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COVID-19 vaccine barriers and perception among rural adults: A qualitative study in Bangladesh

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3 **COVID-19 vaccine barriers and perception among rural adults: A qualitative study in**
4 **Bangladesh**
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Abstract

Objective COVID-19 pandemic continues to pose challenges for global public healthcare, even with the authorization 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 Rural areas of Sylhet and Natore in Bangladesh.

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 they 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 programs play a pivotal role in improving vaccine management. Policymakers should initiate these programs without delay to create a well-informed and enlightened community, given that the coronavirus is still spreading.

Keywords: COVID-19 vaccine, perception, barrier, rural, Bangladesh

Strengths and limitations of this study

- The study sheds light on people's perspectives and attitudes towards the COVID-19 vaccine.
- The implementing institution's competence and trust facilitate the acceptance of administering investigational products of COVID-19 clinical research to participants.
- The researchers had to go to various households to locate potential participants, the study may have been subject to selection bias, which could limit the generalizability of the findings.
- Since the study was conducted at a specific time, its findings may only be relevant for that period, and further research is needed to explore the long-term effects.

Introduction

The emergence of Severe Acute Respiratory Syndrome Coronavirus 2 (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 World Health Organization (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 like "social separation" impossible to implement (3). As a result, it reported 2,037,024 positive cases and 29,439 domestic deaths as of December 30, 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 clinical trials, COVID-19 vaccine candidates have shown effective rates of up to 95% in preventing symptomatic infections (10). 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 (11, 12). 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 immunizations (13). There are several factors that 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 (14). Acceptance of COVID-19 vaccines varies greatly among different nations and regions of the world (9, 15, 16). Public mistrust and resistance to vaccination could impede the success of the COVID-19 vaccination campaign (17, 18).

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 immunization 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 two rural areas of Bangladesh. We conducted in-depth interviews with a total of fifteen participants and also conducted two key informant interviews (KII) with government officials who were involved in dealing with COVID-19 vaccination activities.

Data collection

Through conducting in-depth interviews with individuals who have either not received the COVID-19 vaccine or have dropped the second dose, we aimed to capture the depth and uniqueness of their experiences and perceptions regarding vaccination. This paper presents the results of our in-depth interviews with a purposively selected group of participants (n=15), as well as two key informant interviews with nurses and vaccine administration personnel. We conducted this cross-sectional survey between August 2021 to February 2022. The interviews were conducted in private, with no other individuals present, and guided by pre-tested data collection guidelines that were flexible enough to accommodate any additional feedback. The interviews were digitally recorded, transcribed into Bangla, and then translated into English. To ensure the accuracy and quality of our work, we performed spot checks of the recordings and transcriptions, which were conducted by an anthropologist who is fluent in both Bangla and English. We also used data from an end-of-project survey (n=15) where appropriate to complement the qualitative findings.

Thematic area

To structure and organize our findings, we utilized this index as a framework to analyse post-programmatic 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 audio-recorded interviews conducted in Bangla using MS Word files. These transcripts were translated by a research assistant and carefully reviewed for accuracy by the last author. To conduct a thematic analysis, we used Bernard's framework (19), wherein themes were identified from the data and categorized under various key domains. Initially, we developed a pre-existing codebook based on the interview guidelines, which was then manually coded for one interview by the first author. This was then reviewed and verified by an experienced qualitative researcher (the last author). The first author then manually coded all interviews while maintaining flexibility in incorporating any additional themes relevant to the study's objectives, thereby implementing both deductive and inductive coding while ensuring inter-coder reliability. Following this, thematic codes were categorized and, subsequently, grouped under four themes. Finally, the text pertaining to the five indicators was compiled into separate files.

Results

Demographic characteristics of the participants

A total of fifteen participants (nine males and six females) from two 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 education (can sign 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 labor (such as day laborers, rickshaw or van pullers, drivers, and farmers). The average household income ranged from 9000 to 15000 (BDT). The maximum number of households was 5 to 10 members, and the rest had 2 to 4 members. The socio-demographic characteristics of the interviewees who participated in the IDIs are shown in Table 1.

Table 1 Participant and household characteristics

Indicators	Male	Female
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		
Can signature only (own name)	3	
Primary	3	
Secondary	1	4
Higher secondary	1	2
Graduation	1	
Income		
5000-8000	1	
8000-15000	5	2
Above 15000	3	4
Family members		
2 to 4 members	3	2
4 to 10 members	6	4

Themes emerged

Upon analysis of the semi-structured in-depth and key informant interviews, 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

All of the participants stated that they first learned about COVID-19, a highly contagious and life-threatening illness, through television, their neighbors, and social media. Regarding symptoms, most participants believed that the main indicators of COVID 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, participants emphasized the importance of isolation, using separate utensils for eating, and maintaining social distance. One of the participants stated that receiving this immunization will prevent future occurrences of the condition. Through the mass media, they also learned 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 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”.

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 antibiotics (antibodies) to combat the virus and keep people safe”.

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2
3 A respondent also stated that the fate of a person's health and survival from this disease is
4 ultimately determined by the Creator, regardless of whether or not they receive vaccinations. He
5 believed that a person would not fall ill if he adhered to his religious principles.
6

7 8 **Myths and misconceptions**

9
10 It is common for misinformation and false beliefs about health and medical issues to spread in
11 communities, particularly in rural areas where access to accurate information may be limited (20).
12 All participants discussed side effects when the vaccination programme first started. They
13 identified elderly people above the age of 60 as high-risk, which was the most frequently given
14 response. Additionally, some participants reported that children have a high risk of getting
15 infections.
16

17 *“Elderly people with respiratory problems faced even more problems after*
18 *taking the vaccine. Their immune systems weakened, leading to additional*
19 *problems and, in some cases, death. I have seen or heard about these events on*
20 *TV or from others”.*
21

22
23 Some people's assumptions made the vaccination process difficult. There was also a common
24 misconception that one dose of the vaccine would protect against the virus and there would be no
25 need for additional doses. Some participants confidently shared information that was not accurate
26 or held conspiracy theories about the COVID-19 vaccines. For example, one participant said about
27 COVID-19 vaccines,
28

29
30 *“Injections (vaccines) are sometimes given to reduce the number of dogs.*
31 *However, many people have not yet received the COVID-19 vaccine due to*
32 *concerns about potential side effects in humans.”*
33

34 **Practice and attitude**

35
36 The majority of participants believed that the COVID-19 vaccine was safe to use, with the
37 President and Ministers promoting it as a means to prevent the spread of the disease. Participants
38 considered both personal and communal factors when deciding their stance toward vaccination.
39
40

41 *“Though many people die even if they are vaccinated. Vaccination is necessary*
42 *for us now because the disease is becoming deadly. To keep ourselves and others*
43 *safe, we must get the corona vaccination”.*
44

45
46 Some participants reported feeling a positive change in their social status after getting vaccinated
47 as they received the vaccine initially. However, many were uncertain about getting vaccinated due
48 to a lack of information. One participant preferred a specific vaccine brand, while others were
49 willing to receive any vaccine that was available or offered to them.
50

51
52 When the vaccine program was initially launched, people were filled with fear and uncertainty.
53 Many wanted to receive the vaccine but hesitated and waited for others to take it before deciding.
54 This approach is not recommended, as each individual's health condition should be taken into
55 consideration before getting vaccinated. One participant stated,
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1
2
3 *“When the vaccination programme was first started, some people thought they*
4 *should observe the situation before deciding. With such conflicting thoughts in*
5 *mind, many wanted to wait”.*
6
7

8 Some participants reported symptoms of COVID-19 but were afraid to get tested due to the
9 inconvenience of the testing facility being far from their homes and the risk of losing their job if
10 they tested positive.
11

12 **Barriers and challenges**

13

14 An online registration system is required to receive the vaccine. Study participants reported
15 receiving delayed SMS, and many did not see the SMS on their mobiles, causing a major problem
16 with vaccine discontinuation. Some participants reported receiving their first dose of vaccine
17 through the mass immunization program, but were not provided with vaccine registration cards for
18 further doses, nor were their phone numbers collected for enrollment on the website. Even when
19 they went to the center on the scheduled date, they could not receive their second dose of vaccine
20 without their registration card and SMS. Findings also revealed that missing vaccine cards and a
21 lack of knowledge about reprinting the cards are reported barriers to getting the vaccine. Most of
22 the participants had lost their vaccine cards, so they were unable to receive the vaccine. Participants
23 emphasized the importance of equitable vaccine distribution in their communities and preferred
24 local sites to mass vaccination sites with long lines and crowds. One female participant said,
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29 *“I didn't notice the text reminder for the second dose of the vaccine. When I saw*
30 *it, I went to the vaccination center at the Union Parishad, but the guard in*
31 *charge told me that the vaccine was not available there. He told me to go to*
32 *another vaccination center, but I didn't go there”.*
33
34

35
36 Another participant stated,

37 *“I received my first dose during the mass vaccination program, but when I went*
38 *to the vaccine centre for my second dose, the authorities told me that they*
39 *couldn't give me the vaccine without any documents like a vaccine card or SMS.*
40 *However, they did not give me a card the first time”.*
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44 Dual-dose vaccine schedules were seen as an additional burden for individuals and families, as
45 they needed to move frequently to support themselves. One participant stated,
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48 *“We leave our family behind and work in Dhaka. As poor people, we work ten*
49 *days here today, twenty days in another area, and five days in another place.*
50 *This means that I live in different regions at different times, so I could not get*
51 *vaccinated. But I know this vaccination is necessary for us”.*
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54 Some women hesitated to get vaccinated due to concerns about social norms and religious veil
55 traditions. They believe that being vaccinated by a male nurse goes against these beliefs. A male
56 respondent mentioned:
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3 *“As a Muslim, I believe that female nurses should vaccinate women, as it is*
4 *easier for women to maintain their veil with their hands open during the*
5 *immunization process. This has resulted in many women skipping their*
6 *vaccinations”.*
7

8 Health workers often face challenges while administering vaccines, including a frequent shortage
9 of staff, which leads to an increased workload.
10

