


Understanding the Facilitators and Barriers to COVID-19 Vaccine Uptake Among Teachers in the Sagnarigu Municipality of Northern Ghana: A Cross-Sectional Study

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Purpose: This research aims to identify facilitators and barriers to COVID-19 vaccination intention and uptake among teachers in the Sagnarigu Municipality of Ghana.

Methods: The survey collected quantitative data from the teachers using a cross-sectional study design. Logistic regression analysis was used to identify facilitators and barriers to COVID-19 vaccination.

Results: The teachers' (N = 421) COVID-19 vaccination intention before rollout, after rollout, and actual uptake were 49%, 63%, and 11%, respectively. In a multiple regression analysis, key facilitators of intention were vaccinated against hepatitis B (AOR: 2.5, 95 CI: 1.03, 4.93), willingness to recommend COVID-19 vaccine to students (AOR: 4.78, 95% CI: 1.95, 11.70), adequacy of information about the expectation of the COVID-19 vaccine (2.42, 95% CI: 1.04, 5.56), and the disbelief that COVID-19 vaccine will cause illness (AOR: 2.50, 95% CI: 1.16, 5.33). Unconfident in the COVID-19 vaccine (AOR: 0.01, 95% CI: 0.001, 0.118), perception of not being susceptible to COVID-19 (AOR: 0.38, 95% CI: 0.17, 0.88), and feeling uncomfortable getting the vaccine (AOR: 0.17, 95% CI: 0.08, 0.38) were barriers to COVID-19 vaccination intention. Key facilitators of COVID-19 vaccine uptake were being a Christian (AOR: 3.63, 95% CI: 1.60, 8.24), teaching in the Senior High School (SHS)/technical (AOR: 13.43, 95% CI: 1.90, 9.48). Barriers to the vaccine uptake were uncomfortable getting the vaccine (AOR: 0.06, 95% CI: 0.06, 0.49), disbelief that vaccinating teachers will reduce school absenteeism (AOR: 0.45, 95% CI: 0.18, 1.07), unconfident in the COVID-19 vaccine (AOR: 0.45, 95% CI: 0.18, 1.07), and unavailability of the COVID-19 vaccine.

Conclusion: Facilitators and barriers to COVID-19 vaccination are multifaceted, including sociodemographic, health beliefs, and contextual factors. Addressing the obstacles to COVID-19 vaccination is crucial for adequate COVID-19 vaccine coverage among teachers in Ghana.

Keywords: COVID-19 vaccination, barriers, vaccine uptake, school health, teachers, Ghana

Introduction

The coronavirus disease-2019 (COVID-19) has spread to all continents, causing significant public health crises.¹ Globally, data reported to the WHO showed COVID-19 has infected over 200 million individuals, yielding over 4 million mortalities as of 17 August 2021.¹ The Republic of Ghana has reported more than 100 thousand confirmed cases of COVID-19 and 945 deaths as of 14 August 2021.² Public health prevention measures such as washing hands, wearing masks, avoiding crowded places, and physical distancing are recommended for the prevention and control of the COVID-19 pandemic.³ In addition to these public health preventive measures, there are safe and efficacious COVID-19 vaccines for immunization against the global pandemic.⁴ Indeed, the role of the COVID-19 vaccine in preventing SARS-COV-2 infection has long been established by scholars.⁵⁻⁸ Therefore, the COVID-19 vaccine is recommended for all qualified individuals, including teachers.^{6,7}

Despite the potential role of the COVID-19 vaccine in preventing SARS-COV-2 infections, there are reports of vaccine hesitancy. For instance, preliminary studies in Ghana showed that vaccine acceptance ranges from 39–70% among health workers^{9,10} and 51–54% among the general population.^{11,12} In the Republic of Nigeria, only 50% of the sample were willing to accept the COVID-19 vaccine.¹³ Those unwilling to receive the COVID-19 vaccine raise concerns of safety, efficacy, effectiveness, side effects, and rust in developing the COVID-19 vaccine as the primary reasons for their hesitancy.^{9,12,14} In African countries, the COVID-19 vaccination rollout has been constrained by the unavailability of COVID-19 vaccines due to limited funds, storage requirements, and conflicts.¹⁵ Lastly, a recently published study in Ethiopia showed sociodemographic factors and health beliefs of the individual plays a role in COVID-19 vaccine acceptance.¹⁶

