

BMJ Open COVID-19 vaccine barriers and perception among rural adults: a qualitative study in Bangladesh

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ABSTRACT

Objective The COVID-19 pandemic continues to pose challenges for global public healthcare, even with the authorisation of several vaccines worldwide. To better understand rural communities' knowledge, attitudes, perceptions and barriers towards these vaccines, we conducted a qualitative cross-sectional study with adults in rural Bangladesh.

Setting This cross-sectional study was conducted in the rural areas of Sylhet and Natore in Bangladesh from August 2021 to February 2022.

Participants Our study involved 15 in-depth interviews with rural adults and 2 key informant interviews with health workers.

Results We analysed data thematically, resulting in four main themes: (1) knowledge and perception aspects, (2) myths and misconceptions, (3) practice and attitude and (4) barriers and challenges of COVID-19 vaccines.

Conclusions The findings indicate that rural populations lack sufficient knowledge about COVID-19 vaccines but have a more favourable attitude towards them. Misconceptions, beliefs and personal experiences were found to be the main reasons for vaccine avoidance. To address these challenges and dispel the spread of misinformation, health education programmes play a pivotal role in improving vaccine management. Policy-makers should initiate these programmes without delay to create a well-informed and enlightened community, given that the COVID-19 is still spreading.

INTRODUCTION

The emergence of SARS-CoV-2, a novel strain, has transformed COVID-19 into a critical global public health issue. This virus continues to be present in many countries worldwide, posing a significant threat to human health.¹ As per the latest figures released by the WHO, there have been a staggering 760 897 555 reported cases of COVID-19 globally, which have resulted in the unfortunate loss of 6 874 585 lives.² Bangladesh is at much greater risk since it has the highest population density in the world, making concepts such as 'social separation' impossible to implement.³ As a result, it reported 2 037 024 positive cases and 29 439

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ Employing purposive sampling of participants enables a comprehensive understanding of the topic under study through comparing and contrasting participant viewpoints.
- ⇒ The study's timing, amidst the nation's ongoing COVID-19 mass vaccination campaign, may have influenced the participants' opinions significantly.
- ⇒ The adoption of a qualitative design impacts the study's external validity and restricts how far the results may be applied.
- ⇒ By visiting various households to locate potential participants, the researchers might have introduced selection bias, potentially restricting the generalisability of the findings.
- ⇒ Since the study was conducted at a specific time, the findings may only be relevant for that period, and further research is needed to explore the long-term effects.

domestic deaths as of 30 December 2022.⁴ Since SARS-CoV-2 is a highly contagious virus that affects people worldwide, vaccination is the most effective method of protecting the population from COVID-19.^{5–7} Although vaccines may not be 100% effective, high coverage in a community can significantly improve disease control.⁸ Five key factors—access, affordability, awareness, activation and acceptance are crucial in ensuring maximum coverage.⁹

In December 2020, numerous COVID-19 vaccines were authorised for commercial use in various nations. These vaccines were developed by companies such as Pfizer-BioNTech, Moderna, Janssen, Sinopharm-BBIBP, Sputnik V, CoviVac and Covaxin.¹⁰ The Government of Bangladesh (GoB) had procured and made payments for around 30 million doses of the Oxford-AstraZeneca vaccine. Starting from 7 February 2021, Bangladesh initiated the administration of the AZD1222 vaccine, developed by Oxford AstraZeneca, to high-priority groups, such as healthcare workers



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and individuals aged over 40.¹¹ By the end of October 2021, 25.1% of the total population in Bangladesh have received at least one dose of this vaccine.¹² Besides the Oxford-AstraZeneca vaccine, Bangladesh had authorised two other vaccines, the Gam-COVID-Vac (Sputnik V) and the BBIBP-CorV (Sinopharm COVID-19 vaccine), for emergency use.^{13 14} In June, the GoB also started vaccinating its citizens with the Sinopharm vaccine.¹⁵ Additionally, Bangladesh is scheduled to be provided with 68 million doses of the Covax vaccine through the efforts of the WHO and Gavi, the Vaccine Alliance.¹⁶

