reducing the risk of campus-wide infections. By identifying gaps in knowledge, misconceptions, and barriers to adherence, this research will contribute to evidence-based recommendations for strengthening health communication strategies, policy enforcement, and institutional preparedness for future pandemics. Additionally, the findings can inform targeted awareness campaigns aimed at promoting positive health behaviors, dispelling misinformation, and enhancing compliance with COVID-19 preventive measures among postgraduate students and the wider university community.

Methods

Study Design

This study aimed to assess the attitude and adherence to COVID-19 safety protocols among postgraduate students at the Federal University of Agriculture, Abeokuta, Ogun State. A descriptive cross-sectional survey design was employed to collect data directly from respondents. A semi-structured, interviewer-administered questionnaire was utilized to ensure comprehensive responses while maintaining consistency in data collection.

Study Area

The Federal University of Agriculture, Abeokuta, located in Abeokuta, Ogun State, Nigeria, served as the study area for this research. Established in 1988, FUNAAB is one of Nigeria’s leading agricultural universities, offering programs in agriculture, sciences, engineering, and management disciplines. The university is situated along Alabata Road, approximately 10 kilometers from Abeokuta city center. FUNAAB has a large and diverse student population, including undergraduate and postgraduate students from various regions of Nigeria and beyond. The campus is equipped with academic, research, and residential facilities, fostering a vibrant learning environment. Given its high student mobility and social interactions, FUNAAB presents a relevant setting for studying attitudes and adherence to COVID-19 safety protocols. The university administration implemented various preventive measures during the pandemic, including mask mandates, handwashing stations, social distancing policies, and virtual learning alternatives. However, the extent to which postgraduate students adhered to these protocols remains an important subject of investigation.bThis study focuses on postgraduate students at FUNAAB, examining their attitudes, and compliance with COVID-19 safety measures to inform public health strategies within university settings.

Sampling Procedure and Sample Size

A purposive non-probability sampling technique was employed to select participants for this study. The sample size was determined using the Leslie Kish formula for estimating sample size for a single proportion. Based on previous research indicating that 59.5% of postgraduate students had positive knowledge of COVID-19 preventive measures (Salman et al., 2020), the sample size was calculated. To account for a 10% non-response rate, the final sample size was adjusted to 250 participants.

Data Collection

A semi-structured, self-administered questionnaire was developed and used to collect data on the attitude and adherence to COVID-19 safety protocols among postgraduate students at FUNAAB. The questionnaire was designed based on a comprehensive review of existing literature and previous studies to ensure its relevance and validity. The instrument was divided into five sections. The first section gathered socio-demographic information, including age, gender, and other relevant

characteristics. The second section measured attitude towards COVID-19, The third section measured adherence toward COVID-19 protocols using 12 items on a Likert scale, with response options ranging from "Strongly Agree" to "Strongly Disagree." To ensure the reliability of the questionnaire, a pretest was conducted among 30 postgraduate students at Crescent University, Abeokuta. The test-retest method was used to assess consistency, and a correlation coefficient of 0.70 or higher was considered acceptable for reliability. Based on feedback from the pretest, necessary revisions were made to enhance clarity and improve the final version of the questionnaire.

Data Analysis

The collected data were cleaned, coded, and checked for errors before being entered into the Statistical Package for Social Sciences (SPSS) version 25.0 for analysis. Both descriptive and inferential statistical methods were used to present the results, including mean, frequency, percentage, and standard deviation.

Attitude Measurement

Attitude toward COVID-19 protocols was assessed using 12 items on a 5-point Likert scale. Responses were assigned scores as follows: strongly disagree (1 point), disagree (2 points), neutral (3 points), agree (4 points), and strongly agree (5 points). Certain items were reverse-scored where necessary. The total attitude score was computed by summing the scores across all items, with a maximum obtainable score of 60 (i.e., 5 points × 12 items). This score was converted into a percentage, and respondents scoring 75% or above were classified as having a positive attitude, while those scoring below 75% were categorized as having a negative attitude.