11 **Discussion**

12

13
14 The purpose of this study was to delve into the perceptions and barriers regarding the COVID-19
15 vaccine among slum dwellers residing in rural areas of Bangladesh. Our research revealed that
16 despite the widespread recognition of the COVID-19 vaccine, there remains a gap in understanding
17 the details of its efficacy, adverse effects, and recommended usage. The participants have been
18 exposed to a wide range of information and opinions about COVID-19 vaccines, including both
19 accurate and inaccurate information as well as both positive and negative news. This highlights
20 the importance of continuing to educate the public about these important aspects of the vaccine in
21 order to promote confidence in its usage and ensure its successful implementation in controlling
22 the pandemic.
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26 Safety of vaccines and concern about side effects are significant issues that have been reported in
27 earlier studies as a barrier to COVID-19 vaccine uptake (21). Although some participants in our
28 study reported experiencing various temporary side effects such as soreness, discomfort, allergic
29 reactions, swelling, fever, chills, fatigue, and headaches following COVID-19 vaccination, there
30 have not been many reports of severe adverse reactions among COVID-19 vaccine recipients
31 worldwide (22, 23). Our study found that social relationships significantly influence people's
32 decision-making about getting the COVID-19 vaccine. Participants consider their personal beliefs,
33 the opinions of those around them, and what is best for society when deciding whether or not to
34 get vaccinated. They weigh the potential risks and benefits of getting the vaccine, such as concerns
35 over side effects and efficacy, but also consider the greater good and what others may think.
36 However, some participants were motivated to get vaccinated because they wanted things to return
37 to “normal”. Also, people’s views about getting the COVID-19 vaccine are not just a balance
38 between what is good for them and what is good for society. Instead, they consider it within a
39 larger social context (24). For example, when someone recognizes the positive impact of vaccines
40 in ending the pandemic but is hesitant to be among the first to get them because of fears about side
41 effects, they are mindful of their role in society and the moral obligation that may come with it,
42 influencing their decision-making (24). Our study revealed that almost all the participants were
43 motivated to get vaccinated based on the perception that it would protect themselves and others
44 and lead to a return to normalcy. This finding highlights the potential effectiveness of government-
45 led campaigns to promote vaccination, especially as the fourth dose of the vaccine is now available.
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52 Our study revealed that some might believe that one dose of the vaccine would suffice for
53 protection against the virus. It's a concerning issue that many individuals have been skipping their
54 second dose of the COVID-19 vaccine in our country. Experts suggest that the government's
55 vaccine management system and campaigns are lacking in certain aspects. This may be due to a
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3 decrease in the urgency to get vaccinated as the coronavirus transmission rate in our country has
4 declined, as well as the relaxation of vaccine-related campaigns. In addition, many people may
5 have believed that vaccinations are no longer necessary because the virus is no longer spreading
6 (25). In Bangladesh, people living in rural areas have a lower literacy rate and tend to have less
7 knowledge and less practice in preventing COVID-19 compared to urban people (26). We
8 observed that vaccine hesitance among our participants was largely due to the prevalence of myths
9 and misconceptions surrounding the COVID-19 disease and the vaccine. This issue is especially
10 prevalent in rural areas, where access to reliable information about the vaccine's benefits and safety
11 is limited. This could be because of their lower perception of risk and lower level of education,
12 leading to a lower acceptance rate for the vaccine. In China, a study showed that the acceptance
13 rate of the COVID-19 vaccine was lower among people living in rural areas as compared to those
14 in urban areas (27). Similarly, a national survey conducted in the US found that people living in
15 rural areas were more likely to be hesitant about getting vaccinated for COVID-19 (28). This
16 highlights the need for customizing vaccine distribution strategies for different geographical
17 populations. It is important for health authorities, community leaders, and healthcare providers to
18 work together to educate and raise awareness about the reality of COVID-19 and the benefits of
19 getting vaccinated in order to dispel these myths and misconceptions and promote public health.
20 This can be done through community meetings, health campaigns, and the distribution of
21 educational materials.
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27 The third dose of the COVID-19 vaccination program was ongoing during the study period.
28 COVID-19 is still spreading and causing serious illness and death, even in areas where cases have
29 declined. The vaccines are a crucial tool in controlling the pandemic and ending the spread of the
30 virus. Now that it appears that the fourth vaccine is in progress, this study's outcome and possible
31 recommendations will help with the implementation of the government's further vaccine program.
32 The government must strengthen its vaccine management system and campaigns, making sure that
33 people receive the recommended four doses and preventing the spread of false information. A
34 supportive social environment that encourages vaccination is also critical, as social relationships
35 play a significant role in decision-making. By addressing these key issues, we can increase public
36 confidence in the COVID-19 vaccine and successfully control the spread of the pandemic.
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41 **Limitations**

42
43 The study has a few limitations that need to be acknowledged. Firstly, due to difficulty in securing
44 potential participants, we were compelled to visit numerous households, which may have
45 introduced selection bias. Secondly, because the study was cross-sectional, its conclusions might
46 only be applicable to a specific point in time, and an extended investigation is necessary to examine
47 the long-term implications. Finally, due to time constraints, we were unable to gather data from a
48 more diverse range of locations.
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52 Despite these limitations, this study provides valuable insights into individuals' experiences and
53 perceptions surrounding the COVID-19 vaccine. By identifying potential barriers to accessing a
54 fourth dose of the vaccine and developing strategies for addressing these barriers, further
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3 qualitative research can be invaluable for public health officials and policymakers as they work to
4 ensure equitable access to the vaccine.
5

6 **Conclusion**

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9 In conclusion, our study found that the participants were positive towards receiving the COVID-
10 19 vaccine, but lacked knowledge about it. Despite their positive attitude, there were significant
11 barriers and challenges that they faced. Although the government's efforts to control the spread of
12 the virus, ensuring proper safety measures has proven difficult due to socioeconomic factors.
13 Therefore, it is crucial for policymakers and researchers to implement health education programs
14 and interventions to improve the health and well-being of the population in Bangladesh, as the
15 virus continues to spread even after three years and the fourth vaccination program is underway.
16 To gain a more comprehensive understanding of the perceptions and barriers surrounding the
17 COVID-19 pandemic in Bangladesh, further research is recommended.
18
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20

21 **Author Contributions**

22
23 MK and KIS conceptualized and designed the study with TA. contributing. RSR and MK
24 developed tools and supervised data collection. RSR, FA, MFR and TA analyzed the data. TA and
25 MK developed the manuscript. MKH, MK and KIS critically reviews the draft paper. All authors
26 have read and agreed to the published version of the manuscript.
27
28

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30
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32
33

34 **Informed Consent Statement**

35
36 The Ethical Review Committee of the International Centre for Diarrhoeal Disease Research,
37 Bangladesh (icddr,b) approved the study (Ref. PR-21125). Informed consent was obtained from
38 each participant. Before the interviews were recorded, interviewees gave verbal consent, which
39 was recorded. We assured interviewees that their participation was entirely voluntary and that all
40 information provided would be de-identified, ensuring the anonymity and privacy of the
41 information shared.
42
43

44 **Data Availability Statement**

45
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48
49

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51
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3 **Conflicts of Interest:** There is no conflict of interest
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4 1 **COVID-19 vaccine barriers and perception among rural adults: A qualitative study in**
5 2 **Bangladesh**

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35 16 **Abstract**

36
37 17 **Objective** COVID-19 pandemic continues to pose challenges for global public healthcare, even
38 18 with the authorization of several vaccines worldwide. To better understand rural communities'
39 19 knowledge, attitudes, perceptions, and barriers towards these vaccines, we conducted a qualitative
40 20 cross-sectional study with adults in rural Bangladesh.
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47 22 **Setting** This cross-sectional study was conducted in the rural areas of Sylhet and Natore in
48 23 Bangladesh from August 2021 to February 2022.
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54 25 **Participants** Our study involved 15 in-depth interviews with rural adults and 2 key informant
55 26 interviews with health workers.
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6 28 **Results** We analysed data thematically, resulting in four main themes: (1) knowledge and
7 29 perception aspects, (2) myths and misconceptions, (3) practice and attitude, and (4) barriers and
8 challenges of COVID-19 vaccines.
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14 32 **Conclusions** The findings indicate that rural populations lack sufficient knowledge about COVID-
15 33 19 vaccines, but they have a more favourable attitude towards them. Misconceptions, beliefs, and
16 34 personal experiences were found to be the main reasons for vaccine avoidance. To address these
17 35 challenges and dispel the spread of misinformation, health education programs play a pivotal role
18 36 in improving vaccine management. Policymakers should initiate these programs without delay to
19 37 create a well-informed and enlightened community, given that the coronavirus is still spreading.
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27 39 **Keywords:** COVID-19 vaccine, perception, barrier, rural, Bangladesh
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30 40

31 32 41 **Strengths and limitations of this study**

- 33
34 42
- 35 43 • Employing purposive sampling of participants enables a comprehensive understanding of
36 44 the topic under study through the comparison and contrast of participant viewpoints.
 - 37 45 • The study's timing, amidst the nation's ongoing COVID-19 mass vaccination campaign,
38 46 may have influenced the participants' opinions significantly.
 - 39 47 • The adoption of a qualitative design impacts the study's external validity and restricts how
40 48 far the results may be applied.
 - 41 49 • By visiting various households to locate potential participants, the researchers might have
42 50 introduced selection bias, potentially restricting the generalizability of the findings.
 - 43 51 • Since the study was conducted at a specific time, the findings may only be relevant for that
44 52 period, and further research is needed to explore the long-term effects.
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53 Introduction

54 The emergence of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), a novel
55 strain, has transformed COVID-19 into a critical global public health issue. This virus continues
56 to be present in many countries worldwide, posing a significant threat to human health [1]. As per
57 the latest figures released by the World Health Organization (WHO), there have been a staggering
58 760,897,555 reported cases of COVID-19 globally, which have resulted in the unfortunate loss of
59 6,874,585 lives [2]. Bangladesh is at much greater risk since it has the highest population density
60 in the world, making concepts like "social separation" impossible to implement [3]. As a result, it
61 reported 2,037,024 positive cases and 29,439 domestic deaths as of December 30, 2022 [4]. Since
62 SARS-CoV-2 is a highly contagious virus that affects people worldwide, vaccination is the most
63 effective method of protecting the population from COVID-19 [5-7]. Although vaccines may not
64 be 100% effective, high coverage in a community can significantly improve disease control [8].
65 Five key factors—access, affordability, awareness, activation, and acceptance are crucial in
66 ensuring maximum coverage [9].

67
68 During December 2020, numerous COVID-19 vaccines were authorized for commercial use in
69 various nations. These vaccines were developed by companies such as Pfizer-BioNTech, Moderna,
70 Janssen, Sinopharm-BBIBP, Sputnik V, CoviVac, and Covaxin [10]. The government of
71 Bangladesh had procured and made payments for around 30 million doses of the Oxford-
72 AstraZeneca vaccine. Starting from February 7, 2021, Bangladesh initiated the administration of
73 the AZD1222 vaccine, developed by Oxford AstraZeneca, to high-priority groups, such as
74 healthcare workers and individuals aged over 40 [11]. By the end of October 2021, 25.1% of the
75 total population in Bangladesh have received at least one dose of this vaccine [12]. Besides the
76 Oxford-AstraZeneca vaccine, Bangladesh had authorized two other vaccines, the Gam-COVID-
77 Vac (Sputnik V) and the BBIBP-CorV (Sinopharm COVID-19 vaccine), for emergency use [13,
78 14]. In June, the government of Bangladesh also started vaccinating its citizens with the Sinopharm
79 vaccine [15]. Additionally, Bangladesh is scheduled to be provided with 68 million doses of the
80 Covax vaccine through the efforts of the World Health Organization (WHO) and Gavi, the Vaccine
81 Alliance [16].

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3 83 The government of Bangladesh (GoB) had initiated the largest-ever state-wide vaccination
4 84 program to vaccinate over 130 million individuals, which accounted for 80% of the total
5 85 population [17]. This program was to be implemented in four phases [17], despite the fact that
6 86 approximately 34% of the population was under the age of 18 [18]. A countrywide deployment
7 87 and vaccination plan for COVID-19 were released by the GoB, which included the necessity of
8 88 registering online to obtain the vaccine. The GoB aimed to vaccinate 117 million individuals aged
9 89 18 and above as per the vaccination plan. Nonetheless, as of 3rd August 2021, only 14% of the
10 90 target population had registered to receive the vaccine. Out of those registered, 57% had received
11 91 the first dose vaccine, with gender and administrative regions showing significant variations. Men
12 92 (61%) were vaccinated more than women (39%), and Dhaka (19%) received more vaccinations
13 93 than other administrative divisions [19]. In general, only 8% of the targeted population has
14 94 received the first dose of the vaccine, and 4% have received the second dose of the vaccine [19].
15 95

16 96 In clinical trials, COVID-19 vaccine candidates have shown effective rates of up to 95% in
17 97 preventing symptomatic infections [20]. Based on research findings, it is believed that vaccinating
18 98 approximately 82% of a nation's population may be necessary to attain herd immunity against
19 99 SARS-CoV-2. However, the emergence of new virus variants may require individuals to receive
20 100 multiple vaccinations [21, 22]. In the current context, vaccine hesitancy, which ranges from
21 101 vaccination approval to denial, has emerged as the most critical public health concern. Despite the
22 102 availability of vaccination services, it refers to delays in acceptance or refusal of immunizations
23 103 [23]. There are several factors that contribute to vaccine hesitancy, such as apprehensions
24 104 regarding vaccine safety and efficacy, potential adverse health effects, misunderstandings
25 105 surrounding the value of vaccination, a lack of trust in the healthcare system, and insufficient
26 106 community education regarding vaccine-preventable illnesses [24]. Acceptance of COVID-19
27 107 vaccines varies greatly among different nations and regions of the world [9, 25, 26]. Public mistrust
28 108 and resistance to vaccination could impede the success of the COVID-19 vaccination campaign
29 109 [27, 28].
30 110

31 111 Herd immunity and the ease of vaccination are likely to be impacted by people's knowledge of
32 112 COVID-19 vaccines, level of acceptability, and perception of immunization concerns. However,
33 113 currently, there needs to be more prior research on this subject. Therefore, this study aimed to
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3 114 assess Bangladeshi rural adults' opinions on vaccination and their comprehension and acceptance
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5 115 of COVID-19 vaccines.
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8 117 **Methods**