The GoB initiated the largest-ever state-wide vaccination programme to vaccinate over 130 million individuals, which accounted for 80% of the total population.¹⁷ This programme was to be implemented in four phases¹⁷ despite approximately 34% of the population being under 18.¹⁸ A countrywide deployment and vaccination plan for COVID-19 were released by the GoB, which included the necessity of registering online to obtain the vaccine. The GoB aimed to vaccinate 117 million individuals aged 18 and above as per the vaccination plan. Nonetheless, as of 3 August 2021, only 14% of the target population had registered to receive the vaccine. Out of those registered, 57% had received the first dose vaccine, with gender and administrative regions showing significant variations. Men (61%) were vaccinated more than women (39%), and Dhaka (19%) received more vaccinations than other administrative divisions.¹⁹ In general, only 8% of the targeted population has received the first dose of the vaccine, and 4% have received the second dose of the vaccine.¹⁹

In clinical trials, COVID-19 vaccine candidates have shown effective rates of up to 95% in preventing symptomatic infections.²⁰ Based on research findings, it is believed that vaccinating approximately 82% of a nation's population may be necessary to attain herd immunity against SARS-CoV-2. However, the emergence of new virus variants may require individuals to receive multiple vaccinations.^{21 22} In the current context, vaccine hesitancy, which ranges from vaccination approval to denial, has emerged as the most critical public health concern. Despite the availability of vaccination services, it refers to delays in acceptance or refusal of immunisations.²³ Several factors contribute to vaccine hesitancy, such as apprehensions regarding vaccine safety and efficacy, potential adverse health effects, misunderstandings surrounding the value of vaccination, a lack of trust in the healthcare system and insufficient community education regarding vaccine-preventable illnesses.²⁴ Acceptance of COVID-19 vaccines varies greatly among different nations and regions of the world.^{9 25 26} Public mistrust and resistance to vaccination could impede the success of the COVID-19 vaccination campaign.^{27 28}

Herd immunity and the ease of vaccination are likely to be impacted by people's knowledge of COVID-19 vaccines, level of acceptability and perception of immunisation concerns. However, currently, there needs to be more prior research on this subject. Therefore, this study

aimed to assess Bangladeshi rural adults' opinions on vaccination and their comprehension and acceptance of COVID-19 vaccines.

METHODS

Study area

The study was conducted in rural areas of the Sylhet and Natore districts in Bangladesh, with careful consideration given to logical and transportation concerns. Given the ongoing COVID-19 pandemic and the prevalence of severe cases in the country, we selected locations closer to Dhaka to minimise the risk of disruption in the event of sudden lockdowns. It is worth noting that on 11 August 2021, the GoB lifted the hard lockdown that had been in effect since July 2021.

Natore is a northern district of Bangladesh covering an area of 1896.05 km². According to the 2022 census, its population stands at 1 859 924.²⁹ The district city is situated on the bank of the Narode river. Natore comprises 6 upazilas (subdistricts), 8 pourashavas (municipalities) and 1366 villages. Sylhet, located in the northeast of Bangladesh, is one of the four districts in the Sylhet Division, covering an area of 3452.07 km². According to the 2022 census, its population is 3 897 037.²⁹ The district comprises 11 upazilas (subdistricts), 2 municipalities, 1693 mouzas and 3249 villages. Both Natore and Sylhet districts have a well-developed road network that ensures easy connectivity with Dhaka.

Patient and public participation

Patients and the public were not involved in this study.

Training of the data collectors

Two qualified male research assistants with master's degrees in Anthropology were from Jahangirnagar University, Dhaka, Bangladesh. They were skilled and experienced in qualitative research methods, specifically conducting in-depth interviews (IDIs) and key informant interviews (KIIs). Before commencing the data collection process, the research assistants underwent a 4-day training programme on interviewing techniques. This training consisted of 2 days of theoretical sessions covering topics such as the basic principles of qualitative research, study objectives, research ethics and informed consent in human subjects' research, and the KII and IDI interview guide. Additionally, a practical fieldwork session was conducted on the third day to provide hands-on experience in conducting interviews and obtaining informed consent.

Throughout the training, each research assistant provided feedback on the other's performance during IDIs, and the trainer provided feedback and guidance on group dynamics, participant interaction, body language, conflict avoidance and conflict management. On the second day, the team was taken into a nearby neighbourhood to conduct IDIs with the local communities. The resulting KII and IDIs were transcribed and thoroughly

analysed. The interview guides were revised based on the analysed data and feedback from the data collectors.