Ghana started its COVID-19 vaccination campaigns on 1 March 2021 after receiving 600,000 initial doses of the AstraZeneca vaccine through the COVAX facility.¹⁷ These initial doses were meant for healthcare workers and people with underlying medical conditions. As of 27 January 2022, Ghana has administered over 10 million doses of COVID-19 vaccine comprising 6,712,407 AstraZeneca, 17,982 Sputnik V, 1,048,590 Moderna, 1,505,552 Pfizer-BioNTech and 740,950 COVID-19 vaccine Janssen.¹⁷

Early studies conducted in developed countries showed actual COVID-19 uptake among the general population ranges from 51%–89%.^{18–20} This indicates that COVID-19 vaccine uptake is a significant problem that needs serious attention. Several scholars have investigated factors associated with COVID-19 vaccine acceptance and uptake among healthcare workers.^{9,20,21} These studies are necessary since healthcare workers are at heightened risk of acquiring the SARS-COV-2. Like healthcare workers, teachers work in environments suitable for COVID-19 spread, elevating the teacher's risk of contracting the COVID-19 virus and possible spread to their families and students. Indeed, there are concerns about school reopening and COVID-19 transmission in the schools.^{22,23} Additionally, teachers' vaccine acceptance and subsequent uptake are crucial for the continuous functioning of schools, ensuring the teachers' safety and protection of school children. Against this backdrop, the United Nation's Children Emergency Fund (UNICEF) calls for the prioritization of teachers to receive the COVID-19 vaccine following vaccination of healthcare workers and high-risk populations.²⁴

Despite this call by the UNICEF, there is limited data regarding Ghanaian teachers' COVID-19 vaccination intention and uptake since the rollout of the COVID-19 vaccination in Ghana. Earlier studies on COVID-19 vaccine acceptance in Ghana have primarily focused on healthcare workers⁹ and the general population.^{11,12} To date, no research has been conducted to evaluate COVID-19 vaccination intention and uptake among teachers in Ghana. Therefore, this present study examines facilitators and barriers to COVID-19 vaccination intention and uptake among teachers in the Sagnarigu Municipality of Ghana. This study is crucial as it will form the scientific basis for interventions to ensure adequate COVID-19 vaccine coverage among teachers in Ghana.

Materials and Methods

Study Design and Setting

The study was a cross-sectional study conducted among teachers in Sagnarigu Municipality of Ghana. This study was conducted following guidelines for reporting cross-sectional surveys.²⁵ The study was undertaken between April 2021 to September 2021. Sagnarigu Municipality is one of the municipalities in the Northern region of Ghana. The Municipality, which was carved out of the Tamale metropolis in 2012 by legislative instrument 2066, shares boundaries with Savelugu, Tolon, and Kumbungu Districts. The Sagnarigu municipality has 86 communities and covers a land size of 200.4km².²⁶ The estimated population of the Sagnarigu municipality is 186,796, with a male population of 93,761.

The Sagnarigu Municipality is home to notable Senior High Schools (SHSs) such as Tamale SHS, Tamale Technical Institute, Northern School of Business, Tamale Business Senior High, and Islamic Science Senior High School. The Municipality housed about 205 basic schools comprising 33 nursery/Kindergarten, 119 primary schools, and 53 Junior High Schools (JHSs). The Municipality has over 2000 teachers at the basic school level.²⁶

Study Population, Sample Size, and Sampling

The study participants were teachers in the primary, Junior high, and Senior High schools located within the catchment area of the Sagnarigu Municipality. The sample size for the study was determined using the Cochran formula²⁷ at 95% confidence interval, 5% margin of error, and vaccine acceptance of 54% from a previous study in Ghana.¹¹ The minimum sample size was 420 study subjects after adjusting for a 10% non-response rate.

