Final Report of Summative Learning Project (SLP) presented to the BRAC James P Grant School of Public Health, BRAC University.

An assessment of knowledge and uptake of COVID-19 vaccine among the school going students at Cox Bazar in Bangladesh

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Abstract

Adequate knowledge about COVID-19 vaccination among school students is necessary after the re-opening of schools to ensure that the students stay protected from COVID-19. BRAC has implemented interventions in the selected schools of Cox's Bazar to increase knowledge and awareness about COVID-19. The purpose of this research was to evaluate the knowledge of school students about COVID-19 vaccination and the uptake rate of the vaccines among students who have received BRAC intervention at Cox's Bazar. The sample size calculated for this study was 1546. The study used the descriptive statistics and logistic regression to assess the knowledge and uptake rate of vaccines and the associated factors with vaccine uptake among the students. The study found that 94% of the surveyed students knew about the COVID-19 vaccine, and 92% of them knew accurately about the vaccine doses. Moreover, 91% of the surveyed students have knowledge about the vaccine registration process. In the case of vaccine uptake, 97% of the surveyed students have taken a minimum of one dose of COVID-19 vaccine, and both male and female students have nearly equal uptake percentages. The logistic regression showed that the student's age, the education of mother, the upazila (sub-district), the student's knowledge about vaccination, and the student's knowledge about the vaccination process are significant factors associated with vaccine uptake. The knowledge about vaccines among students and the vaccine uptake rate were satisfactory. The results of this study demonstrated that the BRAC intervention to create awareness among students in schools has been successful in terms of COVID-19 vaccination.

Introduction

Coronavirus sickness is caused by the SARS-CoV-2 virus. (World Health Organization, 2019). The symptoms of COVID-19 in their clinical form include fever, malaise, exhaustion, dry cough and breathing problems (Reuben et al., 2021). Direct dissemination by coughing, sneezing, and inhaling droplets as well as Contact with the mucosa of the nasal, oral, and eye can result in contact transmission are the main mechanisms of transmission (Jayaweera et al., 2020). Almost every nation in the world is currently affected by the virus (Nzaji et al., 2020). The current COVID-19 pandemic, which is the world's biggest public health emergency, has resulted in enormous death and morbidity as well as huge economic damage (Issanov et al., 2021). More than 628.3 million confirmed cases of coronavirus illness (COVID-19) had been reported globally as of November 3, 2022, with more than 6.5 million deaths (WHO, 2022). 1.28 million cases have been documented as of November 18th, 2021, and there had been more than 28.6 thousand deaths overall in the SAARC nations (Hayat et al., 2022). Effective and secure vaccines are vitally needed to reduce the burden of COVID-19 and health system (Yu et al., 2022). In the sphere of public health, where it has been successful in eradicating and controlling many infectious illnesses globally, vaccination is seen as a key advancement (e.g., smallpox, polio, and rubella) (Nzaji et al., 2020). Nevertheless, there are a number of recently created COVID 19 vaccines available, some of which have already been used in several nations (Issanov et al., 2021).

Bangladesh is advancing its vaccine strategy and immunization program as well (Abedin et al., 2021). However, sufficient knowledge and supportive attitudes toward the vaccination are necessary for a successful immunization program. The COVID-19 situation is at its lowest in the South Asian area as a result of the sharp increase in COVID-19 cases in Nepal and India. Bangladesh, a neighboring nation, has similarly fought to contain the epidemic by implementing the lockdown procedure (Siddique et al., 2021). However, the lockdown had to end because of increased economic hardship brought on by the lockdown (Bhuiyan et al., 2021). In accordance with WHO guidelines, the authority also implemented some social isolation laws, mask wearing requirements, travel limitations, and other restrictions (Islam et al., 2020). Additionally, by ensuring diagnosis, maintaining personal hygiene, enforcing social segregation, isolating infected patients, and quarantining suspected cases the government of Bangladesh took the required