9 118 **Study area**

10 119 The study was conducted in rural areas of the Sylhet and Natore districts in Bangladesh, with
11
12 120 careful consideration given to logical and transportation concerns. Given the ongoing COVID-19
13
14 121 pandemic and the prevalence of severe cases in the country, we selected locations closer to Dhaka
15
16 122 to minimize the risk of disruption in the event of sudden lockdowns. It is worth noting that on
17
18 123 August 11th, 2021, the government of Bangladesh lifted the hard lockdown that had been in effect
19
20 124 since July 2021.
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22 125

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25
26 126 Natore is a northern district of Bangladesh covering an area of 1896.05 sq. km. According to the
27
28 127 2022 census, its population stands at 18,59,924 [29]. The district city is situated on the bank of the
29
30 128 Natore river. Natore comprises of 6 upazilas (sub-districts), 8 pourashavas (municipalities), and
31
32 129 1366 villages. Sylhet, located in the northeast of Bangladesh, is one of the four districts in the
33
34 130 Sylhet Division, covering an area of 3452.07 square kilometers. According to the 2022 census, its
35
36 131 population is 38,97,037 [29]. The district comprises of 11 upazilas (sub-districts), 2 municipalities,
37
38 132 1693 mouzas, and 3249 villages. Both Natore and Sylhet districts have a well-developed road
39
40 133 network that ensures easy connectivity with Dhaka.
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43 135 **Patient and public participation**

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46 136 Patients and the public were not involved in this study.
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48 137

49 138 **Training of the data collectors**

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53 139 The research assistants, two qualified males with master's degrees in anthropology from
54
55 140 Jahangirnagar University, Dhaka, Bangladesh. They were skilled and experienced in qualitative
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3 141 research methods, specifically conducting in-depth interviews (IDIs) and key informant interviews
4
5 142 (KIIs). Prior to commencing the data collection process, the research assistants underwent a
6
7 143 comprehensive 4-day training program on interviewing techniques. This training consisted of
8
9 144 2 days of theoretical sessions covering topics such as the basic principles of qualitative research,
10
11 145 study objectives, research ethics and informed consent in human subjects' research, and the KII
12
13 146 and IDI interview guide. Additionally, a practical fieldwork session was conducted on the third
14
15 147 day to provide hands-on experience in conducting interviews and obtaining informed consent.

16 148 Throughout the training, each research assistant provided feedback on the other's performance
17
18 149 during IDIs, and the trainer provided feedback and guidance on group dynamics, participant
19
20 150 interaction, body language, conflict avoidance, conflict management. On the second day, the team
21
22 151 was taken into a nearby neighbourhood to conduct IDIs with the local communities. The resulting
23
24 152 KII and IDIs were transcribed and thoroughly analysed. Based on the analyzed data and feedback
25
26 153 from the data collectors, the interview guides were revised.

27 154

29 155 **Data collection**

31
32 156 We conducted this cross-sectional survey between August 2021 to February 2022, aiming to
33
34 157 investigate individuals' vaccination status regarding COVID-19. Our research involved IDIs with
35
36 158 fifteen participants and two KIIs with government officials involved in COVID-19 vaccination
37
38 159 activities. The selection process was purposive, starting from a landmark and proceeding to visit
39
40 160 households. We specifically focused on individuals who had either not received the COVID-19
41
42 161 vaccine or had missed their second dose. By conducting in-depth interviews with their consent, we
43
44 162 aimed to capture the depth and uniqueness of their experiences and perceptions regarding
45
46 163 vaccination.

47 164 The interviews were conducted in privately, ensuring confidentiality for approximately one hour,
48
49 165 and followed pre-tested data collection guidelines that allowed for flexibility to incorporate any
50
51 166 additional feedback. We obtained their consent, outlining the objectives of our study in a
52
53 167 comprehensive manner. Additionally, we provided them with a brief verbal overview, enlightening
54
55 168 them about the purpose of our research, which aimed to explore the knowledge, attitudes,
56
57 169 perceptions, and barriers related to the COVID-19 vaccine among the rural population of

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3 170 Bangladesh. We assured them that their valuable information would be treated with utmost
4
5 171 confidentiality. The significance of their responses is extremely important as they contribute
6
7 172 greatly to the ongoing efforts in public education, fostering trust in the vaccine and securing its
8
9 173 effective implementation in combating the pandemic.

10
11 174 The interviews were digitally recorded, transcribed into Bangla, and then translated into English.
12
13 175 To ensure accuracy and quality of our work, spot checks of the recordings and transcriptions were
14
15 176 performed by an anthropologist proficient in both Bangla and English.

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19 20 178 **Thematic area**

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22
23 179 To structure and organize our findings, we utilized this index as a framework to analyse post-
24
25 180 programmatic data. Additionally, we have meticulously coded the qualitative data using the
26
27 181 following four indicators:

- 28
29 182 1. Knowledge and perception aspects
30
31 183 2. Myths and misconceptions
32
33 184 3. Practice and attitude
34
35 185 4. Barriers and challenges

36
37 186

38 39 187 **Data Analysis**

40
41
42 188 We transcribed the audio-recorded interviews conducted in Bangla using MS Word files. These
43
44 189 transcripts were translated and carefully reviewed by the research team and co-authors to ensure
45
46 190 accuracy.

47
48 191 To conduct a thematic analysis, we used Bernard's framework [30], wherein themes were identified
49
50 192 from the data and categorized under the four thematic areas. Initially, we developed a pre-existing
51
52 193 codebook based on the interview guidelines, which was manually coded. This was then reviewed
53
54 194 and verified by an anthropologist who conducted spot checks of the recordings and transcriptions.

1
2
3 195 The qualitative members subsequently coded all the interviews manually, while maintaining
4
5 196 flexibility in incorporating any additional themes that were deemed relevant to the study's
6
7 197 objectives. This approach allowed for a combination of both deductive and inductive coding, while
8
9 198 ensuring inter-coder reliability [31]. Following the coding process, thematic codes were
10
11 199 categorized and subsequently grouped under the four themes.

200

201 **Quality assurance and control**

202 Quality control were ensured through the following steps:

- 203 • Hiring knowledgeable and experienced data collectors who underwent a comprehensive
204 five-day training program on both theoretical and practical aspects of the study to reduce
205 interviewer bias.
- 206 • To enhance the accuracy and reliability of the collected data, data collectors were assigned
207 to work in pairs.
- 208 • The interview guide was translated into the local language to ensure clear and effective
209 communication with the participants.
- 210 • To accurately record and document conversations during IDIs and KIIs, data collectors
211 used digital voice recorders and copious note taking.
- 212 • To maintain consistency and address any discrepancies, data collectors compared their
213 notes and voice recordings at the end of each day.
- 214 • The investigators of the study cross checked the interview transcriptions with the audio
215 records and field notes to ensure data credibility.

216

217 **Results**

218 **Demographic characteristics of the participants**

219 A total of fifteen participants (nine males and six females) from two districts were interviewed.
220 Four of the men and women were aged 16-25 years; two men and one woman were aged 25-36
221 years, with the other three 25-34 years. Among them, three of the men had no education (can sign
222 names only) and three of them completed primary education; five of the women completed up to

223 secondary education; and the rest of the men and women completed higher secondary education
224 and graduation.

225 All of the participants were working in unskilled labor (such as day laborers, rickshaw or van
226 pullers, drivers, and farmers). The average household income ranged from 9000 to 15000 (BDT).
227 The maximum number of members in any households was 5 to 10 members, and the rest had 2 to
228 4 members. The socio-demographic characteristics of the interviewees who participated in the IDIs
229 are shown in Table 1.

230 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		
Can signature only (own name)	3	

Primary	3	
Secondary	1	4
Higher secondary	1	2
Graduation	1	
Income		
5000-8000	1	
8000-15000	5	2
Above 15000	3	4
Family members		
2 to 4 members	3	2
4 to 10 members	6	4

231

232 Data that support the findings in the study are included in the Supplementary Material.

233 **Themes emerged**

234 Upon analysis of the semi-structured in-depth and key informant interviews, four main themes
 235 emerged: knowledge and perception aspects, myths and misconceptions, practice and attitude, and
 236 barriers and challenges of COVID-19 vaccines.

237

238 **Knowledge and perception aspects**

239 Participants described COVID-19 as a highly contagious and life-threatening illness and stated
 240 they first learned about it through television, their neighbors, and social media. Regarding
 241 symptoms, most participants believed that the main indicators of COVID are fever, coughing, and
 242 a runny nose, with a few mentioning that shortness of breath is also a symptom. Additionally, some
 243 participants stated that the virus could spread through breathing, touching, and sneezing. Poor
 244 hygiene practices, such as not washing hands with soap, can make an individual more susceptible
 245 to contracting the disease. To prevent the spread of COVID, participants emphasized the
 246 importance of isolation, using separate utensils for eating, and maintaining social distance. One of

1
2
3 247 the participants stated that receiving this immunization will prevent future occurrences of the
4
5 248 condition. Through the mass media, they also learned about the numerous deaths caused by this
6
7 249 contagion that have occurred worldwide. A respondent mentioned that,

8
9 250 *“This illness is easily spreadable. Sneezing and physical activity can exacerbate*
10
11 251 *its transmission. Nevertheless, adhering to recommended precautions like*
12
13 252 *wearing a mask and practicing social distance can protect you from contracting*
14
15 253 *the disease”.*

16
17 254 The majority of the participants had a positive view regarding the COVID vaccine. They expressed
18
19 255 trust in the vaccines’ quality and believed that getting vaccinated reduces the risk of death and
20
21 256 enables them to venture outside more freely. Additionally, they perceived that the vaccine protects
22
23 257 against getting infected by others. Although the majority of the community had positive
24
25 258 perceptions about the vaccine, most of them lacked information about its various types,
26
27 259 administration methods, and frequency. All the study participants believed that pregnant women
28
29 260 were not eligible to receive the vaccine.

30
31 261 *“COVID-19 vaccine may have serious consequences for pregnant women.*
32
33 262 *Hence, it is not recommended for them to receive it. I personally think that*
34
35 263 *pregnant women should avoid getting the vaccine”.*

36
37 264 Some participants reported experiencing mild reactions after vaccination, such as slight fever,
38
39 265 soreness, headaches etc., but nothing of serious concern. Amidst the discussions, certain
40
41 266 individuals brought up the topic of antibodies. They were unaware of the word and mistakenly
42
43 267 referred them as antibiotics. A respondent mentioned:

44
45 268 *“COVID-19 is a devastating illness, and our government has taken proactive*
46
47 269 *measures to ensure the protection of our citizens by implementing a nationwide*
48
49 270 *vaccination program. The vaccines work by generating antibiotics (antibodies)*
50
51 271 *to combat the virus and keep people safe”.*

52
53 272 A respondent also stated that the fate of a person's health and survival from this disease is
54
55 273 ultimately determined by the Creator, regardless of whether or not they receive vaccinations. He
56
57 274 believed that a person would not fall ill if he adhered to his religious principles.

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6 276 **Myths and misconceptions**

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8 277 All participants discussed side effects when the vaccination programme first started. They stated
9
10 278 elderly people above the age of 60 are at a high-risk of complications from vaccination, which was
11
12 279 the most frequently given response.

13
14 280 *“Elderly people with respiratory problems faced even more problems after*
15
16 281 *taking the vaccine. Their immune systems weakened, leading to additional*
17
18 282 *problems and, in some cases, death. I have seen or heard about these events on*
19
20 283 *TV or from others”.*

21
22 284 Furthermore, some participants reported that children are at a high risk of getting infections from
23
24 285 the vaccine, despite the fact that the vaccination campaign for children had not even commenced
25
26 286 at that time. It’s just that they were merely making assumptions or had misconceptions regarding
27
28 287 this matter.

28
29 288 Some people’s assumptions made the vaccination process difficult. There was also a common
30
31 289 misconception that one dose of the vaccine would protect against the virus and there would be no
32
33 290 need for additional doses.