Data collection

We conducted this cross-sectional survey between August 2021 and February 2022, aiming to investigate individuals' vaccination status regarding COVID-19. Our research involved IDIs with 15 participants and 2 KIIs with government officials involved in COVID-19 vaccination activities. The selection process was purposive, starting with a landmark and proceeding to visit households. We specifically focused on individuals who had either not received the COVID-19 vaccine or had missed their second dose. We asked the participants who were willing to participate and interviewed them accordingly. In that case, no one refused to participate or dropped out. By conducting IDIs with their consent, we aimed to capture the depth and uniqueness of their experiences and perceptions regarding vaccination. We chose individual interviews over focus group discussions because of the ongoing COVID-19 restrictions at that time. It was not permitted to gather multiple individuals in one place at a time.

The interviews were conducted privately, ensuring confidentiality for approximately 1 hour, and followed pretested data collection guidelines that allowed for flexibility to incorporate any additional feedback. We obtained their consent, outlining the objectives of our study thoroughly. Additionally, we provided them with a brief verbal overview, enlightening them about the purpose of our research, which aimed to explore the knowledge, attitudes, perceptions and barriers related to the COVID-19 vaccine among the rural population of Bangladesh. We assured them that their valuable information would be treated with utmost confidentiality. The significance of their responses is extremely important as they contribute greatly to the ongoing efforts in public education, fostering trust in the vaccine and securing its effective implementation in combating the pandemic.

The interviews were digitally recorded, transcribed into Bangla, and then translated into English. To ensure accuracy and quality of our work, spot checks of the recordings and transcriptions were performed by an anthropologist proficient in both Bangla and English. As this was a cross-sectional study, no repeat interviews were conducted and transcripts were not returned to the participants for feedback.

Thematic area

To structure and organise our findings, we used this index as a framework to analyse postprogrammatic data. Additionally, we have meticulously coded the qualitative data using the following four indicators:

1. Knowledge and perception aspects.
2. Myths and misconceptions.
3. Practice and attitude.
4. Barriers and challenges.

Data analysis

We transcribed the audiorecorded interviews conducted in Bangla using MS Word files. The research team and co-authors translated and carefully reviewed these transcripts to ensure accuracy.

To conduct a thematic analysis, we used Bernard's framework,³⁰ wherein themes were identified from the data and categorised under the four thematic areas. Initially, we developed a pre-existing codebook based on the interview guidelines, which was manually coded. This was then reviewed and verified by an anthropologist who conducted spot-checks of the recordings and transcriptions.

The qualitative members subsequently coded all the interviews manually while maintaining flexibility in incorporating any additional themes that were deemed relevant to the study's objectives. This approach allowed for a combination of both deductive and inductive coding while ensuring intercoder reliability.³¹ Following the coding process, thematic codes were categorised and subsequently grouped under the four themes.

Quality assurance and control

Quality control was ensured through the following steps:

- ▶ Hiring knowledgeable and experienced data collectors who underwent a comprehensive 5-day training programme on the study's theoretical and practical aspects to reduce interviewer bias.
- ▶ To enhance the accuracy and reliability of the collected data, data collectors were assigned to work in pairs.
- ▶ The interview guide was translated into the local language to ensure clear and effective communication with the participants.
- ▶ To accurately record and document conversations during IDIs and KIIs, data collectors used digital voice recorders and copious note-taking.
- ▶ To maintain consistency and address any discrepancies, data collectors compared their notes and voice recordings at the end of each day.
- ▶ The investigators of the study cross-checked the interview transcriptions with the audio records and field notes to ensure data credibility.

RESULTS

Demographic characteristics of the participants

A total of 15 participants (9 males and 6 females) from 2 districts were interviewed. Four of the men and women were aged 16–25 years; two men and one woman were aged 25–36 years, with the other three 25–34 years. Among them, three of the men had no formal education (can sign their names only), and three of them completed primary education; five of the women completed up to secondary education; and the rest of the men and women completed higher secondary education and graduation.

All of the participants were working in unskilled labour (such as day labourers, rickshaw or van pullers, drivers and farmers). The average household income ranged

**Table 1** Participant and household characteristics

Indicators	Male	Female
Doses of vaccine		
No vaccine given	2	3
One dose of vaccine given	7	3
Age range		
16–25 years	4	4
25–30 years	2	1
30–40 years	3	1
Occupations		
Daily labour/mason	2	
Rickshaw/van puller	3	
Driver	1	
Shopkeeper	1	
Farmer	2	
Housewife		6
Education		
No formal education (can sign their name only)	3	
Primary	3	
Secondary	1	4
Higher secondary	1	2
Graduation	1	
Income		
5000–8000	1	
8000–15 000	5	2
Above 15 000	3	4
Family members		
2–4 members	3	2
4–10 members	6	4

Data that support the findings in the study are included in online supplemental material.

from BDT9000 to BDT15 000. The maximum number of members in any household was 5–10, and the rest had 2–4 members. The sociodemographic characteristics of the interviewees who participated in the IDIs are shown in [table 1](#).