actions to raise awareness throughout the country. The government also unveiled around USD 11.90 billion in financial incentives (*Tackling the COVID-19 Pandemic : The Bangladesh Perspective*, 2023). The "National Preparedness and Response Plan" was created by DGHS in order to organize the health system (Reliefweb, 2020). As a result of the implementation of the strategy, 10,331 general beds and 595 ICU beds were reserved for patients who are afflicted by COVID-19 (WHO,2021). Although all of these measures only marginally slowed the spread of the pandemic, the only method to entirely wipe the Coronavirus is through widespread immunization. Only with widespread public acceptance of COVID-19 vaccinations we can attain widespread immunity. According to experts, in order to stop the spread of the coronavirus, 67% of the population must receive vaccinations. Although a vaccine may not always be 100% effective, extensive vaccination can vastly improve disease prevention (Salje et al., 2020). Bangladesh government has begun the largest-ever statewide vaccination campaign to immunize 80% of the population with the COVID-19 vaccines over the course of four stages as well as the COVID-19 immunization need an online registration, and the Government has also established a countrywide plan for deployment and immunization for it (United Nations Bangladesh, 2020).

The Bangladeshi government started distributing the Oxford AstraZeneca and Covidshield vaccine to the public, and other vaccines like Pfizer and Moderna have also been introduced (Kalam et al., 2021). Sputnik V and Sinopharm are two more vaccines that Bangladesh has authorized for use in emergency situations (Reuters, 2021). 25.1% of the population have taken vaccine's first dose as of the end of October 2021 (Our World in Data, 2021). However, similar to many other nations, the government primarily concentrated vaccination attempts on a small number of groups of people (frontline health workers, public servants, executives in the corporate sector engaged in pandemic challenges, and those over forty years old), in the expectation that ultimately everyone would be able to receive vaccines (Surokkha.com). But subsequently, in February, the government began a widespread vaccination campaign, and starting in August 2021, then they concentrated on immunizing schoolchildren (Anadolu Agency, 2022).

Justification

Schools are thought to be high-risk settings for COVID-19 outbreaks as large number of students from different class study there in a congested space. Due to the pandemic, students and educational institutions have endured great losses (Rahman et al., 2021). To continue the flow of imparting education, a number of methods have already been implemented. One of the methods included intention to create educational institutes that preserve healthy behavior of hygiene maintenance and taking online classes. However, each of these approaches encountered significant obstacles and, in some cases, fell short (Rahman et al., 2021). People and students were worried about the effectiveness and safety of this COVID control effort, though (Abedin et al., 2021). Moreover, due to their early age, parents' opinions and resistance have a considerable impact on whether or not students received vaccinations (Larson et al., 2014). As well as the viral spread of false information, sentiment that shows doubt and mistrust is also contributing to the community's resistance to vaccination (Abedin et al., 2021). To overcome those issues proper knowledge regarding vaccine is must needed.

Project description

The Community Support Team Cox's Bazar (CST Cox's Bazar) project was launched by BRAC, the Bangladeshi government, UNFPA, and the World Bank to address this issue. This project has been carried out by BRAC in 58 unions across the (six host community) upazilas of Cox's Bazar Sadar, Chakaria, Kutubdia, Maheshkhali, Ramu, and Pekua. Through this effort, a total of 1.17 million people were served. This project was scheduled to last from May 2022 until December 2022. Distribution of masks, social and behavior change communication efforts, meetings of the school management committee, and informational sessions for students at madrasas and schools make up the intervention. In 300 educational institutions (schools and madrasas), BRAC identified 1200 classrooms (grades 6–9) for holding informational sessions on COVID-19 prevention, followed by a quiz. Additionally, these institutes provided a comic book with advice on preventing COVID-19. Besides it involved conducting information sessions, where it informed students about the need for the COVID-19 vaccine and worked to increase their uptake of it. Despite the knowledge and practice (vaccine uptake) of these students regarding COVID-19 vaccines, there is, however, no published information. Consequently, the study's emphasis will be on their knowledge and uptake of the COVID-19 vaccine.

COVID-19 vaccination is one of the most effective measures of control the spread of COVID-among the densely populated settings as educational institutes (Gao, 2022). To best of my knowledge, no study has been conducted to assess the knowledge of the students who are beneficiary of BRAC CST Cox's bazar till now. It is necessary to understand whether the interventions provided by the project are properly working and being effectively increasing the knowledge among students about the vaccination. Therefore, this study is aiming to find out the knowledge of the students who have received intervention from the BRAC CST Cox's bazar project regarding the vaccination of COVID-19. This study will additionally find the uptake rate of the vaccine among the students and the factors associated with the vaccine uptake.