The study participants were selected using a cluster and consecutive sampling technique. First, Sagnarigu was divided into three area councils: Sagnarigu-Choggu, Kalpohin, and Kanvilli. Ten schools from each area council were randomly selected through the lottery method. The names of all the schools in each area council were written on papers and placed in a bowl for selection without looking into the bowl. The sample size was proportionally allocated to these area councils based on the number of schools in each area council. The teachers in the schools were selected through consecutive sampling. That is, teachers who met the inclusion criteria and consented to participate were given a questionnaire to complete until the allocated number for the school was reached.

Data Collection Procedure

The data were collected through self-administration. The questionnaire ([supplementary File 1](#)) was distributed to the consented teachers by the research assistants at their schools. This enables the teachers to answer the questions at their convenience. For each distributed questionnaire, one week period was given before collection. The study tool was developed and modified to suit the study after reviewing previous literature.^{19,28,29} The study tool consisted of socio-demographic information, COVID-19 vaccine uptake, intention, and attitudes towards the COVID-19 vaccine. The study tool was pretested on 5% of the study sample size, and questions that needed modification were modified accordingly.

The study was conducted per the Helsinki declaration for medical research.³⁰ Approval for the study was obtained from the Municipal Education Directorate of the Ghana Education Service (GES/NR/SMEO/MC41). Informed consent was obtained from all study participants before distributing the study questionnaire. The study was completely anonymous, and no personal identifiers were collected in the entire data collection process.

Study Variables

The explanatory variables of the study were age, gender, religion, marital status, educational qualification, number of children, presence of chronic disease, and willingness to recommend the COVID-19 vaccine to students. The explanatory variables also included the teachers' attitudes toward the COVID-19 vaccine ([supplementary file 1](#)).

The outcome variables of the study were the intention to receive the COVID-19 vaccine and COVID-19 vaccine uptake.

Intention before rollout: It was measured by asking the teachers, "Before the rollout of the COVID-19 vaccination in Ghana, did you intend to take the vaccine when made available?". There were two responses: "Yes" and "No."

Current intention to receive the COVID-19 vaccine: It was also evaluated by asking the teachers, "Currently, do you intend to receive the COVID-19 Vaccine when it is made available to you?" and the responses were "Yes" and "No." The study used the current intention to identify predictors of COVID-19 vaccination intention since intent before rollout might be prone to recall bias. Additionally, the current intention was also assessed for only the unvaccinated teachers.

COVID-19 vaccine uptake: It was measured by asking whether "they have been vaccinated against COVID-19," and the responses were "Yes" and "No."

Statistical Analysis

The data were entered into an excel template and transported into STATA 16.0 for analysis. The data were summarized using descriptive statistics such as mean and standard deviation for continuous variables; frequency and percentages for categorical variables. Inferential statistics were performed using the Chi-square test of independence and multivariate logistic regression to identify facilitators and barriers to the teachers' COVID-19 vaccine uptake and intention. A variable was included in the multivariate logistic if that variable were significant during the Chi-square test at a P-value less than 0.05.

Results

Sociodemographic Characteristics of the Study Sample

School teachers (19–68 yrs, mean age, SD: 35.5±8.8, n=421) participated in the study. Most (56%) of the study participants were males, 71% were married, and 62% were affiliated with the Islamic religion. A significant majority (84%) of the teachers were from the public school, 43% were teaching at the primary level, and most (61%) of the study participants had a first degree as their highest qualification. More than half (67%) of the study participants reported receiving the hepatitis B vaccine. A vast majority (79%) of the teachers were willing to recommend the COVID-19 vaccine to their students (Table 1).