Themes emerged

On analysis of the semistructured in-depth, and KIIs, four main themes emerged: knowledge and perception aspects, myths and misconceptions, practice and attitude, and barriers and challenges of COVID-19 vaccines.

Knowledge and perception aspects

Participants described COVID-19 as a highly contagious and life-threatening illness and stated they first learnt about it through television, their neighbours and social media. Regarding symptoms, most participants believed that the main indicators of COVID-19 are fever, coughing

and a runny nose, with a few mentioning that shortness of breath is also a symptom. Additionally, some participants stated that the virus could spread through breathing, touching and sneezing. Poor hygiene practices, such as not washing hands with soap, can make an individual more susceptible to contracting the disease. To prevent the spread of COVID-19, participants emphasised the importance of isolation, using separate utensils for eating, and maintaining social distance. One of the participants stated that receiving this immunisation will prevent future occurrences of the condition. Through the mass media, they also learnt about the numerous deaths caused by this contagion that have occurred worldwide. A respondent mentioned that,

This illness is easily spreadable. Sneezing and physical activity can exacerbate its transmission. Nevertheless, adhering to recommended precautions like wearing a mask and practicing social distance can protect you from contracting the disease.

The majority of the participants had a positive view regarding the COVID-19 vaccine. They expressed trust in the vaccines' quality and believed that getting vaccinated reduces the risk of death and enables them to venture outside more freely. Additionally, they perceived that the vaccine protects against getting infected by others. Although the majority of the community had positive perceptions about the vaccine, most of them lacked information about its various types, administration methods and frequency. All the study participants believed that pregnant women were not eligible to receive the vaccine.

COVID-19 vaccine may have serious consequences for pregnant women. Hence, it is not recommended for them to receive it. I personally think that pregnant women should avoid getting the vaccine.

Some participants reported experiencing mild reactions after vaccination, such as slight fever, soreness, headaches, etc., but nothing serious. Amidst the discussions, certain individuals brought up the topic of antibodies. They were unaware of the word and mistakenly referred them as antibiotics. A respondent mentioned:

COVID-19 is a devastating illness, and our government has taken proactive measures to ensure the protection of our citizens by implementing a nationwide vaccination program. The vaccines work by generating antibodies (antibodies) to combat the virus and keep people safe.

A respondent also stated that the fate of a person's health and survival from this disease is ultimately determined by the creator, regardless of whether or not they receive vaccinations. He believed that a person would not fall ill if he adhered to his religious principles.

Myths and misconceptions

All participants discussed side effects when the vaccination programme first started. They stated elderly people

above the age of 60 are at a high-risk of complications from vaccination, which was the most frequently given response.

Elderly people with respiratory problems faced even more problems after taking the vaccine. Their immune systems weakened, leading to additional problems and, in some cases, death. I have seen or heard about these events on TV or from others.

Furthermore, some participants reported that children are at a high risk of getting infections from the vaccine, despite the fact that the vaccination campaign for children had not even commenced at that time. It is just that they were merely making assumptions or had misconceptions regarding this matter.

Some people's assumptions made the vaccination process difficult. There was also a common misconception that one dose of the vaccine would protect against the virus and there would be no need for additional doses.

Some participants confidently shared information that was not accurate or held conspiracy theories about the COVID-19 vaccines. For example, one participant said about COVID-19 vaccines.

Injections (vaccines) are sometimes given to reduce the number of dogs. However, many people have not yet received the COVID-19 vaccine due to concerns about potential side effects in humans.

In 2009, Bangladesh had one of the highest rates of human deaths related to rabies worldwide. During that time, the GoB resorted to indiscriminately killing dogs in an attempt to eliminate rabies across the country. This practice had been ongoing for decades, despite its ineffectiveness. However, in late 2011, as part of a new national strategy aimed at eliminating rabies, the GoB began vaccinating dogs on a large scale instead of resorting to mass killings. So, some participants drew a parallel between this context and the COVID-19 vaccine, forming a conspiracy theory that the vaccine was invented with the intention of reducing the human population.