34 291 Some participants confidently shared information that was not accurate or held conspiracy theories
35
36 292 about the COVID-19 vaccines. For example, one participant said about COVID-19 vaccines,

37
38 293 *“Injections (vaccines) are sometimes given to reduce the number of dogs.*
39
40 294 *However, many people have not yet received the COVID-19 vaccine due to*
41
42 295 *concerns about potential side effects in humans.”*

43
44 296 In 2009, Bangladesh had one of the highest rates of human deaths related to rabies worldwide.
45
46 297 During that time, the government of Bangladesh resorted to indiscriminately killing dogs in an
47
48 298 attempt to eliminate rabies across the country. This practice had been ongoing for decades, despite
49
50 299 its ineffectiveness. However, in late 2011, as part of a new national strategy aimed at eliminating
51
52 300 rabies, the government of Bangladesh began vaccinating dogs on a large scale instead of resorting
53
54 301 to mass killings. So, some participants drew a parallel between this context and the COVID

1
2
3 302 vaccine, forming a conspiracy theory that the vaccine was invented with the intention of reducing
4
5 303 the human population.
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9
10 305 **Practice and attitude**

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12
13 306 Vaccine hesitancy is intricately linked to specific contexts and exhibits variations across different
14 307 periods, locations and socioeconomic class. When the vaccine program was initially launched,
15 308 people were filled with fear and uncertainty. This can be attributed to various factors, including
16 309 limited awareness, the presence of misleading information, lack of confidence in healthcare
17 310 systems, and more.
18
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22

23 311 Many wanted to receive the vaccine but hesitated and waited for others to take it before deciding.
24 312 This approach is not recommended, as each individual's health condition should be taken into
25 313 consideration before getting vaccinated. One participant stated,
26
27
28

29 314 *“When the vaccination programme was first started, some people thought they*
30 315 *should observe the situation before deciding. With such conflicting thoughts in*
31 316 *mind, many wanted to wait”.*
32
33
34

35 317 Some women hesitated to get vaccinated due to concerns about social norms and religious veil
36 318 traditions. They believe that being vaccinated by a male nurse goes against these beliefs. A male
37 319 respondent mentioned:
38
39
40

41 320 *“As a Muslim, I believe that female nurses should vaccinate women, as it is*
42 321 *easier for women to maintain their veil with their hands open during the*
43 322 *immunization process. This has resulted in many women skipping their*
44 323 *vaccinations”.*
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49 324 Over time, an increasing number of individuals displayed willingness to receive COVID-19
50 325 vaccinations as they observed the growing trend of community members getting vaccinated and it
51 326 was free of cost. The majority of participants believed that the COVID-19 vaccine was safe to use,
52 327 with the President and Ministers promoting it as a means to prevent the spread of the disease.
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1
2
3 328 Participants considered both personal and communal factors when deciding their stance toward
4
5 329 vaccination.

6
7 330 *“Though many people die even if they are vaccinated. Vaccination is necessary*
8
9 331 *for us now because the disease is becoming deadly. To keep ourselves and others*
10
11 332 *safe, we must get the corona vaccination”.*

12
13
14 333 Some participants reported feeling a positive change in their social status after getting vaccinated
15
16 334 as they received the vaccine initially.

17
18 335

19
20
21 336 **Barriers and challenges**

22
23 337 An online registration system is required to receive the vaccine. Study participants reported
24
25 338 receiving delayed SMS, and many did not see the SMS on their mobiles, causing a major problem
26
27 339 with vaccine discontinuation. Some participants reported receiving their first dose of vaccine
28
29 340 through the mass immunization program, but were not provided with vaccine registration cards for
30
31 341 further doses, nor were their phone numbers collected for enrollment on the website. Even when
32
33 342 they went to the center on the scheduled date, they could not receive their second dose of vaccine
34
35 343 without their registration card and SMS. Findings also revealed that missing vaccine cards and a
36
37 344 lack of knowledge about reprinting the cards are reported barriers to getting the vaccine. Most of
38
39 345 the participants had lost their vaccine cards, so they were unable to receive the vaccine. Participants
40
41 346 emphasized the importance of equitable vaccine distribution in their communities and preferred
42
43 347 local sites to mass vaccination sites with long lines and crowds. One female participant said,

44
45 348 *“I didn't notice the text reminder for the second dose of the vaccine. When I saw*
46
47 349 *it, I went to the vaccination center at the Union Parishad, but the guard in*
48
49 350 *charge told me that the vaccine was not available there. He told me to go to*
50
51 351 *another vaccination center, but I didn't go there”.*

52
53 352 Another participant stated,

54
55 353 *“I received my first dose during the mass vaccination program, but when I went*
56
57 354 *to the vaccine centre for my second dose, the authorities told me that they*

1
2
3 355 *couldn't give me the vaccine without any documents like a vaccine card or SMS.*

4
5 356 *However, they did not give me a card the first time”.*

6
7 357 Dual-dose vaccine schedules were seen as an additional burden for individuals and families, as
8
9 358 they needed to move frequently to support themselves. One participant stated,

10
11 359 *“We leave our family behind and work in Dhaka. As poor people, we work ten*

12
13 360 *days here today, twenty days in another area, and five days in another place.*

14
15 361 *This means that I live in different regions at different times, so I could not get*

16
17 362 *vaccinated. But I know this vaccination is necessary for us”.*

18
19 363 Health workers often face challenges while administering vaccines, including a frequent shortage
20
21 364 of staff, which leads to an increased workload.

22
23 365

24 25 26 366 **Discussion**

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28
29 367 The purpose of this study was to delve into the perceptions and barriers regarding the COVID-19
30
31 368 vaccine among adults residing in rural areas of Bangladesh. Our research revealed that despite the
32
33 369 widespread recognition of the COVID-19 vaccine, there remains a gap in understanding the details
34
35 370 of its efficacy, adverse effects, and recommended usage. The participants have been exposed to a
36
37 371 wide range of information and opinions about COVID-19 vaccines, including both accurate and
38
39 372 inaccurate information as well as both positive and negative news. This highlights the importance
40
41 373 of continuing to educate the public about these important aspects of the vaccine in order to promote
42
43 374 confidence in its usage and ensure its successful implementation in controlling the pandemic.

44
45 375

46
47 376 Safety of vaccines and concern about side effects are significant issues that have been reported in
48
49 377 earlier studies as a barrier to COVID-19 vaccine uptake [32]. Although some participants in our
50
51 378 study reported experiencing various temporary side effects such as soreness, discomfort, allergic
52
53 379 reactions, swelling, fever, chills, fatigue, and headaches following COVID-19 vaccination, there
54
55 380 have not been many reports of severe adverse reactions among COVID-19 vaccine recipients
56
57 381 worldwide [33, 34]. Our study found that social relationships significantly influence people's

1
2
3 382 decision-making about getting the COVID-19 vaccine. Participants consider their personal beliefs,
4
5 383 the opinions of those around them, and what is best for society when deciding whether or not to
6
7 384 get vaccinated. They weigh the potential risks and benefits of getting the vaccine, such as concerns
8
9 385 over side effects and efficacy, but also consider the greater good and what others may think.
10
11 386 However, some participants were motivated to get vaccinated because they wanted things to return
12
13 387 to “normal”. Also, people’s views about getting the COVID-19 vaccine are not just a balance
14
15 388 between what is good for them and what is good for society. Instead, they consider it within a
16
17 389 larger social context [35]. For example, when someone recognizes the positive impact of vaccines
18
19 390 in ending the pandemic but is hesitant to be among the first to get them because of fears about side
20
21 391 effects, they are mindful of their role in society and the moral obligation that may come with it,
22
23 392 influencing their decision-making [35]. Our study has revealed that almost all the participants were
24
25 393 motivated to get vaccinated based on the perception that it would protect both themselves and
26
27 394 others, ultimately leading our country towards a return to normalcy. This finding highlights the
28
29 395 potential effectiveness of government-led campaigns to promote vaccination, especially as the
30
31 396 fourth dose of the vaccine is now available.

32
33 397
34
35 398 Our study revealed that some might believe that one dose of the vaccine would suffice for
36
37 399 protection against the virus. It's a concerning issue that many individuals have been skipping their
38
39 400 second dose of the COVID-19 vaccine in our country. Experts suggest that the government’s
40
41 401 vaccine management system and campaigns are lacking in certain aspects. This may be due to a
42
43 402 decrease in the urgency to get vaccinated as the coronavirus transmission rate in our country has
44
45 403 declined, as well as the relaxation of vaccine-related campaigns. In addition, many people may
46
47 404 have believed that vaccinations are no longer necessary because the virus is no longer spreading
48
49 405 [36].

50
51 406
52
53 407 The vaccination's geographical location has a significant impact on uptake, [37] as it directly
54
55 408 influences accessibility. In Bangladesh, people living in rural areas have a lower literacy rate and
56
57 409 tend to have less knowledge and less practice in preventing COVID-19 compared to urban people
58
59 410 [38]. We observed that vaccine hesitance among our participants was largely due to the prevalence

1
2
3 411 of myths and misconceptions surrounding the COVID-19 disease and the vaccine. This issue is
4
5 412 especially prevalent in rural areas, where access to reliable information and awareness about the
6
7 413 advantages and safety of the vaccine is limited. This could be because of their lower perception of
8
9 414 risk and lower level of education, leading to a lower acceptance rate for the vaccine. In China, a
10
11 415 study showed that the acceptance rate of the COVID-19 vaccine was lower among people living
12
13 416 in rural areas as compared to those in urban areas [39]. Similarly, a national survey conducted in
14
15 417 the US found that people living in rural areas were more likely to be hesitant about getting
16
17 418 vaccinated for COVID-19 [40]. This highlights the need for customizing vaccine distribution
18
19 419 strategies for different geographical populations. Additionally, it was discovered that organising
20
21 420 vaccinations through university, school, workplace increased uptake [9]. It is important for health
22
23 421 authorities, community leaders, and healthcare providers to work together to educate and raise
24
25 422 awareness about the reality of COVID-19 and the benefits of getting vaccinated in order to dispel
26
27 423 these myths and misconceptions and promote public health. This can be done through community
28
29 424 meetings, health campaigns, and the distribution of educational materials.

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31 425
32
33 426 Our study revealed that, as time passed, a rising number of individuals wanted to receive COVID-
34
35 427 19 vaccinations. This willingness was influenced by the fact that the vaccinations were provided
36
37 428 free of cost. Several studies investigated the influence of non-financial costs on the acceptance of
38
39 429 vaccines, with time-related constraints emerging as the primary non-financial barriers to
40
41 430 affordability [41]. However, in our study, due to their work schedules and frequent movements
42
43 431 from one place to another, these people faced challenges in getting vaccinated in a timely manner.
44
45 432 Moreover, the multiple doses required for the COVID vaccine added an additional burden for
46
47 433 them. Since they are day laborers, they cannot afford to take a single day off work as their wages
48
49 434 would be deducted for that day.

50
51 435 The third dose of the COVID-19 vaccination program was ongoing during the study period.
52
53 436 COVID-19 is still spreading and causing serious illness and death, even in areas where cases have
54
55 437 declined. The vaccines are a crucial tool in controlling the pandemic and ending the spread of the
56
57 438 virus. Now that it appears that the fourth vaccine is in progress, this study's outcome and possible
58
59 439 recommendations will help with the implementation of the government's further vaccine program.

1
2
3 440 The government must strengthen its vaccine management system and campaigns, making sure that
4
5 441 people receive the recommended four doses and preventing the spread of false information. A
6
7 442 supportive social environment that encourages vaccination is also critical, as social relationships
8
9 443 play a significant role in decision-making. By addressing these key issues, we can increase public
10
11 444 confidence in the COVID-19 vaccine and successfully control the spread of the pandemic.
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13 445

13 446 **Limitations**

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15
16 447 The study has a few limitations that need to be acknowledged. Firstly, due to difficulty in securing
17
18 448 potential participants, we were compelled to visit numerous households, which may have
19
20 449 introduced selection bias. Secondly, because the study was cross-sectional, its conclusions might
21
22 450 only be applicable to a specific point in time, and an extended investigation is necessary to examine
23
24 451 the long-term implications. Finally, due to time constraints, we were unable to gather data from a
25
26 452 more diverse range of locations.

27
28 453 Despite these limitations, this study provides valuable insights into individuals' experiences and
29
30 454 perceptions surrounding the COVID-19 vaccine. By identifying potential barriers to accessing a
31
32 455 fourth dose of the vaccine and developing strategies for addressing these barriers, further
33
34 456 qualitative research can be invaluable for public health officials and policymakers as they work to
35
36 457 ensure equitable access to the vaccine.