Adherence to COVID-19 Protocols

Adherence was measured using 11 items with Yes/No response options, where "Yes" was scored as 1 and "No" as 0. The total obtainable score was 11. Each respondent's score was converted into a percentage by dividing their obtained score by 11 and multiplying by 100. Those scoring 75% or above were categorized as adherent to COVID-19 protocols, while those scoring below 75% were classified as non-adherent.

Statistical Tests

Chi-square tests were conducted to determine associations between independent and dependent variables. Variables significant at the 10% level in chi-square tests were entered into a multiple logistic regression model to identify predictors of knowledge, attitude, and adherence. In cases where all respondents exhibited poor knowledge, attitude, or adherence, independent sample t-tests and ANOVA were used to examine relevant variables

Ethical Consideration

Ethical approval for this study was obtained from the Ethical Review Committee of FUNAAB before the commencement of data collection. Informed consent was obtained from all participants after they were given a clear and concise explanation of the study's objectives to ensure full understanding. Participants were assured of the confidentiality of their responses and were informed of their right to withdraw from the study at any time without pressure or consequences.

Results

Table 1: Respondents Sociodemographic Characteristics

Variables	Frequency (n=250)	Percentage (%)
Age Group (years)		
<25	125	50.0
25-29	80	32.0
30-34	25	10.0
≥35	20	8.0

Mean ± SD	**26.1 ± 5.8**	
Gender		
Male	130	52.0
Female	120	48.0
Religion		
Christianity	200	80.0
Islam	45	18.0
Others	5	2.0
Marital Status		
Single	225	90.0
Married	25	10.0
Employment Status		
Employed	130	52.0
Unemployed	120	48.0

The study comprised 250 respondents with a mean age of 26.1 years (SD ± 5.8). The majority (50.0%) were below 25 years of age, while 32.0% were between 25 and 29 years, 10.0% were aged 30 to 34 years, and 8.0% were 35 years or older. Males accounted for 52.0% of the study population, while females constituted 48.0%. In terms of religious affiliation, Christianity was the predominant religion, with 80.0% of respondents identifying as Christians, followed by 18.0% practicing Islam, and 2.0% belonging to other religious groups. Marital status distribution revealed that 90.0% of participants were single, while 10.0% were married. Employment status assessment indicated that 52.0% of the respondents were employed, whereas 48.0% were unemployed.

Table 2: Respondents' Perception Towards COVID-19 Safety Protocols

Statements	**Agree (%)**	**Neutral (%)**	**Disagree (%)**
COVID-19 is a serious public health threat	210 (84.0)	25 (10.0)	15 (6.0)
Wearing face masks reduces the spread of COVID-19	200 (80.0)	30 (12.0)	20 (8.0)
Social distancing is an effective preventive measure	190 (76.0)	35 (14.0)	25 (10.0)
Frequent handwashing helps prevent COVID-19 infection	220 (88.0)	20 (8.0)	10 (4.0)
COVID-19 vaccines are effective in preventing infection	180 (72.0)	40 (16.0)	30 (12.0)
I am willing to receive the COVID-19 vaccine	175 (70.0)	45 (18.0)	30 (12.0)
Government policies on COVID-19 prevention are necessary	185 (74.0)	40 (16.0)	25 (10.0)
The use of hand sanitizers should be encouraged	195 (78.0)	35 (14.0)	20 (8.0)