Practice and attitude

Vaccine hesitancy is intricately linked to specific contexts and exhibits variations across different periods, locations and socioeconomic class. When the vaccine programme was initially launched, people were filled with fear and uncertainty. This can be attributed to various factors, including limited awareness, the presence of misleading information, lack of confidence in healthcare systems and more.

Many wanted to receive the vaccine but hesitated and waited for others to take it before deciding. This approach is not recommended, as each individual's health condition should be taken into consideration before getting vaccinated. One participant stated,

When the vaccination programme was first started, some people thought they should observe the

situation before deciding. With such conflicting thoughts in mind, many wanted to wait.

Some women hesitated to get vaccinated due to concerns about social norms and religious veil traditions. They believe that being vaccinated by a male nurse goes against these beliefs. A male respondent mentioned:

As a Muslim, I believe that female nurses should vaccinate women, as it is easier for women to maintain their veil with their hands open during the immunization process. This has resulted in many women skipping their vaccinations.

Over time, an increasing number of individuals displayed willingness to receive COVID-19 vaccinations as they observed the growing trend of community members getting vaccinated, and it was free of cost. Most participants believed that the COVID-19 vaccine was safe to use, with the President and Ministers promoting it to prevent the spread of the disease. Participants considered both personal and communal factors when deciding their stance towards vaccination.

Though many people die even if they are vaccinated. Vaccination is necessary for us now because the disease is becoming deadly. To keep ourselves and others safe, we must get the corona vaccination.

Some participants reported feeling a positive change in their social status after getting vaccinated as they received the vaccine initially.

Barriers and challenges

An online registration system is required to receive the vaccine. Study participants reported receiving delayed SMS, and many did not see the SMS on their mobiles, causing a major problem with vaccine discontinuation. Some participants reported receiving their first dose of vaccine through the mass immunisation programme but were not provided with vaccine registration cards for further doses, nor were their phone numbers collected for enrollment on the website. Even when they went to the centre on the scheduled date, they could not receive their second dose of the vaccine without their registration card and SMS. Findings also revealed that missing vaccine cards and a lack of knowledge about reprinting the cards are reported barriers to getting the vaccine. Most of the participants had lost their vaccine cards, so they could not receive the vaccine. Participants emphasised the importance of equitable vaccine distribution in their communities and preferred local sites to mass vaccination sites with long lines and crowds. One female participant said,

I didn't notice the text reminder for the second dose of the vaccine. When I saw it, I went to the vaccination center at the Union Parishad, but the guard in charge told me that the vaccine was not available there. He told me to go to another vaccination center, but I didn't go there.

Another participant stated,

I received my first dose during the mass vaccination program, but when I went to the vaccine centre for my second dose, the authorities told me that they couldn't give me the vaccine without any documents like a vaccine card or SMS. However, they did not give me a card the first time.

Dual-dose vaccine schedules were seen as an additional burden for individuals and families, as they needed to move frequently to support themselves. One participant stated,

We leave our family behind and work in Dhaka. As poor people, we work ten days here today, twenty days in another area, and five days in another place. This means that I live in different regions at different times, so I could not get vaccinated. But I know this vaccination is necessary for us.

Health workers often face challenges while administering vaccines, including a frequent shortage of staff, which leads to an increased workload.

DISCUSSION

The purpose of this study was to delve into the perceptions and barriers regarding the COVID-19 vaccine among adults residing in rural areas of Bangladesh. Our research revealed that despite the widespread recognition of the COVID-19 vaccine, there remains a gap in understanding the details of its efficacy, adverse effects and recommended usage. The participants have been exposed to a wide range of information and opinions about COVID-19 vaccines, including both accurate and inaccurate information as well as both positive and negative news. This highlights the importance of continuing to educate the public about these important aspects of the vaccine in order to promote confidence in its usage and ensure its successful implementation in controlling the pandemic.