COVID-19 Vaccine Intention and Uptake Among School Teachers

The reported intention to receive the COVID-19 before its rollout in Ghana was 49%, while the study participants' intention after rollout was 63%. There were significant differences between intention to receive before and after rollout ($P<0.001$). Additionally, there was a significant difference between reported intention before rollout and actual uptake of the vaccine ($P<0.001$). COVID-19 vaccine uptake rate was 11%, and about 52% of the vaccinated have completed the COVID-19 vaccination. Preferred vaccines for the unvaccinated intending to receive were John & Johnson (66%) and AstraZeneca (20%). A little over 27% were completely confident in the effectiveness of the COVID-19 vaccine (Table 1).

Motivation for Receiving the COVID-19 Vaccine

The three top reasons for receiving the COVID-19 vaccine were prevention of COVID-19 (84%), help protect my families, friends, and the community (75%), and protection of students/pupils (52%) (Table 2).

Reasons for Not Receiving the COVID-19 Vaccine

The three top reasons for not receiving the COVID-19 vaccine were unavailability of the COVID-19 vaccine (52%), concern about side effects from the vaccine (45%), and lack of knowledge about the COVID-19 vaccine (20%) (Table 2).

Facilitators and Barriers to COVID-19 Vaccination Intention

Facilitators of intent to receive the COVID-19 vaccine were vaccination against Hepatitis B (AOR: 2.5, 95 CI: 1.03, 4.93), willingness to recommend the COVID-19 vaccine to students (AOR: 4.78, 95% CI: 1.95, 11.70), having adequate information about the expectation of the COVID-19 vaccine (AOR: 2.42, 95% CI: 1.04, 5.56). Intention to receive the COVID-19 vaccine was less likely among teachers who had no confidence in the effectiveness of the COVID-19 vaccine (AOR: 0.01, 95% CI: 0.001, 0.118) (Table 3).

Intention to receive the COVID-19 vaccine was also less likely among respondents who were uncomfortable in getting the COVID-19 vaccine (AOR: 0.17, 95% CI: 0.08, 0.38) and those who disagree that they are more likely to contract COVID-19 (AOR: 0.38, 95% CI: 0.17, 0.88). On the contrary, teachers who disagree that the COVID-19 vaccine will make them sick were 2.5 times more likely to intend to receive the COVID-19 vaccine (AOR: 2.50, 95% CI: 1.16, 5.33) (Table 3).

Facilitators and Barriers to COVID-19 Vaccine Uptake Among School Teachers

Facilitators of COVID-19 vaccine uptake were affiliation to Christianity (AOR: 3.06, 95% CI: 1.60, 8.24), teaching in the SHS/technical (AOR: 13.43, 95% CI: 1.90, 9.48), hepatitis B vaccination (AOR: 3.05, 95% CI: 0.98, 9.51) and having adequate information about the expectation of the COVID-19 vaccine (AOR: 4.84, 95% CI: 2.10, 11.65). COVID-19 vaccination was less likely among teachers who were uncomfortable going for the COVID-19 vaccine (AOR: 0.06, 95% CI: 0.06, 0.49) and teachers who disagree that vaccinating teachers will reduce school absenteeism (AOR: 0.45, 95% CI: 0.18, 1.07). Teachers who were somewhat confident in the effectiveness of the COVID-19 vaccine were less likely to receive the COVID-19 vaccine (AOR: 0.45, 95 CI: 0.18, 1.07) (Table 4).

Table I Sociodemographic Characteristics and COVID-19 Vaccination of the Study Sample