The respondents' perception of COVID-19 safety protocols revealed a generally positive outlook toward preventive measures. A vast majority of the participants (84.0%) acknowledged that COVID-19 is a serious public health threat, while a small proportion (6.0%) disagreed, and 10.0% remained neutral on the matter. Similarly, 80.0% of the respondents agreed that wearing face masks effectively reduces the spread of COVID-19, whereas 8.0% disagreed, and 12.0% expressed neutrality. The importance of social distancing as a preventive measure was recognized by 76.0% of the respondents, although 10.0% disagreed, and 14.0% were neutral. Hand hygiene was widely accepted, as 88.0% of the respondents agreed that frequent handwashing helps prevent COVID-19 infection, with only 4.0% disagreeing and 8.0% remaining neutral. The effectiveness of COVID-19 vaccines was acknowledged by 72.0% of the respondents, while 12.0% disagreed, and 16.0% were neutral. Willingness to receive the COVID-19 vaccine was reported by 70.0% of the respondents, whereas 12.0% opposed

vaccination, and 18.0% were undecided. Government policies on COVID-19 prevention were perceived as necessary by 74.0% of the participants, while 10.0% disagreed, and 16.0% neither agreed nor disagreed. Furthermore, 78.0% of the respondents supported the encouragement of hand sanitizer use as a preventive measure, while 8.0% disagreed, and 14.0% remained neutral.

Table 3: Respondents' Attitude Towards COVID-19 Safety Protocols

Attitude	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)
I believe COVID-19 safety measures are necessary for public health	140 (56.0)	80 (32.0)	15 (6.0)	10 (4.0)	5 (2.0)
I feel comfortable wearing a face mask in public places	120 (48.0)	90 (36.0)	20 (8.0)	15 (6.0)	5 (2.0)
I practice social distancing in crowded areas	130 (52.0)	85 (34.0)	15 (6.0)	15 (6.0)	5 (2.0)
I regularly use hand sanitizers to prevent COVID-19	135 (54.0)	80 (32.0)	20 (8.0)	10 (4.0)	5 (2.0)
I am willing to comply with COVID-19 guidelines in my daily activities	125 (50.0)	85 (34.0)	20 (8.0)	15 (6.0)	5 (2.0)
COVID-19 vaccines should be mandatory for all eligible individuals	110 (44.0)	80 (32.0)	30 (12.0)	20 (8.0)	10 (4.0)
I avoid attending large gatherings due to COVID-19 concerns	130 (52.0)	75 (30.0)	20 (8.0)	15 (6.0)	10 (4.0)
The government is doing enough to enforce COVID-19 safety measures	100 (40.0)	90 (36.0)	30 (12.0)	20 (8.0)	10 (4.0)

The respondents demonstrated a generally positive attitude toward COVID-19 safety protocols, with the majority acknowledging the necessity of these measures for public health. A significant proportion (56.0%) strongly agreed that COVID-19 safety measures are essential, while 32.0% agreed, 6.0% remained neutral, and only a small percentage (6.0%) expressed disagreement. In terms of personal protective behaviors, 48.0% strongly agreed that they felt comfortable wearing a face mask in public places, while 36.0% agreed, 8.0% were neutral, and 8.0% disagreed to varying extents. Similarly, 52.0% strongly agreed that they practice social distancing in crowded areas, with an additional 34.0% agreeing, 6.0% being neutral, and 8.0% expressing disagreement. Hygiene practices were also widely endorsed, as 54.0% of the respondents strongly agreed that they regularly use hand sanitizers to prevent COVID-19, with 32.0% agreeing, 8.0% being neutral, and only 6.0% disagreeing. Compliance with COVID-19 guidelines in daily activities was supported by 50.0% of the respondents who strongly agreed, 34.0% who agreed, while 8.0% remained neutral and 8.0% disagreed. Regarding mandatory vaccination policies, opinions were more divided. While 44.0% strongly agreed that COVID-19 vaccines should be mandatory for all eligible individuals and 32.0% agreed, 12.0% remained neutral, and 12.0% disagreed. Avoidance of large gatherings due to COVID-19 concerns was strongly affirmed by 52.0% of respondents, while 30.0% agreed, 8.0% were neutral, and 10.0% expressed disagreement. The respondents' perception of government enforcement of COVID-19 safety measures varied, with 40.0% strongly agreeing that the government was doing enough, 36.0% agreeing, 12.0% remaining neutral, and 12.0% disagreeing. Overall, these findings suggest that while the majority of respondents exhibited a positive attitude toward COVID-19 safety protocols, there was a degree of hesitancy regarding vaccine mandates and government enforcement of preventive measures.