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38 458

39 40 459 **Conclusion**

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42
43 460 In conclusion, our study found that the participants were positive towards receiving the COVID-
44
45 461 19 vaccine, but lacked knowledge about it. Despite their positive attitude, there were significant
46
47 462 barriers and challenges that they faced. Although the government's efforts to control the spread of
48
49 463 the virus, ensuring proper safety measures has proven difficult due to socioeconomic factors.
50
51 464 Therefore, it is crucial for policymakers and researchers to implement health education programs
52
53 465 and interventions to improve the health and well-being of the population in Bangladesh, as the
54
55 466 virus continues to spread even after three years and the fourth vaccination program is underway.
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3 467 To gain a more comprehensive understanding of the perceptions and barriers surrounding the
4
5 468 COVID-19 pandemic in Bangladesh, further research is recommended.
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9
10 470 **Author Contributions:** MK and KIS conceptualized and designed the study with TA.
11
12 471 contributing. RSR and MK developed tools and supervised data collection. RSR, FA, MFR and
13
14 472 TA¹ analyzed the data. TA¹ and MK developed the manuscript. MKH, MK and KIS critically
15
16 473 reviewed the draft paper. All authors have read and agreed to the published version of the
17
18 474 manuscript.
19

20 475
21
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26
27 478 **Ethics Approval Statement:** The Ethical Review Committee of the International Centre for
28
29 479 Diarrhoeal Disease Research, Bangladesh (icddr,b) approved the study (Ref. PR-21125). Informed
30
31 480 consent was obtained from each participant. Before the interviews were recorded, interviewees
32
33 481 gave verbal consent, which was recorded. We assured interviewees that their participation was
34
35 482 entirely voluntary and that all information provided would be de-identified, ensuring the
36
37 483 anonymity and privacy of the information shared.
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40
41 485 **Data Availability Statement:** The Guidelines for IDI that support the findings in the study are
42
43 486 included in the Supplementary Material; further inquiries can be directed to the corresponding
44
45 487 author.
46
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48 488
49
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51
52 490 collection, analysis, or interpretation; the writing of the manuscript; or the choice to share the
53
54 491 findings were all made independently of the funders.
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493 **Conflicts of Interest:** There is no conflict of interest.

For peer review only

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- 47 584

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3 **Barriers and perceptions of taking the COVID-19 vaccine among poor Bangladeshi adults:**
4 **a cross-sectional mixed-methods survey**
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8 **In-depth interview guidelines**
9

10 **General Information**
11

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13
14 1. Respondent's general information (division, district, age, gender, occupation of both
15 spouses, income, education (if informal education like a scholar or an Islamic scholar,
16 mention that), number of household members, sanitation facilities (water and toilet
17 facilities).
18
19
20

21 **Concept of COVID-19**
22

- 23
24 2. Have you heard about COVID-19? Where or from whom did you hear about it? What was
25 your initial perception when you first heard about this disease? (Please provide details.)
26 Did the coronavirus have any economic or social impact on your household? (For example:
27 work situation, communication and social barriers with relatives, etc.)
28
29
30
31 3. What are the symptoms of the coronavirus? (e.g., dry cough, fever, fatigue, sore throat,
32 sneezing, upset stomach, diarrhoea, vomiting, headache, body aches, feeling cold, and
33 breathing difficulties). Did you experience any of these symptoms of COVID-19? (For
34 example: if you experienced symptoms, did you get tested? What were the test results? If
35 you didn't get tested, why not, and what actions did you take if you tested positive?)
36
37
38
39 4. How does the coronavirus spread? (For example: by shaking hands with an infected person,
40 touching an infected person, being in close proximity to an infected person without any
41 form of contact, through respiratory droplets, not washing hands after using the toilet,
42 touching surfaces in the infected area and then touching the face or nose, or consuming
43 contaminated food.) What preventive measures could be taken to control the spread of this
44 illness?
45
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51 **Perceptions of COVID-19 Vaccination**
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- 53
54 1. What were the general perceptions regarding the COVID vaccine? (effectiveness, benefits)
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- 1
- 2
- 3 2. Did you have any reactions or side effects after receiving the COVID-19 vaccine? If so,
- 4 what were they?
- 5
- 6 3. How did anyone's religious beliefs influence their perception of COVID-19 and the role
- 7 of vaccines?
- 8
- 9
- 10 4. How did you perceive the role of the government in implementing a nationwide vaccination
- 11 programme?
- 12
- 13
- 14

15 **Misconceptions towards COVID-19 Vaccination**

- 16
- 17
- 18 9. What were the initial concerns about side effects during the vaccination programme? (For
- 19 example: perception of side effects, specific concerns, fear, religious beliefs, any myths,
- 20 misinformation.)
- 21
- 22
- 23 10. Is there any specific group of people that you believe should not receive vaccines? (For
- 24 example: specific age groups, individuals with certain medical conditions, pregnant
- 25 women)
- 26
- 27
- 28

29 **Attitude towards COVID-19 Vaccination**

- 30
- 31
- 32 11. What is your attitude towards the COVID-19 vaccine? Do you believe that the COVID-19
- 33 vaccine helps control or prevent the spread of the coronavirus? (For example: why or why
- 34 not?) Do you know how many doses are required for the COVID-19 vaccination to be
- 35 effective in controlling the virus? What are your thoughts on the benefits of the COVID-
- 36 19 vaccination? (For example: mental peace, immunity, social acceptance, physical well-
- 37 being, etc.)
- 38
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44 **Barriers to COVID-19 Vaccination**

- 45
- 46 12. Have you received the COVID-19 vaccine? Can you tell me why you chose to get
- 47 vaccinated or not? (For example: gender/family members' preferences, cost, perceived
- 48 unnecessariness, age, non-communicable diseases, vaccine expiration, feeling well without
- 49 vaccination, short-term efficacy, natural protection against COVID-19, receiving the
- 50 vaccine from abroad or another country, and pregnancy complications.)
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3 13. Which vaccine does he/she want to take (if no vaccine preference has been mentioned so
4 far)?
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8 **Opportunities and Benefits of Vaccination, Vaccine Supply, and Management**

9

10
11 14. Did you face any barriers when registering for the vaccine through the website? If yes,
12 what type of barrier was it? (Note: did not have internet access, did not know the procedure
13 for registration, did not receive any SMS, there was a delay in receiving SMS, received
14 one dose but no vaccine supply, the vaccination centre was far from my area, had to roll
15 up the sleeves during vaccine administration, had to stand in a long queue, and Indian
16 vaccine).
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21 15. What are the main barriers to the management of COVID-19 vaccines? (Note: need to go
22 to the hospital, time-consuming, inadequate behaviour of vaccine workers, difficulties for
23 young children and in the workplace, etc.)
24
25

26 16. In order to bring everyone within the ambit of vaccination, what kind of steps do you think
27 the government needs to take? Do you have any recommendations on this matter? If so,
28 please elaborate.
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Manuscript: COVID-19 vaccine barriers and perception among rural adults: A qualitative study in Bangladesh

Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist

Developed from:

Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

No. Item	Guide questions/description	Reported on Page #
Domain 1: Research team and reflexivity		
<i>Personal Characteristics</i>		
1. Interviewer/facilitator	Which author/s conducted the interview or focus group?	Page 5
2. Credentials	What were the researcher's credentials? E.g. PhD, MD	Page 5
3. Occupation	What was their occupation at the time of the study?	Page 5 and 6
4. Gender	Was the researcher male or female?	Page 5
5. Experience and training	What experience or training did the researcher have?	Page 5
<i>Relationship with participants</i>		
6. Relationship established	Was a relationship established prior to study commencement?	Page 6
7. Participant knowledge of the interviewer	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	Page 6
8. Interviewer characteristics	What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	Page 6

Domain 2: study design		
<i>Theoretical framework</i>		
9. Methodological orientation and Theory	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	Page 5 and 6
<i>Participant selection</i>		
10. Sampling	How were participants selected? e.g. purposive, convenience, consecutive, snowball	Page 6
11. Method of approach	How were participants approached? e.g. face-to-face, telephone, mail, email	Page 5 and 6
12. Sample size	How many participants were in the study?	Page 6
13. Non-participation	How many people refused to participate or dropped out? Reasons?	N/A
<i>Setting</i>		
14. Setting of data collection	Where was the data collected? e.g. home, clinic, workplace	Page 6
15. Presence of non-participants	Was anyone else present besides the participants and researchers?	Page 6 Inferred as one to one interviews
16. Description of sample	What are the important characteristics of the sample? e.g. demographic data, date	Page 6
<i>Data collection</i>		
17. Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	Supplementary file and page 5
18. Repeat interviews	Were repeat interviews carried out? If yes, how many?	No
19. Audio/visual recording	Did the research use audio or visual recording to collect the data?	Page 7
20. Field notes	Were field notes made during and/or after the interview or focus group?	Page 7

21. Duration	What was the duration of the interviews or focus group?	Page 6
22. Data saturation	Was data saturation discussed?	Page 7
23. Transcripts returned	Were transcripts returned to participants for comment and/or correction?	No
Domain 3: analysis and findings		
<i>Data analysis</i>		
24. Number of data coders	How many data coders coded the data?	Page 7
25. Description of the coding tree	Did authors provide a description of the coding tree?	Page 7
26. Derivation of themes	Were themes identified in advance or derived from the data?	Page 7
27. Software	What software, if applicable, was used to manage the data?	N/A
28. Participant checking	Did participants provide feedback on the findings?	No
<i>Reporting</i>		
29. Quotations presented	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	Page 10 to 15
30. Data and findings consistent	Was there consistency between the data presented and the findings?	Yes, there was. Page 8 to 15
31. Clarity of major themes	Were major themes clearly presented in the findings?	Yes. they were. From page 8 to 15
32. Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	Discussion of major themes From page 15 to 18

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COVID-19 vaccine barriers and perception among rural adults: A qualitative study in Bangladesh

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4 1 **COVID-19 vaccine barriers and perception among rural adults: A qualitative study in**
5 2 **Bangladesh**
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30 14 Word count: 4918
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34
35 16 **Abstract**
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37

38 17 **Objective** The COVID-19 pandemic continues to pose challenges for global public healthcare,
39 18 even with the authorization of several vaccines worldwide. To better understand rural
40 19 communities' knowledge, attitudes, perceptions, and barriers towards these vaccines, we
41 20 conducted a qualitative cross-sectional study with adults in rural Bangladesh.
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47 22 **Setting** This cross-sectional study was conducted in the rural areas of Sylhet and Natore in
48 23 Bangladesh from August 2021 to February 2022.
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54 25 **Participants** Our study involved 15 in-depth interviews with rural adults and 2 key informant
55 26 interviews with health workers.
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6 28 **Results** We analysed data thematically, resulting in four main themes: (1) knowledge and
7 29 perception aspects, (2) myths and misconceptions, (3) practice and attitude, and (4) barriers and
8 challenges of COVID-19 vaccines.
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13
14 32 **Conclusions** The findings indicate that rural populations lack sufficient knowledge about COVID-
15 33 19 vaccines but have a more favourable attitude towards them. Misconceptions, beliefs, and
16 34 personal experiences were found to be the main reasons for vaccine avoidance. To address these
17 35 challenges and dispel the spread of misinformation, health education programs play a pivotal role
18 36 in improving vaccine management. Policymakers should initiate these programs without delay to
19 37 create a well-informed and enlightened community, given that the coronavirus is still spreading.
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25 38
26
27 39 **Keywords:** COVID-19 vaccine, perception, barrier, rural, Bangladesh
28
29

30 40 31 32 41 **Strengths and limitations of this study** 33

- 34
35 42
- 36 43 • Employing purposive sampling of participants enables a comprehensive understanding of
37 the topic under study through comparing and contrasting participant viewpoints.
 - 38 44 • The study's timing, amidst the nation's ongoing COVID-19 mass vaccination campaign,
39 45 may have influenced the participants' opinions significantly.
 - 40 46 • The adoption of a qualitative design impacts the study's external validity and restricts how
41 47 far the results may be applied.
 - 42 48 • By visiting various households to locate potential participants, the researchers might have
43 49 introduced selection bias, potentially restricting the generalizability of the findings.
 - 44 50 • Since the study was conducted at a specific time, the findings may only be relevant for that
45 51 period, and further research is needed to explore the long-term effects.
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53 Introduction

54 The emergence of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), a novel
55 strain, has transformed COVID-19 into a critical global public health issue. This virus continues
56 to be present in many countries worldwide, posing a significant threat to human health [1]. As per
57 the latest figures released by the World Health Organization (WHO), there have been a staggering
58 760,897,555 reported cases of COVID-19 globally, which have resulted in the unfortunate loss of
59 6,874,585 lives [2]. Bangladesh is at much greater risk since it has the highest population density
60 in the world, making concepts like "social separation" impossible to implement [3]. As a result, it
61 reported 2,037,024 positive cases and 29,439 domestic deaths as of December 30, 2022 [4]. Since
62 SARS-CoV-2 is a highly contagious virus that affects people worldwide, vaccination is the most
63 effective method of protecting the population from COVID-19 [5-7]. Although vaccines may not
64 be 100% effective, high coverage in a community can significantly improve disease control [8].
65 Five key factors—access, affordability, awareness, activation, and acceptance are crucial in
66 ensuring maximum coverage [9].

