

# Knowledge, attitude, practices and concerns regarding COVID-19 vaccination in Nepal – A descriptive cross-sectional study

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## ABSTRACT

**Introduction:** COVID-19 shifted from a 2020 pandemic to a 2023 end of emergency. Though the pandemic ended, the virus persists, and global vaccination remains vital. Initial vaccination rates were high, but subsequent doses declined. This study assesses the population's knowledge, attitude, practice, and concerns about COVID-19 vaccines.

**Methods:** Web-based descriptive cross-sectional study was conducted using convenience sampling technique. Google data collection forms with digital consent were developed based on 39-item standard questionnaire. Ethical approval was obtained from Nepal Health Research Council. Using SPSS version 22.0, descriptive statistical analysis was done.

**Results:** A Total of 424 respondents were included in the study. The mean age of respondents was 28.35±8.01 years. 66.04% respondents were young adults aged 18-29 years and 83.02% resided in urban areas. 84.67% respondents were willing to receive the COVID-19 vaccine in the future, though only 56.84% were willing to pay for the vaccine if needed. Among those willing to pay, 58.51% were willing to pay less than NRs. 400. 91.98% demonstrated adequate knowledge about COVID-19 vaccination, exceeding threshold score of 13.5. All respondents exhibited favorable attitudes towards COVID-19 vaccination with a median score of 4.00. Contrary to favourable attitude, 83.73% respondents had negative concerns towards vaccination.

**Conclusion:** The study found that people have adequate knowledge and favourable attitude towards COVID-19 vaccination. However, there are still concerns regarding vaccination that should be addressed when planning future vaccination strategies.

**Keywords:** Attitude; COVID-19 vaccines, Knowledge, Perception, Vaccine hesitancy

## INTRODUCTION

In 2020, the World Health Organization (WHO) declared the Coronavirus disease 2019 (COVID-19) outbreak a global pandemic, a status that was officially lifted in May 2023 [1]. This transition was made possible through concerted global effort that included widespread vaccination efforts, improved global preparedness strategies, regular monitoring of the virus's spread, and strengthened healthcare systems [2-4]. Despite

these advancements, COVID-19 has claimed 7,059,612 lives worldwide by August 2024, including 12,031 in Nepal [5-6].

Vaccination has been proven to be a crucial tool in mitigating the impact of pandemic diseases, including COVID-19. By reducing the overall prevalence of the virus, vaccination helps to limit the emergence of new variants [7-9]. The WHO's updated advice on COVID-19 vaccination now includes recommendations for revaccination in specific groups, which includes pregnant women, adults over 50 years of age and those with weakened immune systems [10]. As of December 31, 2023, the global COVID-19 vaccination rate for the primary series was 67%, while in Nepal, it was 84%. However, the rate for booster doses was lower, standing at 32% globally and 35% nationally [5,11].

Even though the global health emergency status for COVID-19 has been lifted, the virus continues to circulate, underscoring the importance of ongoing vaccination efforts [10]. To gain a deeper understanding of the public's perception of COVID-19 vaccination, the study was conducted to assess knowledge, attitude, practice and concerns regarding COVID-19 vaccination among the general population. By understanding these factors, we can identify areas where public health interventions can be tailored to improve vaccine uptake and address any lingering concerns

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in upcoming days.

## METHODS

Online based descriptive, cross-sectional study was conducted to gather responses from public to assess knowledge, attitude, practice and concerns regarding COVID-19 vaccination. The target population consisted of general population group. Respondents aged more than 18 years of age and with access to the internet were included in the study.

The sample size calculation was calculated using the Cochran formula:

$$n = Z^2 \times (p \times q) / e^2$$

$$= 1.96^2 \times (0.5 \times 0.5) / 0.05^2$$

$$= 385$$

Where,

n= minimum required sample size

Z=1.96 at 95% Confidence Interval (CI)

p= prevalence, since no such studies were found in context of Nepal, it was taken as 50%= 0.5

q= 1-p = 0.5

e=margin of error, 5%

The calculated sample size was 385.