Research question:

What is the status of knowledge and uptake of COVID-19 vaccine among school going students at the schools of Cox Bazar and Pekua?

Specific research question

What is the knowledge level regarding covid 19 vaccine among male and female students at the school of Cox Bazar and Pekua?

What is the rate of COVID-19 vaccine uptake among male and female students at the school of Cox Bazar and Pekua?

Is the uptake rate different among male and female students at Cox Bazar and Pekua?

Conceptual framework

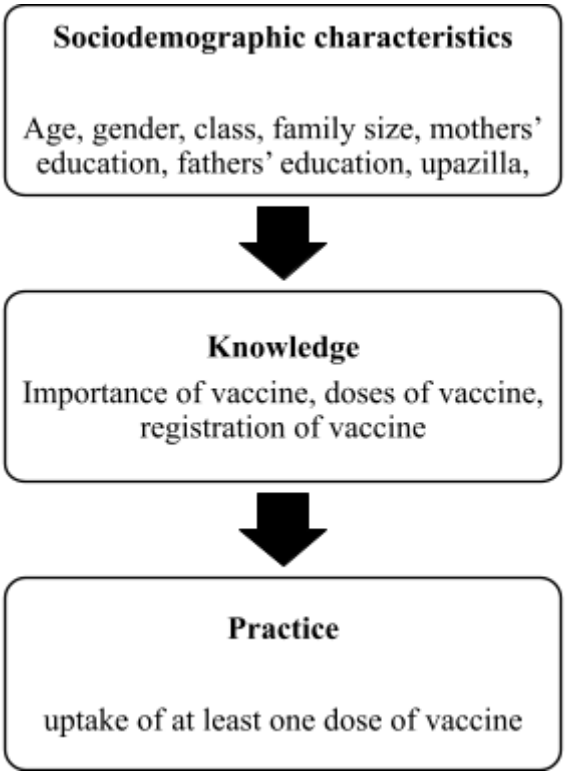

Figure 01: Conceptual framework showing relation of sociodemographic characteristics and knowledge with practice

Studies have indicated that the socio-demographic characteristics of the students influence their knowledge on COVID-19 prevention(Ferdous et al., 2020). Then the knowledge of the students impacts the behavior and practice of COVID-19 preventive measures. This conceptual framework shows that knowledge about vaccine and how vaccine works is related with the student's age gender, education and occupation of parents. Additionally, this knowledge drives the students to incline more towards taking at least one dose COVID-19 vaccine

Methodology

Study approach and design

This study was conducted by a quantitative cross-sectional study to assess the status of knowledge and uptake of COVID-19 vaccine of school going male and female students at the school of Cox Bazar and Pekua.

Study settings

This research was conducted in six Schools of Cox Bazar and Pekua sub-district of Cox's Bazar district of Bangladesh

Target population and study population

Our target population was school going male and female students of class 6 to 9 who will give consent to participate and fulfills the inclusion criteria.

Inclusion criteria

Male and female students studying from class 6 to 9 were included

Exclusion criteria

Male and female students studying below class 6 and over class 9 were excluded

Sampling technique, sampling frame and sample size

Multistage sampling technique was applied to conduct this study. In stage one from 3 high performing area of Cox Bazar, 1 Upazila was selected randomly and from 3 low performing area from Cox Bazar, 1 Upazila was selected randomly. This performance is categorized based on mask distribution. From the high performing area of Pekua, 3 Union was selected randomly, and from the low-performing area of Cox Bazar, 3 Union was selected randomly. From these 6 Union 6 schools were selected randomly. All the students from classes 6 to 9 present on the day of data collection were included as study participants.

Sample Size Calculation

The sample size was calculated by the formula used in WHO STEPS survey (WHO, 2018) at 95% level of confidence, 5% of margin of error and 78% of the school students of class 6 to 9 had proper knowledge on COVID-19 vaccine at the baseline. The design effect for the multistage cluster sampling will be considered as 1.5 and the sample size was adjusted for two groups based on sex (male and female)

$n=z^2\frac{p(1-P)}{e^2}$

Where

Z=level of confidence

p=baseline level of the indicators

e=margin of error

$=1.96^2*\frac{0.78(1-0.78)}{0.05^2}$

=264

Adjusted sample size 264*1.5*2=792

Study tools

School students were surveyed through a self-reported structured quantitative questionnaire on their knowledge and practices of the COVID-19 vaccination in both English and translated local Bengali versions. The questionnaire included parts with obligatory response questions, including those asking about the students' sociodemographic and academic data, a knowledge portion, and a practice section. Expert opinion was taken and pre-testing was done prior finalizing the questionnaires.