| Variables | Mean (SD) | Min-Max |
|--|------------------|--------------------|
| Age (years) | 35.5(8.8) | 19–68 |
| Working experience | 9.3(7.6) | 0–37 |
| Number of children | 2.1(1.8) | 0–8 |
| | Frequency | Percent (%) |
| Gender | | |
| Female | 186 | 44.2 |
| Male | 235 | 55.8 |
| Marital status | | |
| Married | 298 | 70.8 |
| Separated/Divorced | 8 | 1.9 |
| Single | 115 | 27.3 |
| Religious affiliation | | |
| African Traditional Religion | 4 | 1 |
| Christianity | 158 | 37.5 |
| Islam | 259 | 61.5 |
| School type | | |
| Day-care/KG | 39 | 9.3 |
| JHS | 174 | 41.3 |
| Primary | 180 | 42.8 |
| SHS/technical | 28 | 6.7 |
| Ownership of school | | |
| Private School | 67 | 16.1 |
| Public school | 350 | 83.9 |
| Highest qualification | | |
| Certificate | 1 | 0.2 |
| Diploma | 106 | 25.3 |
| First degree | 254 | 60.6 |
| Postgraduate | 31 | 7.4 |
| WASSCE/SSCE | 27 | 6.4 |
| Age | | |
| ≥39 | 265 | 62.9 |
| ≥39 | 156 | 37.1 |
| Number of children | | |
| Less than three | 252 | 60.0 |
| Greater than three | 168 | 40.0 |
| Teaching experience | | |
| < 11 | 256 | 60.8 |
| ≥ 11 | 165 | 39.2 |
| Received Hepatitis B vaccine | | |
| No | 138 | 32.8 |
| Yes | 283 | 67.2 |
| Willing to recommend COVID-19 vaccine to students | | |
| No | 90 | 21.4 |
| Yes | 330 | 78.6 |
| Presence chronic disease | | |
| No | 392 | 93.1 |
| Yes | 29 | 6.9 |
| Have Family Member diagnosed with COVID-19 | | |
| No | 397 | 94.3 |
| Yes | 24 | 5.7 |

(Continued)

Table 1 (Continued).

| Variables | Mean (SD) | Min-Max |
|---|-----------|---------|
| Intention before the rollout of COVID-19 vaccination in Ghana | | |
| No | 213 | 50.6 |
| Yes | 208 | 49.4 |
| Received COVID-19 vaccine | | |
| No | 377 | 89.5 |
| Yes | 44 | 10.5 |
| Number of Doses received | | |
| I received Single John and Johnson | 3 | 6.8 |
| One dose | 21 | 47.7 |
| Two doses | 20 | 45.5 |
| Current intention to receive COVID-19 vaccine | | |
| No | 141 | 37.4 |
| Yes | 236 | 62.6 |
| Preferred vaccine for unvaccinated with the intention to receive | | |
| AstraZeneca | 46 | 19.5 |
| Johnson and Johnson | 155 | 65.7 |
| Moderna | 5 | 2.1 |
| Pfizer/Biontech | 9 | 3.8 |
| Sinopharm | 3 | 1.3 |
| Sinova-coronavac | 1 | 0.4 |
| Sputnik v | 17 | 7.2 |
| Have adequate information about the expectations of the COVID-19 vaccine | | |
| No | 289 | 68.6 |
| Yes | 132 | 31.4 |
| Have adequate information to make an informed decision to receive the COVID-19 | | |
| No | 261 | 62.0 |
| Yes | 160 | 38.0 |
| Confidence in the effectiveness of the COVID-19 vaccine | | |
| Completely confident | 113 | 26.8 |
| Not confident at all | 132 | 31.4 |
| Somewhat confident | 176 | 41.8 |

Discussion

Teachers are crucial for the continuity of education amid the COVID-19 outbreak and response. The study investigated facilitators and barriers to COVID-19 vaccination intention and uptake among school teachers in the Sagnarigu Municipality of Northern Ghana. The current study is vital as it has provided initial data about COVID-19 vaccination intention, uptake, and associated factors among teachers in Ghana. Sixty-three percent of the unvaccinated teachers intend to receive the COVID-19 vaccine. This finding is higher than earlier studies conducted among the Ghanaian population^{11,12} and Ghana's healthcare workers.⁹ However, the intent in this study is lower than studies conducted elsewhere.^{31,32} The reason for these differences is unclear, but intention to receive the COVID-19 vaccine is affected by a complex web of factors.^{31–33}