67
68 In December 2020, numerous COVID-19 vaccines were authorized for commercial use in various
69 nations. These vaccines were developed by companies such as Pfizer-BioNTech, Moderna,
70 Janssen, Sinopharm-BBIBP, Sputnik V, CoviVac, and Covaxin [10]. The government of
71 Bangladesh had procured and made payments for around 30 million doses of the Oxford-
72 AstraZeneca vaccine. Starting from February 7, 2021, Bangladesh initiated the administration of
73 the AZD1222 vaccine, developed by Oxford AstraZeneca, to high-priority groups, such as
74 healthcare workers and individuals aged over 40 [11]. By the end of October 2021, 25.1% of the
75 total population in Bangladesh have received at least one dose of this vaccine [12]. Besides the
76 Oxford-AstraZeneca vaccine, Bangladesh had authorized two other vaccines, the Gam-COVID-
77 Vac (Sputnik V) and the BBIBP-CorV (Sinopharm COVID-19 vaccine), for emergency use [13,
78 14]. In June, the government of Bangladesh also started vaccinating its citizens with the Sinopharm
79 vaccine [15]. Additionally, Bangladesh is scheduled to be provided with 68 million doses of the
80 Covax vaccine through the efforts of the World Health Organization (WHO) and Gavi, the Vaccine
81 Alliance [16].

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2
3 83 The government of Bangladesh (GoB) initiated the largest-ever state-wide vaccination program to
4 84 vaccinate over 130 million individuals, which accounted for 80% of the total population [17]. This
5 85 program was to be implemented in four phases [17] despite approximately 34% of the population
6 86 being under 18 [18]. A countrywide deployment and vaccination plan for COVID-19 were released
7 87 by the GoB, which included the necessity of registering online to obtain the vaccine. The GoB
8 88 aimed to vaccinate 117 million individuals aged 18 and above as per the vaccination plan.
9 89 Nonetheless, as of 3rd August 2021, only 14% of the target population had registered to receive
10 90 the vaccine. Out of those registered, 57% had received the first dose vaccine, with gender and
11 91 administrative regions showing significant variations. Men (61%) were vaccinated more than
12 92 women (39%), and Dhaka (19%) received more vaccinations than other administrative divisions
13 93 [19]. In general, only 8% of the targeted population has received the first dose of the vaccine, and
14 94 4% have received the second dose of the vaccine [19].

15 95
16 96 In clinical trials, COVID-19 vaccine candidates have shown effective rates of up to 95% in
17 97 preventing symptomatic infections [20]. Based on research findings, it is believed that vaccinating
18 98 approximately 82% of a nation's population may be necessary to attain herd immunity against
19 99 SARS-CoV-2. However, the emergence of new virus variants may require individuals to receive
20 100 multiple vaccinations [21, 22]. In the current context, vaccine hesitancy, which ranges from
21 101 vaccination approval to denial, has emerged as the most critical public health concern. Despite the
22 102 availability of vaccination services, it refers to delays in acceptance or refusal of immunizations
23 103 [23]. Several factors contribute to vaccine hesitancy, such as apprehensions regarding vaccine
24 104 safety and efficacy, potential adverse health effects, misunderstandings surrounding the value of
25 105 vaccination, a lack of trust in the healthcare system, and insufficient community education
26 106 regarding vaccine-preventable illnesses [24]. Acceptance of COVID-19 vaccines varies greatly
27 107 among different nations and regions of the world [9, 25, 26]. Public mistrust and resistance to
28 108 vaccination could impede the success of the COVID-19 vaccination campaign [27, 28].

29 109
30 110 Herd immunity and the ease of vaccination are likely to be impacted by people's knowledge of
31 111 COVID-19 vaccines, level of acceptability, and perception of immunization concerns. However,
32 112 currently, there needs to be more prior research on this subject. Therefore, this study aimed to

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3 113 assess Bangladeshi rural adults' opinions on vaccination and their comprehension and acceptance
4 of COVID-19 vaccines.
5 114

6 115

8 116 **Methods**

10 117 **Study area**

12
13 118 The study was conducted in rural areas of the Sylhet and Natore districts in Bangladesh, with
14 careful consideration given to logical and transportation concerns. Given the ongoing COVID-19
15 119 pandemic and the prevalence of severe cases in the country, we selected locations closer to Dhaka
16 120 to minimize the risk of disruption in the event of sudden lockdowns. It is worth noting that on
17 121 August 11, 2021, the government of Bangladesh lifted the hard lockdown that had been in effect
18 122 since July 2021.
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25
26 125 Natore is a northern district of Bangladesh covering an area of 1896.05 sq. km. According to the
27 126 2022 census, its population stands at 18,59,924 [29]. The district city is situated on the bank of the
28 127 Narode river. Natore comprises 6 upazilas (sub-districts), 8 pourashavas (municipalities), and 1366
29 128 villages. Sylhet, located in the northeast of Bangladesh, is one of the four districts in the Sylhet
30 129 Division, covering an area of 3452.07 square kilometers. According to the 2022 census, its
31 130 population is 38,97,037 [29]. The district comprises 11 upazilas (sub-districts), 2 municipalities,
32 131 1693 mouzas, and 3249 villages. Both Natore and Sylhet districts have a well-developed road
33 132 network that ensures easy connectivity with Dhaka.
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43 134 **Patient and public participation**

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46 135 Patients and the public were not involved in this study.
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51 137 **Training of the data collectors**

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53 138 Two qualified male research assistants with master's degrees in Anthropology were from
54 139 Jahangirnagar University, Dhaka, Bangladesh. They were skilled and experienced in qualitative
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3 140 research methods, specifically conducting in-depth interviews (IDIs) and key informant interviews
4
5 141 (KIIs). Before commencing the data collection process, the research assistants underwent a 4-day
6
7 142 training program on interviewing techniques. This training consisted of 2 days of theoretical
8
9 143 sessions covering topics such as the basic principles of qualitative research, study objectives,
10
11 144 research ethics and informed consent in human subjects' research, and the KII and IDI interview
12
13 145 guide. Additionally, a practical fieldwork session was conducted on the third day to provide hands-
14
15 146 on experience in conducting interviews and obtaining informed consent.

16 147 Throughout the training, each research assistant provided feedback on the other's performance
17
18 148 during IDIs, and the trainer provided feedback and guidance on group dynamics, participant
19
20 149 interaction, body language, conflict avoidance, and conflict management. On the second day, the
21
22 150 team was taken into a nearby neighbourhood to conduct IDIs with the local communities. The
23
24 151 resulting KII and IDIs were transcribed and thoroughly analysed. The interview guides were
25
26 152 revised based on the analyzed data and feedback from the data collectors.

27 153

29 154 **Data collection**

31
32 155 We conducted this cross-sectional survey between August 2021 to February 2022, aiming to
33
34 156 investigate individuals' vaccination status regarding COVID-19. Our research involved IDIs with
35
36 157 fifteen participants and two KIIs with government officials involved in COVID-19 vaccination
37
38 158 activities. The selection process was purposive, starting with a landmark and proceeding to visit
39
40 159 households. We specifically focused on individuals who had either not received the COVID-19
41
42 160 vaccine or had missed their second dose. We asked the participants who were willing to participate
43
44 161 and interviewed them accordingly. In that case, no one refused to participate or dropped out. By
45
46 162 conducting in-depth interviews with their consent, we aimed to capture the depth and uniqueness
47
48 163 of their experiences and perceptions regarding vaccination. We chose individual interviews over
49
50 164 focus group discussions because of the ongoing Covid-19 restrictions at that time. It was not
51
52 165 permitted to gather multiple individuals in one place at a time.

53
54 166 The interviews were conducted privately, ensuring confidentiality for approximately one hour, and
55
56 167 followed pre-tested data collection guidelines that allowed for flexibility to incorporate any
57
58 168 additional feedback. We obtained their consent, outlining the objectives of our study thoroughly.

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3 169 Additionally, we provided them with a brief verbal overview, enlightening them about the purpose
4
5 170 of our research, which aimed to explore the knowledge, attitudes, perceptions, and barriers related
6
7 171 to the COVID-19 vaccine among the rural population of Bangladesh. We assured them that their
8
9 172 valuable information would be treated with utmost confidentiality. The significance of their
10
11 173 responses is extremely important as they contribute greatly to the ongoing efforts in public
12
13 174 education, fostering trust in the vaccine and securing its effective implementation in combating
14
15 175 the pandemic.

16
17 176 The interviews were digitally recorded, transcribed into Bangla, and then translated into English.
18
19 177 To ensure accuracy and quality of our work, spot checks of the recordings and transcriptions were
20
21 178 performed by an anthropologist proficient in both Bangla and English. As this was a cross-
22
23 179 sectional study, no repeat interviews were conducted and transcripts were not returned to the
24
25 180 participants for feedback.

26 181

27 28 29 182 **Thematic area**

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32 183 To structure and organize our findings, we utilized this index as a framework to analyse post-
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34 184 programmatic data. Additionally, we have meticulously coded the qualitative data using the
35
36 185 following four indicators:

- 37
38 186 1. Knowledge and perception aspects
- 39
40 187 2. Myths and misconceptions
- 41
42 188 3. Practice and attitude
- 43
44 189 4. Barriers and challenges

45 190

46 47 48 191 **Data Analysis**

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51 192 We transcribed the audio-recorded interviews conducted in Bangla using MS Word files. The
52
53 193 research team and co-authors translated and carefully reviewed these transcripts to ensure
54
55 194 accuracy.

1
2
3 195 To conduct a thematic analysis, we used Bernard's framework [30], wherein themes were identified
4 196 from the data and categorized under the four thematic areas. Initially, we developed a pre-existing
5 197 codebook based on the interview guidelines, which was manually coded. This was then reviewed
6 198 and verified by an anthropologist who conducted spot-checks of the recordings and transcriptions.
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11 199 The qualitative members subsequently coded all the interviews manually while maintaining
12 200 flexibility in incorporating any additional themes that were deemed relevant to the study's
13 201 objectives. This approach allowed for a combination of both deductive and inductive coding while
14 202 ensuring inter-coder reliability [31]. Following the coding process, thematic codes were
15 203 categorized and subsequently grouped under the four themes.
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22 23 205 **Quality assurance and control**

24
25 206 Quality control was ensured through the following steps:

- 26 207 • Hiring knowledgeable and experienced data collectors who underwent a comprehensive
27 208 five-day training program on the study's theoretical and practical aspects to reduce
28 209 interviewer bias.
- 29 210 • To enhance the accuracy and reliability of the collected data, data collectors were assigned
30 211 to work in pairs.
- 31 212 • The interview guide was translated into the local language to ensure clear and effective
32 213 communication with the participants.
- 33 214 • To accurately record and document conversations during IDIs and KIIs, data collectors
34 215 used digital voice recorders and copious note-taking.
- 35 216 • To maintain consistency and address any discrepancies, data collectors compared their
36 217 notes and voice recordings at the end of each day.
- 37 218 • The investigators of the study cross-checked the interview transcriptions with the audio
38 219 records and field notes to ensure data credibility.

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51 52 53 221 **Results**

54 55 56 222 **Demographic characteristics of the participants**

223 A total of fifteen participants (nine males and six females) from two districts were interviewed.
 224 Four of the men and women were aged 16-25 years; two men and one woman were aged 25-36
 225 years, with the other three 25-34 years. Among them, three of the men had no formal education
 226 (can sign their names only), and three of them completed primary education; five of the women
 227 completed up to secondary education; and the rest of the men and women completed higher
 228 secondary education and graduation.