Adding 10% non-response rate, final sample size was

n=n + 10% of n

=424

Convenience sampling method was used to collect the data. An online structured self-administered questionnaire developed using Google formed was used for data collection.. The online link of information sheet and questionnaire was developed and sent to target respondents through social media via contacts from investigators. Each selected respondents were further asked to provide reference and to send the questionnaire link.

The questionnaire was based on 39-item standard questionnaire to assess knowledge, attitude, practices and concerns regarding COVID-19 vaccination among general population [12]. The questionnaire was divided into three sections: Section I: Questions related to socio-demographic information; Section II: Questions related to vaccine related variables; Section III: Questions related to knowledge, attitude, practice and concerns regarding COVID-19 vaccination.

For knowledge-related questions, a score of 1 was given for each correct response. The total knowledge score was 27, out of which scores  $\geq 13.5$  were considered adequate and scores  $< 13.5$  were considered inadequate. For attitude, 14 statements were rated on a five-point Likert scale. The Likert scale had a total highest score of 70, out of which scores  $\geq 35$  were considered favourable and scores  $< 35$  were considered unfavourable. Concerns regarding COVID-19 vaccination were measured using six items on a five-point Likert scale. The Likert scale had a total highest score of 30, out of which scores  $\leq 15$  were considered positive concerns and scores  $> 15$  were considered negative concerns towards vaccination.

Pretesting of the questionnaire was done among 43 individual through on-line medium. The respondents who participated in pretesting of the questionnaire were excluded in main study. After completion of pretesting, the questionnaire was revised and finalized by study team.

Before data collection, ethical approval was obtained from the Ethical Review Board (ERB) of the Nepal Health Research Council (NHRC) (Reference number 1481). Respondents were informed regarding the purpose of the study through an online information sheet, and digital consent was taken. After obtaining digital consent, they were directed to the questionnaire section, which took around 15-20 minutes. To ensure the completeness of data, all questions were made mandatory. The period of

data collection was 4 weeks. No monetary incentive was provided to respondents, and anonymity was maintained to ensure confidentiality and reliability of data. No one was forced to participate in the study, and the study population was selected without any discrimination regarding ethnicity, education, or economic status.

The collected data were coded, entered, classified, and analyzed by using Statistical Package for the Social Sciences (SPSS version 22) for Windows. Descriptive statistics were presented as frequency, percentage, and mean to summarize the results.

## RESULTS

Among 424 respondents, the study findings revealed the dominance of female respondents (72.64%) than male (27.36%). The mean age+SD of respondents was 28.35+8.01 years. The sample was primarily composed of young adults of 18-29 age group (66.04%) and those residing in urban areas (83.02%) (Table 1).

**Table 1: Socio-demographic Characteristics of Respondents(n=424)**

Variables	n(%)
Age (Completed Years)	
18-29	280(66.04)
30-39	96(22.64)
40-49	39(9.20)
50-59	9(2.12)
Sex	
Male	116(27.36)
Female	308(72.64)
Educational status	
SEE	26(6.13)
Higher secondary	141(33.25)
Undergraduate	166(39.15)
Graduate	90(21.23)
PhD	1(0.24)
Area of residence	
Rural	38(8.96)
Semi-urban	34(8.02)
Urban	352(83.02)

Most of the respondents, 411 out of 424 respondents (96.93%) did not have chronic non-communicable diseases. Regarding self-rating of one's health status, around half of the respondents rated their health as good with 221 (52.12%) respondents followed by responded their health as "good" (52.12%), followed by "average" among 143 (33.73%) respondents, (33.73%), "very good" among 56 (13.21%) respondents or and "poor" among 4 (0.94 %) respondents. Majority of respondents, 402 (94.81%) of respondents had completed the COVID-19 vaccination, indicating a strong uptake of the vaccine in the sample (Table 2).