In this study, teachers intending to go for the COVID-19 vaccine were constrained by the unavailability of the COVID-19 vaccine and fear of possible side effects from the vaccine. The challenge of COVID-19 vaccine access in African countries has been emphasized by Nachega et al.³⁴ Indeed, Africa's COVID-19 vaccine rollout has been challenged by a low supply of the vaccine.³⁵ Other scholars in Ghana have also emphasized the concern of possible side effects from the COVID-19 vaccine.^{9,12} However, side effects and deaths related to the COVID-19 vaccine are uncommon.³⁶

Table 2 Motivation for and Not Receiving the COVID-19 Vaccine

| Motivation for receiving the COVID-19 vaccine (N = 44) | n(%) |
|---|-------------|
| Prevention of COVID-19 | 37(84.1) |
| Help protect my families, friends, and the community | 33(75.0) |
| Protection of my students/pupils | 23(52.0) |
| Protecting myself to avoid school absenteeism | 15(34.0) |
| COVID-19 Vaccine will stop the outbreak | 13(30.0) |
| COVID-19 vaccine is safe | 11(25.0) |
| I heard it is recommended to get COVID-19 Vaccine | 17(16.0) |
| Reasons for not receiving the COVID-19 vaccine (N = 377) | |
| Fear of needles | 34(9.0) |
| Lack of knowledge about the COVID-19 vaccine | 75(20.0) |
| I do not need it since I am not in the risk group | 24(6.0) |
| The vaccine is not safe | 39(10.0) |
| I am against vaccines in general | 17(5.0) |
| COVID-19 vaccine is ineffective | 19(5.0) |
| Lack of time | 18(5.0) |
| Concerned about side effects | 170(45.0) |
| Unavailability of COVID-19 vaccine | 195(52.0) |

Note: Multiple responses possible.

Ensuring access to the COVID-19 vaccine is vital for guaranteeing adequate COVID-19 vaccine coverage among teachers in the Sagnarigu Municipality of Ghana. Additionally, debunking the misleading claims about post-COVID-19 vaccination deaths and side effects is crucial in facilitating vaccine uptake. Further, to ensure unimpeded access to the COVID-19 vaccine, COVID-19 vaccination centers should be immediately instituted in all schools.

We noticed a remarkable gap between intention to receive the vaccine before rollout and actual vaccine uptake. This is a validation of a recent study that found a significant gap between intention and actual uptake of the COVID-19 vaccine among Poland teachers.³⁷ Perhaps, focusing on facilitators and barriers to COVID-19 vaccine uptake may help the teachers translate their intent to actual uptake of the COVID-19 vaccine.

COVID-19 vaccine uptake in the study sample was unacceptably low. This is in variance with a study conducted among teachers in Poland, where over 63% of the sampled teachers had received the COVID-19 vaccine.³⁷ In the United States of America, poorer counties' vaccine uptake rate is 48%,³⁸ higher than COVID-19 vaccine uptake in this present study. Furthermore, a recently published study in Ethiopia showed that vaccine uptake was higher (62%)³⁹ than teachers in the sagnarigu Municipality. These discrepancies may be due to sociodemographic, beliefs and context-specific factors.

The key motivation for receiving the COVID-19 vaccine was the desire to avoid contracting the COVID-19 virus and for the protection of families, friends, and the community. This aligns with published studies in Poland³⁷ and the United States of America.²⁹ Public health communication strategies aimed at encouraging COVID-19 vaccine uptake should include these motivators.

We explored facilitators and barriers to COVID-19 vaccination intention and uptake among the school teachers. Compared to Muslim teachers, those aligned to the Christian faith were more likely to receive the COVID-19 vaccine. This finding is a validation of a study conducted in the Eastern African country of Ethiopia.¹⁶ Religious values might have played a crucial role in COVID-19 vaccine uptake. Public health campaigns aimed at increasing vaccine uptake in this dominant Muslim population should engage religious leaders. Compared to teachers in Daycare/Kindergartens, those in the SHS/Technical schools had higher odds of receiving the COVID-19 vaccine. There have been reported cases of COVID-19 infections in Ghanaian SHSs.⁴⁰ This may be the possible explanation for this finding, as the SHS teachers may consider themselves at risk of contracting the COVID-19 virus.