Safety of vaccines and concern about side effects are significant issues that have been reported in earlier studies as a barrier to COVID-19 vaccine uptake.³² Although some participants in our study reported experiencing various temporary side effects such as soreness, discomfort, allergic reactions, swelling, fever, chills, fatigue and headaches following COVID-19 vaccination, there have not been many reports of severe adverse reactions among COVID-19 vaccine recipients worldwide.^{33 34} Our study found that social relationships significantly influence people's decision-making about getting the COVID-19 vaccine. Participants consider their personal beliefs, the opinions of those around them, and what is best for society when deciding whether or not to get vaccinated. They weigh the potential risks and benefits of getting the vaccine, such as concerns over side effects and efficacy, but also consider the greater good and what others may think. However, some participants were motivated

to get vaccinated because they wanted things to return to 'normal'. Also, people's views about getting the COVID-19 vaccine are not just a balance between what is good for them and what is good for society. Instead, they consider it within a larger social context.³⁵ For example, when someone recognises the positive impact of vaccines in ending the pandemic but is hesitant to be among the first to get them because of fears about side effects, they are mindful of their role in society and the moral obligation that may come with it, influencing their decision-making.³⁵ Our study has revealed that almost all the participants were motivated to get vaccinated based on the perception that it would protect both themselves and others, ultimately leading our country towards a return to normalcy. This finding highlights the potential effectiveness of government-led campaigns to promote vaccination, especially as the fourth dose of the vaccine is now available.

Our study revealed that some might believe that one dose of the vaccine would suffice for protection against the virus. It is a concerning issue that many individuals have been skipping their second dose of the COVID-19 vaccine in our country. Experts suggest that the government's vaccine management system and campaigns were lacking in certain aspects. This might be due to a decrease in the urgency to get vaccinated as the COVID-19 transmission rate in our country has declined, as well as the relaxation of vaccine-related campaigns. In addition, many people may have believed that vaccinations are no longer necessary because the virus is no longer spreading.³⁶

The vaccination's geographical location has a significant impact on uptake,³⁷ as it directly influences accessibility. In Bangladesh, people living in rural areas have a lower literacy rate and tend to have less knowledge and less practice in preventing COVID-19 compared with urban people.³⁸ We observed that vaccine hesitance among our participants was largely due to the prevalence of myths and misconceptions surrounding the COVID-19 disease and the vaccine. This issue is especially prevalent in rural areas, where access to reliable information and awareness about the advantages and safety of the vaccine is limited. This could be because of their lower perception of risk and lower level of education, leading to a lower acceptance rate for the vaccine. In China, a study showed that the acceptance rate of the COVID-19 vaccine was lower among people living in rural areas as compared with those in urban areas.³⁹ Similarly, a national survey conducted in the USA found that people living in rural areas were more likely to be hesitant about getting vaccinated for COVID-19.⁴⁰ This highlights the need for customising vaccine distribution strategies for different geographical populations. Additionally, it was discovered that organising vaccinations through universities, schools and workplaces increased uptake.⁹ It is important for health authorities, community leaders and healthcare providers to work together to educate and raise awareness about the reality of COVID-19 and the benefits of getting vaccinated in

order to dispel these myths and misconceptions and promote public health. This can be done through community meetings, health campaigns and the distribution of educational materials.

Our study revealed that, as time passed, a rising number of individuals wanted to receive COVID-19 vaccinations. This willingness was influenced by the fact that the vaccinations were provided free of cost. Several studies investigated the influence of non-financial costs on the acceptance of vaccines, with time-related constraints emerging as the primary non-financial barriers to affordability.⁴¹ However, in our study, due to their work schedules and frequent movements from one place to another, these people faced challenges in getting vaccinated in a timely manner. Moreover, the multiple doses required for the COVID-19 vaccine added an additional burden for them. Since they are day labourers, they cannot afford to take a day off work as their wages would be deducted for that day.

The third dose of the COVID-19 vaccination programme was ongoing during the study period. COVID-19 is still spreading and causing serious illness and death, even in areas where cases have declined. The vaccines are a crucial tool in controlling the pandemic and ending the spread of the virus. Now that it appears that the fourth vaccine is in progress, this study's outcome and possible recommendations will help with the implementation of the government's further vaccine programme. The government must strengthen its vaccine management system and campaigns, ensuring people receive the recommended four doses and preventing the spread of false information. A supportive social environment encouraging vaccination is also critical, as social relationships play a significant role in decision-making. By addressing these key issues, we can increase public confidence in the COVID-19 vaccine and successfully control the spread of the pandemic.

Limitations

The study has a few limitations that need to be acknowledged. First, due to the difficulty in securing potential participants, we were compelled to visit numerous households, which may have introduced selection bias. Second, because the study was cross-sectional, its conclusions might only be applicable to a specific point in time, and an extended investigation is necessary to examine the long-term implications. Finally, due to time constraints, we could not gather data from a more diverse range of locations.