Data collection process

A structured questionnaire was used to assess the status of knowledge and practice of the COVID-19 vaccine in the schools of Cox bazar. The BRAC research team, which collected baseline data, collected data according to the structured questionnaire prepared for this study. The questionnaires were given to the study participants, and they themselves filled them in. The administration of the survey was done during school hours.

Variables

Outcome variables

Outcome variables was Knowledge and practice of COVID 19 vaccine of the school going students.

Knowledge: knowledge was assessed by question regarding vaccine's important, doses of vaccine, how vaccine works, who are eligible for vaccine

Practice: The uptake of at least one dose of COVID 19 vaccine was used to evaluate practice.

Explanatory variables

The explanatory variables in the study included sex of the student, age of the student, level of education, number of family members, parent educational status, parent occupation, type of education institution. Based on literature review explanatory variables were selected.

Data analysis process

Data was collected and entered into Microsoft Excel before being cleaned and analyzed with the Stata SE 17 statistical tool. The analysis involved descriptive statistics. By doing a chi-square test, we have seen if there is any association between the explanatory and outcome variables. At a 95% confidence interval, a P-value of less than 0.05 has been set as the level of statistical significance. In order to evaluate the potential sociodemographic variables that may substantially correlate with uptake, a logistic regression has been performed. This analysis plan was used because it is efficient and consumes less time. Students were deemed to have adequate knowledge when they properly answered 70% or more of the knowledge questions, whereas inadequate knowledge was defined as answering less than 70% of the knowledge questions which is adopted from the study of Tadesse et al (2019) (Tadesse et al., 2019).

Ethical Consideration

Ethical permission has been sought from the BRAC JPGSPH ethical review committee. The purpose of the study was to explain this to respondents prior to the initiation of data collection. Written and verbal consent has been obtained from the respondent's guardian and assent has been obtained from the respondents. The consent and the assent forms were translated into Bengali. The confidentiality of the respondents was preserved.

All the data has been kept confidential. Only the research team, including the supervisor, co-supervisors, and mentors, has access to the data. After completion of the study, the data has been preserved according to the policy of BRAC JPGSPH.

Findings

In this study data was collected from 6 different schools of Pekua and Coxbazar and total number of respondents were 1546.

Table-1: Sociodemographic characters of the respondents

	Overall	**Male**	**Female**	**P-Value**
Age (mean)				
	1546(13.68)	636(13.75)	910(13.63)	0.098
Grade				
Class 6 and equivalent	335(21.67%)	143(22.48%)	192(21.10%)	<0.001
Class 7 and equivalent	410(26.52%)	201(31.60%)	209(22.97%)	
Class 8 and equivalent	423(27.36%)	140(22.01%)	283(31.10%)	
Class 9 and equivalent	378(24.45%)	152(23.90%)	226(24.84%)	
Total family members				
Equal or less then 4	313(20.25%)	150(23.58%)	163(17.91%)	0.006
Above 4	1233(79.75%)	486(76.42%)	747(82.09%)	
Education of father				

Never went to school or below class 5	632(40.88%)	263(41.35%)	369(40.55%)	
Finished class 5	328(21.22%)	122(19.18%)	206(22.64%)	
Finished class 10	279(18.05%)	122(19.18%)	157(17.25%)	0.414
Studied until college	119(7.70%)	46(7.23%)	73(8.02%)	
Studied more than college	188(12.16%)	83(13.05%)	105(11.54%)	
Education of mother				
Never went to school or below class 5	547(35.38%)	237(37.26%)	310(34.07%)	
Finished class 5	306(19.79%)	125(19.65%)	181(19.89%)	0.01
Finished class 10	451(29.17%)	162(25.47%)	289(31.76%)	
Studied until college	130(8.41%)	52(8.18%)	78(8.71%)	
Studied more than college	112(7.24%)	60(9.43%)	52(5.71%)	
School name				
Jalalabad Public School	51(3.30%)	15(2.36%)	36(3.96%)	
Pokkhali Adarsha High School	155(10.03%)	44(6.92%)	111(12.20%)	
PM Khali High School	197(12.74%)	108(16.98%)	89(9.78%)	<0.001
Pekua Govt. GMC Institute	577(37.32%)	288(45.28%)	289(31.76%)	
Toitong High School	271(17.53%)	80(12.58%)	191(20.99%)	