The study's findings also showed that teachers who previously received the Hepatitis B vaccine were more likely to have COVID-19 vaccination intention; vaccine uptake was also higher among teachers who were previously vaccinated against hepatitis B. In a scoping review, Joshi et al intimated that previous influenza vaccination affected COVID-19

Table 3 Facilitators and Barriers to COVID-19 Vaccination Intention Among School Teachers in Sagnarigu Municipality

| Predictors | AOR (95% CI) | P-value |
|---|--------------------|---------|
| Received Hepatitis B Vaccine | | |
| No | Ref | |
| Yes | 2.56(1.03, 4.93) | 0.041 |
| Willing to recommend COVID-19 vaccine to students | | |
| No | Ref | |
| Yes | 4.78(1.95, 11.70) | 0.001 |
| Have adequate information about the expectations of the COVID-19 vaccine | | |
| No | Ref | |
| Yes | 2.42(1.04, 5.56) | 0.040 |
| Confident in the effectiveness of the COVID-19 vaccine | | |
| Completely confident | Ref | |
| Not confident at all | 0.01(0.001, 0.118) | <0.001 |
| Somewhat confident | 0.13(0.02, 1.07) | 0.057 |
| COVID-19 vaccine will make me sick | | |
| Agree | Ref | |
| Disagree | 2.50(1.16, 5.33) | 0.02 |
| I feel comfortable getting the COVID-19 vaccine | | |
| Agree | Ref | |
| Disagree | 0.17(0.08, 0.38) | <0.001 |
| Compared to my friends, I am more likely to get COVID-19 | | |
| Agree | Ref | |
| Disagree | 0.38(0.17, 0.88) | 0.024 |
| My co-worker's think I should get a COVID-19 vaccine | | |
| Agree | Ref | |
| Disagree | 0.24(0.11, 0.52) | <0.001 |

Abbreviations: AOR, Adjusted odds ratio; CI, Confidence interval.

acceptance across the globe.⁴¹ Perhaps, the motivation for Hepatitis vaccination might have played a role in facilitating the teacher's intent to receive the COVID-19 vaccine. A vast majority of the teachers were willing to recommend the COVID-19 vaccine to their students if they were eligible to receive it. This is an encouraging finding and may promote the COVID-19 vaccine uptake among students in Ghana. Indeed, teachers who were willing to recommend the COVID-19 vaccine to their students had higher odds of intent to receive the COVID-19 vaccine. The role of teachers in the success of school-based health interventions has been documented in a previous study in Canada.⁴² Engaging the teachers is critical to the successful rollout of COVID-19 vaccination in schools.

Teachers who reported having adequate information about the expectations of the COVID-19 vaccine had higher COVID-19 vaccination intention and uptake. This finding is supported by an earlier study conducted among nursing staff in the United States of America.¹⁹ Educating the teachers about how the COVID-19 vaccine works may motivate subsequent COVID-19 vaccine uptake. The study found lower odds of intention to receive the COVID-19 vaccine among teachers who had no confidence in the effectiveness of the COVID-19 vaccine. Previous studies among Finnish healthcare workers and American nursing staff support this finding.^{19,43} Furthermore, teachers who were doubtful about the efficacy of the COVID-19 vaccine were less likely to receive the vaccine. Programs that seek to build the teachers' confidence are crucial for increasing vaccine uptake. Such programs should include evidence of the effectiveness of the COVID-19 vaccine in preventing SARS-COV-2 infection.