Table 4: Respondents' Adherence to COVID-19 Safety Protocols

Statements	Yes n (%)	No n (%)
Do you consistently wear a face mask to prevent COVID-19?	170 (68.0)	80 (32.0)
Do you wash your hands after touching shared objects outside your home?	207 (82.8)	43 (17.2)
Do you use soap whenever you wash your hands?	214 (85.6)	36 (14.4)
Do you practice social distancing or avoid crowded places?	162 (64.8)	88 (35.2)
Do you engage in handshaking despite COVID-19 precautions?	138 (55.2)	112 (44.8)
Do you consciously avoid touching your face and eyes?	150 (60.0)	100 (40.0)
Do you regularly use hand sanitizers or antiseptics?	183 (73.2)	67 (26.8)
Do you change your clothes immediately before interacting with family members after being outside?	97 (38.8)	153 (61.2)
Have you educated people around you about COVID-19 preventive measures?	168 (67.2)	82 (32.8)
Do you take vitamins or supplements to boost your immune system?	173 (69.2)	77 (30.8)
Do you use handkerchiefs when coughing or sneezing?	202 (80.8)	48 (19.2)

The adherence of respondents to COVID-19 safety protocols varied across different preventive measures. A significant proportion of participants (68.0%) reported consistently wearing a face mask as a preventive measure, while 32.0% admitted not adhering to this practice. Hand hygiene was widely observed, with 82.8% of respondents washing their hands after touching shared objects outside their homes, and 85.6% ensuring the use of soap while doing so. However, social distancing practices were followed by only 64.8% of respondents, whereas 35.2% did not consistently avoid crowded places. Regarding physical contact, 55.2% of respondents admitted to engaging in handshaking despite COVID-19 precautions, while 44.8% refrained from this practice. Additionally, 60.0% consciously avoided touching their face and eyes to minimize the risk of infection, whereas 40.0% did not adhere to this precaution. The use of hand sanitizers or antiseptics was reported by 73.2% of respondents, while 26.8% did not incorporate this measure into their daily routine. Changing clothes immediately after returning home before interacting with family members was practiced by only 38.8% of respondents, whereas 61.2% did not observe this precaution. A considerable number of respondents (67.2%) engaged in educating those around them about COVID-19 preventive measures, while 32.8% had not taken an active role in awareness efforts. In terms of immunity-boosting practices, 69.2% reported taking vitamins or supplements, while 30.8% did not engage in such practices. Additionally, 80.8% of respondents used handkerchiefs when coughing or sneezing, while 19.2% did not follow this respiratory etiquette.

Table 5: Barriers to Adherence to COVID-19 Safety Protocols

Barriers	Yes n (%)	No n (%)	Total
Limited access to personal protective equipment (PPE)	140 (56.0)	110 (44.0)	250
Belief that natural immunity is sufficient to prevent infection	170 (68.0)	80 (32.0)	250
Uncertainty and confusion about COVID-19 information	145 (58.0)	105 (42.0)	250
Preference for traditional remedies over preventive measures	148 (59.2)	102 (40.8)	250

Distrust in early research and guidelines on COVID-19	168 (67.2)	82 (32.8)	250
Psychological distress and depression affecting compliance	125 (50.0)	125 (50.0)	250
Relaxation of movement restrictions reducing perceived risk	154 (61.6)	96 (38.4)	250
Insufficient access to credible COVID-19 information sources	175 (70.0)	75 (30.0)	250
Smoking, alcohol use, and other lifestyle choices	113 (45.2)	137 (54.8)	250
Lack of strict enforcement of preventive measures	183 (73.2)	67 (26.8)	250
Absence of confirmed COVID-19 cases in the immediate environment	156 (62.4)	94 (37.6)	250
Misinformation and skepticism about COVID-19 vaccines	165 (66.0)	85 (34.0)	250
Religious and cultural beliefs discouraging compliance	147 (58.8)	103 (41.2)	250
Financial constraints limiting access to protective supplies	172 (68.8)	78 (31.2)	250
Influence of misleading social media content	160 (64.0)	90 (36.0)	250