Rajakhali Faijunnesa High School	295(19.08%)	101(15.88%)	194(21.32%)	
Upazila				
CoxBazar	403(26.07%)	167(26.26%)	236(25.93%)	0.887
Pekua	1143(73.932%)	469(73.74%)	674(74.07%)	

The study respondents' demographic details are shown in Table 1. More than half of the respondents were female (59%). The mean age of the respondents was 13.7 years where there was no significant different mean among the male and the female respondents. The respondents were almost equally distributed amongst the four categories of grade, with a proportion of approximately 25% where in class 7 male respondent were most (32%) and in class 8 female were the most which was 31%. However, the respondents from class 8 group are still high with about 27.36%, followed by the class 7 at 26.52%, and the rest are almost equal. Most of the respondents (79.75%) have more than four family members. Equal or less than 4 family members is 23% which is more in male than female. Most of the respondents 40.88% said that their father never went to school or finished less than class 5. The majority of respondents 35.38%, stated that their mother did not attend school or finished less than class 5. Most of the respondents were from Pekua upazila 74%.

Table-2: Knowledge about COVID-19 vaccine

	Overall	**Male**	**Female**	**P-value**
Heard about the Covid-19 vaccine				
No	13(0.84%)	3(0.47%)	10(1.10%)	0.184

Yes	1533(94.64%)	633(99.53%)	900(94.92%)	
Source of information				
Newspaper	771(50.29%)	382(60.35%)	389(43.22%)	<0.001
TV news	892(58.19%)	426(67.30%)	466(51.78%)	<0.001
Social media	338(22.05%)	194(30.65%)	144(16.00%)	<0.001
Cellphone	283(18.46%)	161(25.43%)	122(13.56%)	<0.001
School	1126(73.45%)	456(72.04%)	670(74.44%)	1.000
Friends	524(34.18%)	239(37.76%)	285(31.67%)	0.133
Family members	688(44.88%)	298(47.08%)	390(43.33%)	1.000
Neighbors	535(34.90%)	243(38.39%)	292(32.44%)	0.162
Government campaign	432(28.18%)	203(32.07%)	229(25.44%)	0.045
Student do not know	86(5.61)	51(8.06%)	35(3.89%)	0.005
required doses for proper vaccination				
One dose	52(3.39%)	23(3.36%)	29(3.22%)	
Two doses	254(16.57%)	114(18.01%)	140(15.56%)	0.158

Three doses	1141(74.43%)	453(71.56%)	688(76.44%)	
More than 3 doses	45(2.94%)	25(3.95%)	20(2.22%)	
Others	45(2.94%)	18(2.84%)	23(2.56%)	
knowledge about registration for the vaccine				
No	133(8.68%)	52(8.21%)	81(9.00%)	
Yes	1400(91.32%)	581(91.79%)	819(91.00%)	0.591
Where can register for the vaccine				
In the hospital	528(37.71%)	234(40.28%)	294(35.90%)	0.479
In the pharmacy	78(5.57%)	40(6.88%)	38(4.64%)	0.356
In the school	519(37.07%)	194(33.39%)	325(39.68%)	0.082
Online registration	822(58.71%)	367(63.17%)	455(55.56%)	0.022
Student do not know	40(2.86%)	27(4.65%)	13(1.59%)	0.004
vaccine reduces virus related death				
No	383(18.73%)	126(20.26%)	157(17.66%)	0.203
Yes	1228(81.27%)	496(79.74%)	732(82.34%)	