The teachers' attitudes significantly predicted their intention to receive the COVID-19 vaccine and subsequent vaccine uptake. For instance, teachers who were uncomfortable getting the COVID-19 vaccine had lower COVID-19

Table 4 Facilitators and Barriers to COVID-19 Vaccine Uptake Among School Teachers in Sagnarigu Municipality

| Predictors | AOR(95% CI) | P-value |
|---|-------------------|---------|
| Religious affiliation | | |
| Islam | Ref | |
| Christianity | 3.63(1.60, 8.24) | 0.002 |
| Category of school | | |
| Daycare/Kindergarten | Ref | |
| Primary | 0.92(0.21, 4.03) | 0.915 |
| JHS | 0.88(0.21, 3.71) | 0.851 |
| SHS/Technical | 13.43(1.90, 9.48) | 0.009 |
| Received Hepatitis B vaccine | | |
| No | Ref | |
| Yes | 3.05(0.98, 9.51) | 0.049 |
| Have adequate information about the expectations of the COVID-19 vaccine | | |
| No | Ref | |
| Yes | 4.84(2.10, 11.65) | <0.001 |
| Confident in the effectiveness of the COVID-19 vaccine | | |
| Completely confident | Ref | |
| Not confident at all | 0.12(0.01, 1.05) | 0.056 |
| Somewhat confident | 0.26(0.09, 0.53) | <0.001 |
| I feel comfortable getting the COVID-19 vaccine | | |
| Agree | Ref | |
| Disagree | 0.06(0.06, 0.49) | 0.009 |
| Vaccinating teachers may reduce work absenteeism | | |
| Agree | Ref | |
| Disagree | 0.45(0.18, 1.07) | 0.048 |

Abbreviations: AOR, Adjusted odds ratio; CI, Confidence interval; JHS, Junior High School; SHS, Senior High School.

vaccination intention and uptake. This is in line with a previous study conducted among secondary school teachers in the United States of America.²⁹ Additionally, perception of not susceptible to contracting the COVID-19 was a barrier to COVID-19 vaccination intention. In a similar study, Ethiopian teachers' perception of being at risk of contracting the COVID-19 virus was a motivator for COVID-19 vaccination intention.¹⁶ This finding reinforced that if people perceived themselves at risk of contracting SARS-COV-2, they would be more willing to accept the COVID-19 vaccine.⁴⁴ Disbelief that the COVID-19 vaccine will cause illness was a definite predictor of COVID-19 vaccination intention. This is in line with flu vaccination uptake among Irish Hospital workers.²⁸ Addressing the negative attitudes of the teachers may play a crucial role in facilitating vaccine intention and subsequent uptake. Furthermore, the belief that vaccinating teachers will reduce school absenteeism was a key predictor of vaccine uptake. This agrees with a study conducted in Saudi Arabia, where perceived benefit facilitated COVID-19 vaccination intention.³²

This is the first study to evaluate COVID-19 vaccination intention and uptake among teachers in Ghana. Additionally, the present research is crucial to literature since it evaluated both intent to receive and actual uptake of the COVID-19 vaccine. However, the study design could not allow for causality among variables. The non-probability sampling technique may not allow for the generalizability of the findings.

Conclusion and Recommendations

This study has contributed to our understanding of teachers' COVID-19 vaccination intention and uptake among teachers in Ghana. The current research has demonstrated a significant increase in the teachers COVID-19 vaccination intention

before and after rollout in Ghana. The teachers' COVID-19 vaccine uptake was constrained by the unavailability of the COVID-19 vaccine, fear of side effects, and lack of knowledge about the COVID-19 vaccine. Common and divergent facilitators and barriers influenced COVID-19 vaccine uptake among the teachers. These facilitators and barriers are multifaceted, stemming from sociodemographic, health beliefs, and contextual factors. Addressing these facilitators and barriers is crucial for increasing future COVID-19 vaccine uptake among teachers in Ghana. This should include building the confidence of the teachers about the efficacy of the vaccine, dispelling misconceptions about susceptibility and side effects of the COVID-19 vaccine, and ultimately, ensuring that the vaccine is available to those willing to receive it. This is particularly important for adequate COVID-19 vaccine coverage among teachers in Ghana.

Data Sharing Statement

The data used in this study are available from the author upon reasonable request.

Acknowledgment

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Author Contributions

The author made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis, and interpretation, or in all these areas; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

The author declares no competing interests in this work.

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