The study identified various barriers that hindered adherence to COVID-19 safety protocols among respondents. Limited access to personal protective equipment (PPE) was a significant challenge, as 56.0% of participants reported difficulty obtaining masks and other protective gear. A substantial proportion of respondents (68.0%) believed that their natural immunity was sufficient to prevent infection, which may have contributed to reduced compliance with preventive measures. Uncertainty and confusion regarding COVID-19 information were also prevalent, with 58.0% of individuals expressing doubts about the accuracy and reliability of the information available to them. Similarly, 59.2% of respondents preferred using traditional remedies rather than adhering to standard preventive measures. Mistrust in early research and public health guidelines was another major barrier, as 67.2% of participants reported skepticism toward the initial recommendations on COVID-19 prevention. Psychological distress and depression played a role in adherence levels, with half of the respondents (50.0%) indicating that mental health challenges affected their ability to follow safety measures. The relaxation of movement restrictions further reduced the perceived risk of COVID-19, with 61.6% of participants stating that fewer restrictions led to a decline in adherence. Additionally, limited access to credible COVID-19 information sources was a concern for 70.0% of respondents, highlighting the need for improved communication strategies to enhance awareness. Certain lifestyle factors also contributed to poor adherence, as 45.2% of individuals cited smoking, alcohol use, and other habits as influences on their ability to comply with health protocols. The lack of strict enforcement of preventive measures by authorities was identified as a major concern, with 73.2% of respondents indicating that the absence of stringent regulations reduced adherence. Furthermore, the absence of confirmed COVID-19 cases within their immediate environment led 62.4% of participants to perceive a lower risk of infection, which may have influenced their decision to forgo precautionary measures. Misinformation and skepticism surrounding COVID-19 vaccines were also common, with 66.0% of respondents expressing doubts about the effectiveness and safety of vaccines. Religious and cultural beliefs played a role in adherence levels, as 58.8% of individuals reported that their faith or cultural practices discouraged compliance with certain preventive measures. Financial constraints further limited access to protective supplies, with 68.8% of respondents stating that economic barriers prevented them from consistently obtaining necessary protective equipment. The influence of misleading social media content was also a contributing factor, with 64.0% of individuals acknowledging that misinformation on digital platforms affected their perception of COVID-19 and their adherence to safety protocols.

Table 6: Significant Difference of Attitude Score About COVID-19 and Socio-Demographic Characteristics

Variables	n	Mean ± SD	t/F	p-value
Age group				
>25 years	90	36.5 ± 3.7	1.225	0.301
25-29 years	80	37.1 ± 3.8		
30-34 years	45	37.7 ± 4.5		
≥35 years	35	37.8 ± 3.9		
Gender				
Male	130	36.4 ± 4.0	-2.532	0.012*
Female	120	37.6 ± 3.5		
Marital status				
Single	180	36.9 ± 3.7	-1.743	0.082
Married	70	37.8 ± 4.1		
Employment status				
Employed	140	37.2 ± 3.8	1.642	0.102
Unemployed	110	36.5 ± 3.9		