Knowledge about the COVID-19 vaccine is shown in Table 2. In this study, 1533 (94.64%) of the respondents said that they had heard about the COVID-19 vaccine. Among them, 99.53% of

male respondents acknowledged hearing about the COVID-19 vaccination. In this study, 73.5% of the students learned about COVID-19 from their respective schools, and about 60% of them learned about it via television news and about 50% from newspapers. Similarly, 74.43% respondents said that for proper vaccination, three doses of vaccine are required and 16.5% said two doses of vaccine are required. The proportion of males and females is nearly equal (75%) among those students who correctly answered about COVID-19 vaccines that three doses of vaccine are required for proper vaccination. 91% of those polled said they know how to register for vaccines. 58% respondents said one of the ways to register for the vaccine is online where male was 63% and female was 55%. From school registration for the vaccine is another option, according to 37% of respondents. Additionally, among 1546 respondents 81.27% respondents said that vaccines reduce virus-related deaths. Among them, the male-to-female ratio is almost equal.

Table-3: Vaccine uptake

	Overall	**Male**	**Female**	**P-value**
Have you taken the vaccine?				
No	49(3.17%)	23(3.62%)	26(2.86%)	0.402
Yes	1497(96.83%)	613(96.38%)	884(97.14%)	
Number of doses taken				
One dose	174(11.62%)	88(14.86%)	86(9.73%)	0.013
Two doses	1314(87.78%)	523(85.32%)	791(89.48%)	
More than two doses	9(0.60%)	2(0.33%)	7(0.79%)	

Table 3 shown the COVID-19 vaccine uptake among male and female. 1497(96.83%) respondents had taken COVID-19 vaccine. Proportion is nearly similar 97% among male and female respondents. Most of the respondents 87.8% have taken two doses of COVID-19 vaccine. Incase of gender 85.3% male and 89.5% female have taken two doses of vaccine. Only 0.6% have taken more than two doses of vaccine.

Table-4: logistic regression for vaccine uptake

Variables	Crude OR (95%cl)	P-value	Adjusted OR (95% cl)	P-value
Age	2.36(1.8-3.04)	<0.001	2.68(1.98-3.60)	**<0.001**
Gender				
Male	ref			
Female	1.28(0.72-2.25)	0.403	1.53(0.79-2.95)	0.201
Family size				
Equal or less than four	ref.			
Above four	0.34(0.12-0.96)	0.041	0.36(0.12-1.07)	0.065
Education of father				
Finished class above than 5	ref.			
Finished class 5 and below than 5	0.65(0.35-1.21)	0.174	0.62(0.28-1.35)	0.23
Education of mother				
Finished class above than 5	ref.			
Finished class 5 and below than 5	1.67(0.94-2.97)	0.081	2.53(1.21-5.25)	**0.013**
Upazila				
Coxbazar	ref.			
Pekua	9.53(4.92-18.47)	<0.001	10(5.19-22.99)	**<0.001**
Vaccine reduces virus related death				
No	ref.			
Yes	1.47(0.76-2.86)	0.26	1.16(0.52-2.61)	0.713
Knowledge about doses require for proper vaccination				
No	ref.			
Yes	3.25(1.53-6.89)	0.002	3.33(1.13-9.79)	**0.029**

Knowledge about vaccine registration				
No	ref.			
Yes	2.99(1.45-6.17)	0.003	2.5(1.07-6.20)	**0.034**

The table above is showing unadjusted and adjusted logistic regression which determined whether the independent variables had an effect on vaccine uptake among the respondents. The logistic regression investigated the association of socio-demographic factors and knowledge of vaccines among students with vaccine uptake. For both the crude and adjusted models, the analysis revealed that the student's age, his or her mother's education, upazila, knowledge of the vaccine dose, and knowledge of the vaccine registration process were significant factors associated with the students' vaccine uptake. In the adjusted logistic regression model, age is a significant factor associated with vaccine uptake. The adjusted model predicts that for every unit increase in age, odds of getting vaccine increased by 2.68 times. The relationship was statistically significant. In the adjusted logistic regression model, mothers' education is a notable factor associated with vaccine uptake. A student whose mother has completed education in class five or below receiving the vaccine are 2.53 times greater than those of a student whose mother has completed education in a class higher than five. Vaccine uptake is a crucial factor associated with vaccine uptake in the adjusted logistic regression model. Vaccine uptake among students in Pekua upazila is 10 times that of a student who lives in Cox's Bazar upazila. In the adjusted logistic regression model, knowledge about the doses required for proper vaccination is significantly associated with vaccine uptake. The model predicts that vaccine uptake among students who have the knowledge about doses required for proper vaccination is 3.33 times higher than that of a student who does not have the knowledge about doses required for proper vaccination. In the adjusted logistic regression model, knowledge about vaccine registration is remarkably associated with vaccine uptake. In adjusted model vaccine uptake among students who have knowledge about vaccine registration are 2.5 times those of students who have no knowledge about vaccine registration.