Despite these limitations, this study provides valuable insights into individuals' experiences and perceptions surrounding the COVID-19 vaccine. By identifying potential barriers to accessing a fourth dose of the vaccine and developing strategies for addressing these barriers, further qualitative research can be invaluable for public health officials and policy-makers as they work to ensure equitable access to the vaccine.

Conclusion

In conclusion, our study found that the participants were positive towards receiving the COVID-19 vaccine but lacked knowledge about it. Despite their positive attitude, they faced significant barriers and challenges. Although the government's efforts to control the spread of the virus, ensuring proper safety measures has proven difficult due to socioeconomic factors. Therefore, it is crucial for policymakers and researchers to implement health education programmes and interventions to improve the health and well-being of the population in Bangladesh, as the virus continues to spread even after 3 years and the fourth vaccination programme is underway. Further research is recommended to gain a more comprehensive understanding of the perceptions and barriers surrounding the COVID-19 pandemic in Bangladesh.

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Contributors MK and KIS conceptualised and designed the study with TALam. Contributing RSR and MK developed tools and supervised data collection. RSR, FA, MFR and TAHmed analysed the data. TAHmed and MK developed the manuscript. MKH, MK and KIS critically reviewed the draft paper. All authors have read and agreed to the published version of the manuscript. MK is responsible for the overall content as guarantor.

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Patient consent for publication Not applicable.

Ethics approval The Ethical Review Committee of the International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) approved the study (Ref. PR-21125). Informed consent was obtained from each participant. Before the interviews were recorded, interviewees gave verbal consent, which was recorded. We assured interviewees that their participation was entirely voluntary and that all information provided would be deidentified, ensuring the anonymity and privacy of the information shared.