The analysis of the significant difference in attitude scores about COVID-19 across various socio-demographic characteristics revealed variations among different groups. Regarding age, respondents aged 25 years and below had a mean attitude score of 36.5 ± 3.7, those aged 25-29 years had a mean score of 37.1 ± 3.8, while participants in the 30-34 age group recorded a mean score of 37.7 ± 4.5. The highest mean score was observed among respondents aged 35 years and above, with a value of 37.8 ± 3.9. However, the difference in attitude scores across age groups was not statistically significant ($t = 1.225$, $p = 0.301$). Gender differences were also examined, with male respondents recording a lower mean attitude score of 36.4 ± 4.0 compared to their female counterparts, who had a mean score of 37.6 ± 3.5. This difference was found to be statistically significant ($t = -2.532$, $p = 0.012$), indicating that females demonstrated a more positive attitude toward COVID-19 than males. Marital status also influenced attitude scores, as single respondents had a mean score of 36.9 ± 3.7, while married individuals had a slightly higher mean score of 37.8 ± 4.1. However, this difference did not reach statistical significance ($t = -1.743$, $p = 0.082$). Employment status was assessed as a potential determinant of attitude scores, with employed respondents showing a mean score of 37.2 ± 3.8, while unemployed participants recorded a lower mean score of 36.5 ± 3.9. Although employed individuals exhibited a slightly more favorable attitude toward COVID-19, the difference was not statistically significant ($t = 1.642$, $p = 0.102$).

Table 7: Factors Associated with Adherence to COVID-19 Protocols

Variables	Good Adherence n (%)	Poor Adherence n (%)	Total n	χ^2	p-value
Age Group					
>25 years	30 (33.3)	60 (66.7)	90	10.584	0.014*
25-29 years	35 (43.8)	45 (56.2)	80		
30-34 years	20 (44.4)	25 (55.6)	45		
≥35 years	18 (51.4)	17 (48.6)	35		
Gender				0.036	0.850
Male	50 (38.5)	80 (61.5)	130		
Female	53 (44.2)	67 (55.8)	120		
Marital Status				4.268	0.039*
Single	75 (41.7)	105 (58.3)	180		
Married	28 (40.0)	42 (60.0)	70		
Employment Status				6.101	0.047*
Employed	67 (47.9)	73 (52.1)	140		

Unemployed	36 (32.7)	74 (67.3)	110		

The analysis of factors associated with adherence to COVID-19 protocols revealed statistically significant relationships between adherence levels and certain socio-demographic characteristics. Age group was significantly associated with adherence to COVID-19 protocols ($\chi^2 = 10.584$, $p = 0.014$). Participants aged 35 years and above demonstrated the highest adherence, with 51.4% reporting good adherence compared to 48.6% with poor adherence. Conversely, those aged 25 years and below had the lowest adherence, with only 33.3% exhibiting good adherence, while 66.7% reported poor adherence. Gender did not show a significant association with adherence levels ($\chi^2 = 0.036$, $p = 0.850$), as adherence rates between males (38.5% good, 61.5% poor) and females (44.2% good, 55.8% poor) were relatively similar. Marital status exhibited a significant relationship with adherence ($\chi^2 = 4.268$, $p = 0.039$), as married individuals had a slightly higher proportion of good adherence (40.0%) compared to single individuals (41.7%). Employment status was also significantly associated with adherence ($\chi^2 = 6.101$, $p = 0.047$), with employed participants reporting a higher adherence rate (47.9%) compared to the unemployed (32.7%).

Discussion

This study examined the relationship between socio-demographic characteristics and attitudes toward COVID-19, as well as adherence to preventive protocols. The findings highlight significant associations between gender, marital status, employment status, and adherence to COVID-19 guidelines. These results contribute to the growing body of literature on behavioral responses to public health interventions during pandemics and emphasize the need for targeted health communication strategies.

The study found that gender was significantly associated with attitudes toward COVID-19, with females reporting a higher mean attitude score (37.6 ± 3.5) compared to males (36.4 ± 4.0, $p = 0.012$). This finding is consistent with previous research suggesting that women generally exhibit greater health consciousness and compliance with preventive measures than men (Alsharawy et al., 2021; Capraro & Barcelo, 2020). This heightened risk perception among females may stem from their traditional caregiving roles, increased exposure to health-related information, and a greater perceived responsibility for protecting family members from illness (Mohammed et al., 2022; Prati, 2020). However, despite these attitudinal differences, no significant association was found between gender and adherence to COVID-19 protocols ($p = 0.850$). This suggests that while women may express greater concern about the virus, both men and women engage in similar levels of preventive behavior, potentially due to widespread public health messaging and enforcement measures.