Discussion

This study evaluated respondents' knowledge of and uptake of vaccine in relation to various sociodemographic characteristic among male and female students in Cox's Bazar. Incorporating school students into the COVID-19 vaccination program is essential. However, to best of my knowledge, no studies have been conducted to examine the proportion of students took COVID-19 vaccine after the reopening of the schools in Cox's Bazar, Bangladesh. We think that this study is the first to evaluate their knowledge and practice in relation to the vaccine. Accurate knowledge about COVID-19 vaccine was discovered among majority of the surveyed. However, many of these students had incorrect information. Prior to the immunization campaign, the authority should increase vaccination awareness, especially among school students

The majority of students, according to the analysis of their understanding of COVID-19 vaccine, they are aware of it. The vast majority of students heard this information from school, Tv news and from newspaper. Knowledge regarding required doses for vaccine was satisfactory as around 90% students mentioned that for proper vaccination two or more doses are required. A notably high number of students answered correctly that they know from where they can register for vaccine. Three fourth students knew that vaccine can reduce virus related death only one fourth students did not know that vaccine can reduce virus related death. Vaccine uptake rate was quite high among the respondent. Nearly 100% respondent both male and female mentioned that they have been vaccinated. Vaccine uptake was highly associated with their vaccine knowledge, age and upazila. It was unexpected to find out that the odds of taking vaccine of a student with less educated mother (mother with education up to class five or below) was higher than of a student with more educated mother. The possible cause behind this finding can be the number of respondents with less educated mother was higher than the number of students with more educated mother. Furthermore, student from Pekua upazila taking vaccine were 10 times than of a student from Cox's bazar upazila. This was found through analysis due to the fact that the major portion of the students surveyed were from Pekua. However, expected relationship has been found with knowledge about vaccine and vaccine uptake among student. Students who understand the doses required for proper vaccination are more likely to take the vaccine than students who do not understand the doses required for proper vaccination. Similarly, taking vaccine of a student with knowledge about vaccine registration process were more than two

times than of a student with no knowledge about vaccine registration process. This finding highlights that knowledge about COVID-19 vaccine doses and registration process increased the rate of vaccine uptake among the students.

The analysis of students' knowledge on COVID-19 depicts 94% of the school students have heard about the COVID-19 which is similar to previous findings(Paul et al., 2021). In term of vaccination, more than 93% of the respondent demonstrated having knowledge about two or more dosages of COVID-19 vaccine, which is considered as a good knowledge and which is way more higher than the previous study where only 20% respondents had proper knowledge regarding adequate doses for COVID-19(Paul et al., 2021). Furthermore, more than 85% of the total respondents accurately mentioned about the vaccine registration process that they can do both from online and from school which is 83% similar to the previous study(Rahman et al., 2022), which indicates that majority of surveyed students has correct knowledge about vaccine registration. Moreover, more than 80% of the surveyed students accurately understood that vaccine reduces risk of COVID-19 caused deaths. Additionally, most of the students (96.83%) has taken COVID-19 vaccines which indicated that vaccine uptake rate is very high and also higher than one British study that showed an acceptance rate was 71.7%(Freeman et al., 2021). The school based COVID-19 awareness projects CST could be one of the reasons behind majority of the students having accurate knowledge on COVID-19 and higher uptake of COVID-19 vaccines.

Contrary to a French study, which revealed that males were much more likely than females to accept vaccine, we discovered that gender is not significantly related to vaccine acceptance(Detoc et al., 2020). Age has a significant impact on uptake of vaccine. With the increase of age vaccine uptake also significantly increased. (Grech et al., 2020) also discovered that older age groups received the COVID-19 vaccine at a higher rate.