229 All of the participants were working in unskilled labor (such as day laborers, rickshaw or van
 230 pullers, drivers, and farmers). The average household income ranged from 9000 to 15000 (BDT).
 231 The maximum number of members in any household was 5 to 10, and the rest had 2 to 4 members.
 232 The socio-demographic characteristics of the interviewees who participated in the IDIs are shown
 233 in Table 1.

234 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	
8000-15000	5	2
Above 15000	3	4
Family members		
2 to 4 members	3	2
4 to 10 members	6	4

235

236 Data that support the findings in the study are included in the Supplementary Material.

237 **Themes emerged**

238 Upon analysis of the semi-structured in-depth, and key informant interviews, four main themes
 239 emerged: knowledge and perception aspects, myths and misconceptions, practice and attitude, and
 240 barriers and challenges of COVID-19 vaccines.

241

242 **Knowledge and perception aspects**

243 Participants described COVID-19 as a highly contagious and life-threatening illness and stated
 244 they first learned about it through television, their neighbors, and social media. Regarding
 245 symptoms, most participants believed that the main indicators of COVID are fever, coughing, and
 246 a runny nose, with a few mentioning that shortness of breath is also a symptom. Additionally, some

1
2
3 247 participants stated that the virus could spread through breathing, touching, and sneezing. Poor
4
5 248 hygiene practices, such as not washing hands with soap, can make an individual more susceptible
6
7 249 to contracting the disease. To prevent the spread of COVID-19, participants emphasized the
8
9 250 importance of isolation, using separate utensils for eating, and maintaining social distance. One of
10
11 251 the participants stated that receiving this immunization will prevent future occurrences of the
12
13 252 condition. Through the mass media, they also learned about the numerous deaths caused by this
14
15 253 contagion that have occurred worldwide. A respondent mentioned that,

16 254 *“This illness is easily spreadable. Sneezing and physical activity can exacerbate*
17
18 255 *its transmission. Nevertheless, adhering to recommended precautions like*
19
20 256 *wearing a mask and practicing social distance can protect you from contracting*
21
22 257 *the disease”.*

23
24 258 The majority of the participants had a positive view regarding the COVID vaccine. They expressed
25
26 259 trust in the vaccines’ quality and believed that getting vaccinated reduces the risk of death and
27
28 260 enables them to venture outside more freely. Additionally, they perceived that the vaccine protects
29
30 261 against getting infected by others. Although the majority of the community had positive
31
32 262 perceptions about the vaccine, most of them lacked information about its various types,
33
34 263 administration methods, and frequency. All the study participants believed that pregnant women
35
36 264 were not eligible to receive the vaccine.

37 265 *“COVID-19 vaccine may have serious consequences for pregnant women.*
38
39 266 *Hence, it is not recommended for them to receive it. I personally think that*
40
41 267 *pregnant women should avoid getting the vaccine”.*

42
43
44 268 Some participants reported experiencing mild reactions after vaccination, such as slight fever,
45
46 269 soreness, headaches etc., but nothing serious. Amidst the discussions, certain individuals brought
47
48 270 up the topic of antibodies. They were unaware of the word and mistakenly referred them as
49
50 271 antibiotics. A respondent mentioned:

51
52 272 *“COVID-19 is a devastating illness, and our government has taken proactive*
53
54 273 *measures to ensure the protection of our citizens by implementing a nationwide*

274 *vaccination program. The vaccines work by generating antibiotics (antibodies)*
275 *to combat the virus and keep people safe”.*

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

279

280 **Myths and misconceptions**

281 All participants discussed side effects when the vaccination programme first started. They stated
282 elderly people above the age of 60 are at a high-risk of complications from vaccination, which was
283 the most frequently given response.

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

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

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

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

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

300 In 2009, Bangladesh had one of the highest rates of human deaths related to rabies worldwide.
301 During that time, the government of Bangladesh resorted to indiscriminately killing dogs in an

1
2
3 302 attempt to eliminate rabies across the country. This practice had been ongoing for decades, despite
4
5 303 its ineffectiveness. However, in late 2011, as part of a new national strategy aimed at eliminating
6
7 304 rabies, the government of Bangladesh began vaccinating dogs on a large scale instead of resorting
8
9 305 to mass killings. So, some participants drew a parallel between this context and the COVID
10
11 306 vaccine, forming a conspiracy theory that the vaccine was invented with the intention of reducing
12
13 307 the human population.
14

15 308

17 309 **Practice and attitude**

20 310 Vaccine hesitancy is intricately linked to specific contexts and exhibits variations across different
21
22 311 periods, locations and socioeconomic class. When the vaccine program was initially launched,
23
24 312 people were filled with fear and uncertainty. This can be attributed to various factors, including
25
26 313 limited awareness, the presence of misleading information, lack of confidence in healthcare
27
28 314 systems, and more.

30 315 Many wanted to receive the vaccine but hesitated and waited for others to take it before deciding.
31
32 316 This approach is not recommended, as each individual's health condition should be taken into
33
34 317 consideration before getting vaccinated. One participant stated,

36 318 *“When the vaccination programme was first started, some people thought they*
37
38 319 *should observe the situation before deciding. With such conflicting thoughts in*
39
40 320 *mind, many wanted to wait”.*

42 321 Some women hesitated to get vaccinated due to concerns about social norms and religious veil
43
44 322 traditions. They believe that being vaccinated by a male nurse goes against these beliefs. A male
45
46 323 respondent mentioned:

48 324 *“As a Muslim, I believe that female nurses should vaccinate women, as it is*
49
50 325 *easier for women to maintain their veil with their hands open during the*
51
52 326 *immunization process. This has resulted in many women skipping their*
53
54 327 *vaccinations”.*

1
2
3 328 Over time, an increasing number of individuals displayed willingness to receive COVID-19
4
5 329 vaccinations as they observed the growing trend of community members getting vaccinated, and
6
7 330 it was free of cost. Most participants believed that the COVID-19 vaccine was safe to use, with
8
9 331 the President and Ministers promoting it to prevent the spread of the disease. Participants
10
11 332 considered both personal and communal factors when deciding their stance toward vaccination.

12
13 333 *“Though many people die even if they are vaccinated. Vaccination is necessary*
14
15 334 *for us now because the disease is becoming deadly. To keep ourselves and others*
16
17 335 *safe, we must get the corona vaccination”.*

18
19 336 Some participants reported feeling a positive change in their social status after getting vaccinated
20
21 337 as they received the vaccine initially.

22
23 338

24 25 26 339 **Barriers and challenges**

27
28
29 340 An online registration system is required to receive the vaccine. Study participants reported
30
31 341 receiving delayed SMS, and many did not see the SMS on their mobiles, causing a major problem
32
33 342 with vaccine discontinuation. Some participants reported receiving their first dose of vaccine
34
35 343 through the mass immunization program but were not provided with vaccine registration cards for
36
37 344 further doses, nor were their phone numbers collected for enrollment on the website. Even when
38
39 345 they went to the center on the scheduled date, they could not receive their second dose of the
40
41 346 vaccine without their registration card and SMS. Findings also revealed that missing vaccine cards
42
43 347 and a lack of knowledge about reprinting the cards are reported barriers to getting the vaccine.
44
45 348 Most of the participants had lost their vaccine cards, so they could not receive the vaccine.
46
47 349 Participants emphasized the importance of equitable vaccine distribution in their communities and
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49 350 preferred local sites to mass vaccination sites with long lines and crowds. One female participant
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51 351 said,

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53 352 *“I didn't notice the text reminder for the second dose of the vaccine. When I saw*
54
55 353 *it, I went to the vaccination center at the Union Parishad, but the guard in*
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57 354 *charge told me that the vaccine was not available there. He told me to go to*
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59 355 *another vaccination center, but I didn't go there”.*

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3 356 Another participant stated,
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6 357 *“I received my first dose during the mass vaccination program, but when I went*
7 358 *to the vaccine centre for my second dose, the authorities told me that they*
8 *couldn’t give me the vaccine without any documents like a vaccine card or SMS.*
9 359 *However, they did not give me a card the first time”.*
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13 361 Dual-dose vaccine schedules were seen as an additional burden for individuals and families, as
14
15 362 they needed to move frequently to support themselves. One participant stated,

16
17 363 *“We leave our family behind and work in Dhaka. As poor people, we work ten*
18 364 *days here today, twenty days in another area, and five days in another place.*
19 365 *This means that I live in different regions at different times, so I could not get*
20 366 *vaccinated. But I know this vaccination is necessary for us”.*
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25 367 Health workers often face challenges while administering vaccines, including a frequent shortage
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27 368 of staff, which leads to an increased workload.
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32 370 **Discussion**

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35 371 The purpose of this study was to delve into the perceptions and barriers regarding the COVID-19
36 372 vaccine among adults residing in rural areas of Bangladesh. Our research revealed that despite the
37 373 widespread recognition of the COVID-19 vaccine, there remains a gap in understanding the details
38 374 of its efficacy, adverse effects, and recommended usage. The participants have been exposed to a
39 375 wide range of information and opinions about COVID-19 vaccines, including both accurate and
40 376 inaccurate information as well as both positive and negative news. This highlights the importance
41 377 of continuing to educate the public about these important aspects of the vaccine in order to promote
42 378 confidence in its usage and ensure its successful implementation in controlling the pandemic.
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52 380 Safety of vaccines and concern about side effects are significant issues that have been reported in
53 381 earlier studies as a barrier to COVID-19 vaccine uptake [32]. Although some participants in our
54 382 study reported experiencing various temporary side effects such as soreness, discomfort, allergic
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3 383 reactions, swelling, fever, chills, fatigue, and headaches following COVID-19 vaccination, there
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5 384 have not been many reports of severe adverse reactions among COVID-19 vaccine recipients
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7 385 worldwide [33, 34]. Our study found that social relationships significantly influence people's
8
9 386 decision-making about getting the COVID-19 vaccine. Participants consider their personal beliefs,
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11 387 the opinions of those around them, and what is best for society when deciding whether or not to
12
13 388 get vaccinated. They weigh the potential risks and benefits of getting the vaccine, such as concerns
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15 389 over side effects and efficacy, but also consider the greater good and what others may think.
16
17 390 However, some participants were motivated to get vaccinated because they wanted things to return
18
19 391 to “normal”. Also, people’s views about getting the COVID-19 vaccine are not just a balance
20
21 392 between what is good for them and what is good for society. Instead, they consider it within a
22
23 393 larger social context [35]. For example, when someone recognizes the positive impact of vaccines
24
25 394 in ending the pandemic but is hesitant to be among the first to get them because of fears about side
26
27 395 effects, they are mindful of their role in society and the moral obligation that may come with it,
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29 396 influencing their decision-making [35]. Our study has revealed that almost all the participants were
30
31 397 motivated to get vaccinated based on the perception that it would protect both themselves and
32
33 398 others, ultimately leading our country towards a return to normalcy. This finding highlights the
34
35 399 potential effectiveness of government-led campaigns to promote vaccination, especially as the
36
37 400 fourth dose of the vaccine is now available.

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41 402 Our study revealed that some might believe that one dose of the vaccine would suffice for
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43 403 protection against the virus. It's a concerning issue that many individuals have been skipping their
44
45 404 second dose of the COVID-19 vaccine in our country. Experts suggest that the government’s
46
47 405 vaccine management system and campaigns were lacking in certain aspects. This might be due to
48
49 406 a decrease in the urgency to get vaccinated as the coronavirus transmission rate in our country has
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51 407 declined, as well as the relaxation of vaccine-related campaigns. In addition, many people may
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53 408 have believed that vaccinations are no longer necessary because the virus is no longer spreading
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55 409 [36].