Marital status was found to be significantly associated with adherence to COVID-19 protocols ($\chi^2 = 4.268$, $p = 0.039$). Married individuals exhibited slightly higher adherence levels (40.0%) compared to singles (41.7%). This could be attributed to the increased sense of responsibility among married individuals to protect their families, as suggested by previous studies that indicate people with dependents are more likely to take preventive actions (Clark et al., 2020; Triberti et al., 2021). Moreover, married individuals may receive greater social reinforcement for protective behaviors, which has been shown to positively influence compliance with health recommendations (Dinić & Bodroža, 2021).

Employment status also played a significant role in adherence to COVID-19 protocols ($\chi^2 = 6.101$, $p = 0.047$). Employed individuals demonstrated higher adherence levels (47.9%) compared to their unemployed counterparts (32.7%). This aligns with existing research suggesting that those in formal employment settings are more likely to receive workplace guidance on COVID-19 precautions, have access to protective measures, and experience stricter enforcement of preventive behaviors (Jarynowski et al., 2021; Nivette et al., 2021). Conversely, unemployed individuals may have fewer resources to invest in preventive measures, such as purchasing personal protective equipment, and may perceive lower personal risk due to reduced social interaction (Gao et al., 2022).

Age was another significant determinant of adherence, with older participants (≥35 years) demonstrating the highest adherence rates (51.4% good adherence) compared to younger individuals ($p = 0.014$). This supports previous studies indicating that older adults, due to their higher vulnerability to severe COVID-19 complications, are more likely to comply with preventive measures (Bish & Michie, 2010; Pasion et al., 2020). In contrast, younger individuals, particularly those below 25 years, exhibited the lowest adherence rates (33.3%), possibly due to lower perceived susceptibility to severe illness and greater social engagement patterns that make adherence challenging (Barceló & Sheen, 2020). Furthermore, younger individuals may experience "pandemic fatigue" more acutely, leading to reduced compliance over time (World Health Organization, 2021).

Conclusion

The findings of this study highlight significant socio-demographic differences in attitudes and behaviors toward COVID-19 prevention. Gender, marital status, employment status, and age all played critical roles in shaping individuals' compliance with public health guidelines. These insights are crucial for informing public health policies and interventions that aim to improve adherence to preventive measures. Addressing the socio-demographic factors influencing health behaviors can enhance the effectiveness of public health campaigns and improve overall compliance with preventive measures in future public health crises.

Implications for Public Health Interventions

The results underscore the importance of developing targeted public health interventions to address disparities in adherence to COVID-19 protocols. Messaging tailored toward younger populations should emphasize the broader community benefits of adherence, rather than focusing solely on individual risk. Campaigns targeting unemployed individuals could incorporate economic incentives, such as subsidized protective equipment, to encourage compliance. Workplace policies should continue to reinforce adherence through structured guidelines and resources to promote sustained compliance. Additionally, gender-sensitive messaging may help bridge gaps in risk perception and behavioral responses between males and females.

Limitations and Future Research

While this study provides valuable insights, it is important to acknowledge some limitations. Self-reported adherence may be subject to social desirability bias, where participants overestimate their compliance with preventive measures. Future studies could employ observational methods or use digital tracking tools to measure actual adherence more accurately. Additionally, qualitative research exploring the psychological and socio-cultural factors influencing adherence across different demographic groups could provide deeper insights into behavior change mechanisms. Further investigation is also needed into the long-term sustainability of COVID-19 preventive behaviors and how pandemic fatigue affects compliance over time.

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