According to the findings of this study, BRAC's intervention to inform school students about COVID-19 was successful in terms of increasing knowledge about the COVID-19 vaccination process and increasing vaccine uptake rate. A considerable portion of the students have knowledge about vaccines and have taken at least one dose of vaccine. Furthermore, the study found that students' vaccination rates are related to their knowledge of vaccines and the vaccine registration process. Therefore, if this intervention is scaled up in other parts of the country, then

this finding will assist the planning body to focus on increasing the knowledge of students about COVID-19 vaccination and the vaccine registration process to make the intervention similarly successful.

Limitation

Nevertheless, the following limitation may apply to this study: First off, since the majority of the samples for this study were from six schools in the Cox Bazar district, it is possible that the findings may not accurately reflect the vaccination rates of students in other districts and divisions of Bangladesh. Secondly, A subjective questionnaire survey was also used in this study. It was unable to gather more precise and neutral measurement information. Thirdly, only those who were interested in participating in the study filled out the survey, which was done voluntarily. As a result, gender parity was not possible. Furthermore, the sample size was substantial enough to achieve enough statistical power for correctly detecting COVID-19 vaccination uptake.

Conclusion and recommendation

Overall, both male and female respondents in this study presented with good knowledge and COVID-19 vaccine uptake. They are completely knowledgeable about the COVID-19 vaccine. Knowledge regarding proper doses for COVID-19, vaccine registration process was satisfactory. The vaccine uptake was almost cent percent. As Bangladesh is one of the countries hardest hit by the COVID-19 outbreak, real knowledge and techniques are required to combat pandemics like the COVID-19 outbreak. Due to their educational connections and capacity to regulate adaptation for their family members and the community, school students can play a vital role in this situation, as this knowledge may not easily reach the wider public. They are able to prevent their own infection by using their real knowledge, and behaviors. They can serve as an important resource for their family members and the community due to their access to knowledge and enhanced comprehension of COVID-19. Information from this study will be helpful for a school-wide immunization program to be successful. The success of the immunization campaign is greatly influenced by public awareness about the vaccine. Since the majority of school students used the internet, social media, and electronic media to find out information about the COVID-19 vaccine, substantial campaigns using these platforms should be combined with the

vaccine campaign. Collaborations between authorities and schools are also necessary. Governments, public health professionals, and advocacy groups should take the initiative to promote vaccine literacy in order to convince the public to accept immunization. Prior to the immunization campaign, the authority should increase vaccination awareness, especially among school students.

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Annex

Annex A: Questionnaire

Socio demographic and academic information

nam	Name of the participant	
Student	Respondent ID	
date	Date of the survey	
Adress	Location	1. Cox's Bazar 2. Pekua
inst_type	Type of the institution	1. School 2. Madrasa
inst_name	Name of the institution	
age	Age (in years)	
gender	Gender	1. Male 2. Female
grade	Grade	1. Grade 6 2. Grade 7 3. Grade 8 4. Grade 9
fath_edu	Father'education	1. none 2. Primary 3. Secondary 4. Higher secondary 0. I do not know
mot_edu	Mother's education	1. none 2. Primary 3. Secondary 4. Higher secondary 0. I do not know

Knowledge Regarding COVID vaccine

know_1	Have you ever heard about the COVID-19 vaccine?	1. Yes 2. No

know_2	If yes, where did you get your information about COVID-19 vaccine? (Multiple answers allowed)	1. Newspapers 2. Television 3. news Social 4. Media 5. Cellphone 6. School 7. Friends 8. Family members 9. Community 10. Government 99. Others
know_2oth	If Others, please specify	
know_3	Do you have any idea how many doses are required for proper vaccination?	1. One dose 2. Two doses 3. Three doses 99. Others 0. I do not know
know_3oth	If others please specify	
know_4	Do you know how to register for the vaccine?	1. Yes 2. NO 0. I do not know
know_5	If yes, how can you register for the vaccine?	1. By going to the hospital 2. By going to the pharmacy 3. Online registration 4. From school 99. Others
know_5oth	If others please specify	
know_6	Do you think COVID-19 vaccine can reduces virus related death?	0. Yes 1. No

Practice of COVID-19 Vaccination

prac_1	Did you take COVID-19 vaccine?	1. Yes 2. No
prac_2	How many doses of the vaccine did you take?	1. One dose 2. Two doses 3. Three doses 99. Others
prac_2oth	If others, please specify	
prac_3	From where you took vaccine?	1. School 2. Hospital 3. Pharmacy 99. Others