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3 411 The vaccination's geographical location has a significant impact on uptake, [37] as it directly
4 412 influences accessibility. In Bangladesh, people living in rural areas have a lower literacy rate and
5 413 tend to have less knowledge and less practice in preventing COVID-19 compared to urban people
6 414 [38]. We observed that vaccine hesitance among our participants was largely due to the prevalence
7 415 of myths and misconceptions surrounding the COVID-19 disease and the vaccine. This issue is
8 416 especially prevalent in rural areas, where access to reliable information and awareness about the
9 417 advantages and safety of the vaccine is limited. This could be because of their lower perception of
10 418 risk and lower level of education, leading to a lower acceptance rate for the vaccine. In China, a
11 419 study showed that the acceptance rate of the COVID-19 vaccine was lower among people living
12 420 in rural areas as compared to those in urban areas [39]. Similarly, a national survey conducted in
13 421 the US found that people living in rural areas were more likely to be hesitant about getting
14 422 vaccinated for COVID-19 [40]. This highlights the need for customizing vaccine distribution
15 423 strategies for different geographical populations. Additionally, it was discovered that organising
16 424 vaccinations through universities, schools, and workplaces increased uptake [9]. It is important for
17 425 health authorities, community leaders, and healthcare providers to work together to educate and
18 426 raise awareness about the reality of COVID-19 and the benefits of getting vaccinated in order to
19 427 dispel these myths and misconceptions and promote public health. This can be done through
20 428 community meetings, health campaigns, and the distribution of educational materials.
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38 430 Our study revealed that, as time passed, a rising number of individuals wanted to receive COVID-
39 431 19 vaccinations. This willingness was influenced by the fact that the vaccinations were provided
40 432 free of cost. Several studies investigated the influence of non-financial costs on the acceptance of
41 433 vaccines, with time-related constraints emerging as the primary non-financial barriers to
42 434 affordability [41]. However, in our study, due to their work schedules and frequent movements
43 435 from one place to another, these people faced challenges in getting vaccinated in a timely manner.
44 436 Moreover, the multiple doses required for the COVID vaccine added an additional burden for
45 437 them. Since they are day laborers, they cannot afford to take a day off work as their wages would
46 438 be deducted for that day.
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3 439 The third dose of the COVID-19 vaccination program was ongoing during the study period.
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5 440 COVID-19 is still spreading and causing serious illness and death, even in areas where cases have
6
7 441 declined. The vaccines are a crucial tool in controlling the pandemic and ending the spread of the
8
9 442 virus. Now that it appears that the fourth vaccine is in progress, this study's outcome and possible
10
11 443 recommendations will help with the implementation of the government's further vaccine program.
12
13 444 The government must strengthen its vaccine management system and campaigns, ensuring people
14
15 445 receive the recommended four doses and preventing the spread of false information. A supportive
16
17 446 social environment encouraging vaccination is also critical, as social relationships play a
18
19 447 significant role in decision-making. By addressing these key issues, we can increase public
20
21 448 confidence in the COVID-19 vaccine and successfully control the spread of the pandemic.
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24 25 450 **Limitations**

26
27 451 The study has a few limitations that need to be acknowledged. Firstly, due to the difficulty in
28
29 452 securing potential participants, we were compelled to visit numerous households, which may have
30
31 453 introduced selection bias. Secondly, because the study was cross-sectional, its conclusions might
32
33 454 only be applicable to a specific point in time, and an extended investigation is necessary to examine
34
35 455 the long-term implications. Finally, due to time constraints, we could not gather data from a more
36
37 456 diverse range of locations.

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39 457 Despite these limitations, this study provides valuable insights into individuals' experiences and
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41 458 perceptions surrounding the COVID-19 vaccine. By identifying potential barriers to accessing a
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43 459 fourth dose of the vaccine and developing strategies for addressing these barriers, further
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45 460 qualitative research can be invaluable for public health officials and policymakers as they work to
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47 461 ensure equitable access to the vaccine.
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49 462 50 463 **Conclusion**

51
52 464 In conclusion, our study found that the participants were positive towards receiving the COVID-
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54 465 19 vaccine but lacked knowledge about it. Despite their positive attitude, they faced significant
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56 466 barriers and challenges. Although the government's efforts to control the spread of the virus,

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3 467 ensuring proper safety measures has proven difficult due to socioeconomic factors. Therefore, it
4
5 468 is crucial for policymakers and researchers to implement health education programs and
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7 469 interventions to improve the health and well-being of the population in Bangladesh, as the virus
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9 470 continues to spread even after three years and the fourth vaccination program is underway. Further
10
11 471 research is recommended to gain a more comprehensive understanding of the perceptions and
12
13 472 barriers surrounding the COVID-19 pandemic in Bangladesh.
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18
19 475 contributing. RSR and MK developed tools and supervised data collection. RSR, FA, MFR and
20
21 476 TA¹ analyzed the data. TA¹ and MK developed the manuscript. MKH, MK and KIS critically
22
23 477 reviewed the draft paper. All authors have read and agreed to the published version of the
24
25 478 manuscript.
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28
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35 482 **Ethics Approval Statement:** The Ethical Review Committee of the International Centre for
36
37 483 Diarrhoeal Disease Research, Bangladesh (icddr,b) approved the study (Ref. PR-21125). Informed
38
39 484 consent was obtained from each participant. Before the interviews were recorded, interviewees
40
41 485 gave verbal consent, which was recorded. We assured interviewees that their participation was
42
43 486 entirely voluntary and that all information provided would be de-identified, ensuring the
44
45 487 anonymity and privacy of the information shared.
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47 488
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49 489 **Data Availability Statement:** The Guidelines for IDI that support the findings in the study are
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51 490 included in the Supplementary Material; further inquiries can be directed to the corresponding
52
53 491 author.
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496

497 **Conflicts of Interest:** There is no conflict of interest

498

For peer review only

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- 47 589

Barriers and perceptions of taking the COVID-19 vaccine among poor Bangladeshi adults: a cross-sectional mixed-methods survey

In-depth interview guidelines

General Information

1. Respondent's general information (division, district, age, gender, occupation of both spouses, income, education (if informal education like a scholar or an Islamic scholar, mention that), number of household members, sanitation facilities (water and toilet facilities).

Concept of COVID-19

2. Have you heard about COVID-19? Where or from whom did you hear about it? What was your initial perception when you first heard about this disease? (Please provide details.) Did the coronavirus have any economic or social impact on your household? (For example: work situation, communication and social barriers with relatives, etc.)
3. What are the symptoms of the coronavirus? (e.g., dry cough, fever, fatigue, sore throat, sneezing, upset stomach, diarrhoea, vomiting, headache, body aches, feeling cold, and breathing difficulties). Did you experience any of these symptoms of COVID-19? (For example: if you experienced symptoms, did you get tested? What were the test results? If you didn't get tested, why not, and what actions did you take if you tested positive?)
4. How does the coronavirus spread? (For example: by shaking hands with an infected person, touching an infected person, being in close proximity to an infected person without any form of contact, through respiratory droplets, not washing hands after using the toilet, touching surfaces in the infected area and then touching the face or nose, or consuming contaminated food.) What preventive measures could be taken to control the spread of this illness?

Perceptions of COVID-19 Vaccination

1. What were the general perceptions regarding the COVID vaccine? (effectiveness, benefits)

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- 2
- 3 2. Did you have any reactions or side effects after receiving the COVID-19 vaccine? If so,
- 4 what were they?
- 5
- 6 3. How did anyone's religious beliefs influence their perception of COVID-19 and the role
- 7 of vaccines?
- 8
- 9
- 10 4. How did you perceive the role of the government in implementing a nationwide vaccination
- 11 programme?
- 12
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- 14

15 **Misconceptions towards COVID-19 Vaccination**

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- 17
- 18 9. What were the initial concerns about side effects during the vaccination programme? (For
- 19 example: perception of side effects, specific concerns, fear, religious beliefs, any myths,
- 20 misinformation.)
- 21
- 22
- 23 10. Is there any specific group of people that you believe should not receive vaccines? (For
- 24 example: specific age groups, individuals with certain medical conditions, pregnant
- 25 women)
- 26
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- 28

29 **Attitude towards COVID-19 Vaccination**

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- 31
- 32 11. What is your attitude towards the COVID-19 vaccine? Do you believe that the COVID-19
- 33 vaccine helps control or prevent the spread of the coronavirus? (For example: why or why
- 34 not?) Do you know how many doses are required for the COVID-19 vaccination to be
- 35 effective in controlling the virus? What are your thoughts on the benefits of the COVID-
- 36 19 vaccination? (For example: mental peace, immunity, social acceptance, physical well-
- 37 being, etc.)
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44 **Barriers to COVID-19 Vaccination**

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- 46 12. Have you received the COVID-19 vaccine? Can you tell me why you chose to get
- 47 vaccinated or not? (For example: gender/family members' preferences, cost, perceived
- 48 unnecessariness, age, non-communicable diseases, vaccine expiration, feeling well without
- 49 vaccination, short-term efficacy, natural protection against COVID-19, receiving the
- 50 vaccine from abroad or another country, and pregnancy complications.)
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3 13. Which vaccine does he/she want to take (if no vaccine preference has been mentioned so
4 far)?
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8 **Opportunities and Benefits of Vaccination, Vaccine Supply, and Management**

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- 10
11 14. Did you face any barriers when registering for the vaccine through the website? If yes,
12 what type of barrier was it? (Note: did not have internet access, did not know the procedure
13 for registration, did not receive any SMS, there was a delay in receiving SMS, received
14 one dose but no vaccine supply, the vaccination centre was far from my area, had to roll
15 up the sleeves during vaccine administration, had to stand in a long queue, and Indian
16 vaccine).
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21 15. What are the main barriers to the management of COVID-19 vaccines? (Note: need to go
22 to the hospital, time-consuming, inadequate behaviour of vaccine workers, difficulties for
23 young children and in the workplace, etc.)
24
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26 16. In order to bring everyone within the ambit of vaccination, what kind of steps do you think
27 the government needs to take? Do you have any recommendations on this matter? If so,
28 please elaborate.
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Manuscript: COVID-19 vaccine barriers and perception among rural adults: A qualitative study in Bangladesh

Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist

Developed from:

Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

No. Item	Guide questions/description	Reported on Page #
Domain 1: Research team and reflexivity		
<i>Personal Characteristics</i>		
1. Interviewer/facilitator	Which author/s conducted the interview or focus group?	Page 5
2. Credentials	What were the researcher's credentials? E.g. PhD, MD	Page 5
3. Occupation	What was their occupation at the time of the study?	Page 5 and 6
4. Gender	Was the researcher male or female?	Page 5
5. Experience and training	What experience or training did the researcher have?	Page 5
<i>Relationship with participants</i>		
6. Relationship established	Was a relationship established prior to study commencement?	Page 6
7. Participant knowledge of the interviewer	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	Page 6
8. Interviewer characteristics	What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	Page 6

Domain 2: study design		
<i>Theoretical framework</i>		
9. Methodological orientation and Theory	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	Page 5 and 6
<i>Participant selection</i>		
10. Sampling	How were participants selected? e.g. purposive, convenience, consecutive, snowball	Page 6
11. Method of approach	How were participants approached? e.g. face-to-face, telephone, mail, email	Page 5 and 6
12. Sample size	How many participants were in the study?	Page 6
13. Non-participation	How many people refused to participate or dropped out? Reasons?	N/A
<i>Setting</i>		
14. Setting of data collection	Where was the data collected? e.g. home, clinic, workplace	Page 6
15. Presence of non-participants	Was anyone else present besides the participants and researchers?	Page 6 Inferred as one to one interviews
16. Description of sample	What are the important characteristics of the sample? e.g. demographic data, date	Page 6
<i>Data collection</i>		
17. Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	Supplementary file and page 5
18. Repeat interviews	Were repeat interviews carried out? If yes, how many?	No
19. Audio/visual recording	Did the research use audio or visual recording to collect the data?	Page 7
20. Field notes	Were field notes made during and/or after the interview or focus group?	Page 7

21. Duration	What was the duration of the interviews or focus group?	Page 6
22. Data saturation	Was data saturation discussed?	Page 7
23. Transcripts returned	Were transcripts returned to participants for comment and/or correction?	No
Domain 3: analysis and findings		
<i>Data analysis</i>		
24. Number of data coders	How many data coders coded the data?	Page 7
25. Description of the coding tree	Did authors provide a description of the coding tree?	Page 7
26. Derivation of themes	Were themes identified in advance or derived from the data?	Page 7
27. Software	What software, if applicable, was used to manage the data?	N/A
28. Participant checking	Did participants provide feedback on the findings?	No
<i>Reporting</i>		
29. Quotations presented	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	Page 10 to 15
30. Data and findings consistent	Was there consistency between the data presented and the findings?	Yes, there was. Page 8 to 15
31. Clarity of major themes	Were major themes clearly presented in the findings?	Yes. they were. From page 8 to 15
32. Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	Discussion of major themes From page 15 to 18