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REFERENCES

- 1 Hu B, Guo H, Zhou P, *et al.* Characteristics of SARS-Cov-2 and COVID-19. *Nat Rev Microbiol* 2021;19:141–54.
- 2 WHO Coronavirus (COVID-19) dashboard. 2022. Available: <https://covid19.who.int>
- 3 WHO health emergency. n.d. Available: <https://covid19.who.int/region/searo/country/bd>
- 4 COVID-19 dynamic dashboard for Bangladesh. n.d. Available: <http://dashboard.dghs.gov.bd/webportal/pages/covid19.php>
- 5 Tse A, Tseng HF, Greene SK, *et al.* Signal identification and evaluation for risk of febrile seizures in children following Trivalent Inactivated influenza vaccine in the vaccine safety Datalink project, 2010–2011. *Vaccine* 2012;30:2024–31.
- 6 Mina MJ, Parker R, Larremore DB. Rethinking COVID-19 test sensitivity—a strategy for containment. *N Engl J Med* 2020;383:e120.
- 7 Custers J, Kim D, Leyssen M, *et al.* Vaccines based on replication incompetent Ad26 viral vectors: standardized template with key considerations for a risk/benefit assessment. *Vaccine* 2021;39:3081–101.
- 8 Akiful Haque MMd, Rahman ML, Hossian M, *et al.* Acceptance of COVID-19 vaccine and its determinants: evidence from a large sample study in Bangladesh. *Heliyon* 2021;7:e07376.
- 9 Thomson A, Robinson K, Vallée-Tourangeau G. The 5As: A practical Taxonomy for the determinants of vaccine uptake. *Vaccine* 2016;34:1018–24.
- 10 Tumban E. Lead SARS-Cov-2 candidate vaccines: expectations from phase III trials and recommendations post-vaccine approval. *Viruses* 2020;13:54.
- 11 Bangladesh Ministry of Health and Family Welfare. COVID-19 vaccination dashboard available from. n.d. Available: <http://103.247.238.92/webportal/pages/covid19-vaccination.php>
- 12 Our World in Data. Coronavirus (COVID-19) Vaccinations, Available: <https://ourworldindata.org/covid-vaccinations>
- 13 Business Standard. *Bangladesh govt approves purchase of Covid-19 vaccines from China.* 2021.
- 14 Paul R. Bangladesh APPROVES Russia's Sputnik V COVID-19 shot; says Sinopharm pending. *Reuters* 2021.
- 15 Bangladesh gets another 5 million doses of Sinopharm vaccine in the times of India. 2021.
- 16 Paul R. *The wait is over: Bangladesh begins COVID-19 vaccinations.* Reuters, 2021.
- 17 UN Bangladesh COVID-19 quarterly situation report-Q4 2020. 2020. Available: <https://bangladesh.un.org/en/116428-un-bangladesh-covid-19-quarterly-situation-report-q4-2020>
- 18 United Nations, Department of Economic and Social Affairs PD. World population prospects 2019. 2020. Available: <https://population.un.org/wpp/DataQuery>
- 19 COVID-19 vaccination dashboard for Bangladesh. 2021. Available: <http://103.247.238.92/webportal/pages/covid19-vaccination-update.php>
- 20 Bernal JL. Effectiveness of the Pfizer-Biontech and Oxford-Astrazeneca vaccines on COVID-19 related symptoms, hospital admissions, and mortality in older adults in England: test negative case-control study. *BMJ* 2021;373.
- 21 Britton T, Ball F, Trapman P. A mathematical model reveals the influence of population heterogeneity on herd immunity to sars-cov-2. *Science* 2020;369:846–9.
- 22 Sanche S, Lin YT, Xu C, *et al.* High Contagiousness and rapid spread of severe acute respiratory syndrome Coronavirus 2. *Emerg Infect Dis* 2020;26:1470–7.
- 23 Butler R. Vaccine hesitancy: what it means and what we need to know in order to tackle it. *World Health Organization* 2016;34:1643–9.
- 24 Xiao X, Wong RM. Vaccine hesitancy and perceived behavioral control: A meta-analysis. *Vaccine* 2020;38:5131–8.
- 25 Lindholt MF, Jørgensen F, Bor A, *et al.* Public acceptance of COVID-19 vaccines: cross-national evidence on levels and individual-level predictors using observational data. *BMJ Open* 2021;11:e048172.
- 26 Bari MS, Hossain MJ, Ahmmed F, *et al.* Knowledge, perception, and willingness towards immunization among Bangladeshi population during COVID-19 vaccine rolling period. *Vaccines (Basel)* 2021;9:1449.
- 27 Caron RM, Dorsey MG. Challenges, inquiry, and recommendations: effective COVID-19 vaccine management in the face of public mistrust and concern. *Front Commun* 2022;6:283.
- 28 Berg M. What doctors wish patients knew about COVID-19 herd immunity. 2021.
- 29 Preliminary Report. Population & housing census 2022. 2022.
- 30 Bernard HR. Research methods in anthropology: qualitative and quantitative methods. 2002.
- 31 O'Connor C, Joffe H. Inter-coder reliability in qualitative research: debates and practical guidelines. *Int J Qualit Method* 2020;19:160940691989922.
- 32 Lockyer B, Islam S, Rahman A, *et al.* Understanding COVID-19 misinformation and vaccine hesitancy in context: findings from a qualitative study involving citizens in Bradford, UK. *Health Expect* 2021;24:1158–67.
- 33 Ganesan S, Al Ketbi LMB, Al Kaabi N, *et al.* Vaccine side effects following COVID-19 vaccination among the residents of the UAE—an observational study. *Front Public Health* 2022;10:876336.
- 34 Lazarus JV, Ratzan SC, Palayew A, *et al.* Author correction: A global survey of potential acceptance of a COVID-19 vaccine. *Nat Med* 2021;27:354.
- 35 Baylis F, Kenny NP, Sherwin S. A relational account of public health ethics. *Public Health Ethics* 2008;1:196–209.
- 36 Moral S. *17pc people skip their second jab, in Prothom Alo.* 2021.
- 37 Athavale D, McCullough S, Mactier H. Implementing the new BCG vaccination guidelines—a maternity hospital-based clinic approach. *J Public Health (Bangkok)* 2006;28:133–6.
- 38 Rahman MS, Karamelic-Muratovic A, Amrin M, *et al.* COVID-19 epidemic in Bangladesh among rural and urban residents: an online cross-sectional survey of knowledge, attitudes, and practices. *Epidemiologia (Basel)* 2020;2:1–13.
- 39 Mumbai slum dwellers wary of vaccine: survey, in the times of India. 2020.
- 40 Khubchandani J, Sharma S, Price JH, *et al.* COVID-19 vaccination hesitancy in the United States: a rapid national assessment. *J Community Health* 2021;46:270–7.
- 41 Tickner S, Leman PJ, Woodcock A. Factors underlying suboptimal childhood Immunisation. *Vaccine* 2006;24:7030–6.