Regarding future vaccination, 359 (84.67%) respondents were willing to receive the COVID-19 vaccine in future. In terms of respondents' willingness to pay for COVID-19 vaccines, 241 (56.84%) respondents were willing to pay for the vaccine if needed. Among those willing to pay, 141 (58.51%) respondents were willing to pay less than NRs. 400 followed by NRs. 400-799 among 32 (13.28%) respondents and NRs. 800-1199 by 33 (13.69%) respondents (Table 2).

Table 2: Health related Characteristics of Respondents. (n=424)

Variables	n(%)
Presence of communicable diseases	
Yes	13 (3.1)
No	411 (96.9)
Rating of overall health	
Very good	54 (13.1)
Good	215 (52.3)
Average	138 (33.6)
Poor	4 (1.0)
Ever infected with COVID-19	
Yes	169(39.86)
No	255(60.14)
Vaccination status	
Complete vaccination	402(94.81)
Incomplete vaccination	14(3.30)
No vaccination	8(1.89)
Willingness to receive COVID vaccine in future	
Yes	359(84.67)
No	65(15.33)
Willingness to pay for vaccine (if needed)	
Yes	241(56.84)
No	183(43.16)
Amount willing to pay (NRs.) (n=241)	
<400	141(58.51)
400-799	32(13.28)
800-1199	33(13.69)
1200-1599	20(8.30)
>1600	15(6.22)

Table 3: Knowledge regarding COVID-19 Vaccination among Respondents. (n=424)

Variables	n(%)
Vaccine is mandatory.	315(74.29)
Eligibility for vaccination	
Children and adolescents (5-18 years)	380(89.62)
Adults (>18 years)	408(96.23)
Pregnant/lactating mothers	217(51.18)
Patients with chronic diseases	253(59.67)
Persons recovered from COVID-19	366(86.32)
Persons with allergies (food items/ drugs)	179(42.22)
Immunocompromised persons	292(68.87)
Side effects of COVID-19 Vaccination	
Pain, redness and swelling in injection site	396(93.40)
Lethargy	348(82.07)
Headache	360(84.91)
Cold/Flu like symptoms	170(40.09)
Fever	400(94.34)
Management of Side effects of Vaccination	
Hot compression at injection site	246(58.02)
Gentle hand exercises	166(39.15)
Wear light clothes	312(73.58)
Take mild analgesics (e.g. paracetamol)	279(65.80)
Go to health facility if needed	352(83.02)
Common misconceptions	
Protective immunity is achieved 14 days after full vaccination	290(68.40)
No need for preventive measures (masks/ sanitization/ social distancing) after vaccination	330(77.83)

Among 424 respondents, 315 (74.29%) believed that the COVID-19 vaccine is mandatory. Most of the respondents (94.34%) were aware of common side effect like fever. However, many were unaware that people with allergies and pregnant/lactating mothers can also be vaccinated. Furthermore, 68.40% respondents correctly identified that protective immunity is achieved after 14 days of full vaccination. However 77.83% respondents incorrectly believed that preventive measures like wearing masks, sanitization, and social distancing are no longer necessary after vaccination (Table 3).

Respondents' attitudes and concerns about COVID-19 vaccination were measured using a Likert scale with five response options. The respondents overwhelmingly expressed positive attitudes towards COVID-19 vaccination. The median scores for most variables were positive, indicating a generally positive attitude towards vaccination. On the other side, respondents expressed their doubtful concerns in most of the statements. The interquartile range showed presence of variability in concerns compared to attitudes towards vaccination (Table 4).

Majority of respondents, 390 (91.98%) respondents had adequate knowledge regarding COVID-19 vaccination, exceeding the threshold of 13.5. All respondents exhibited favorable attitudes towards COVID-19 vaccination, with a median score of 4.00, indicating strong support for vaccination. On the other hand, 83.73% of respondents had negative concerns regarding COVID-19 vaccination. This shows that while the majorities support vaccination, there are still existing concerns that need to be addressed. Female respondents demonstrated significantly higher levels of adequate knowledge compared to male respondents (68.40% vs. 23.58%) and male respondents reported higher levels of negative concerns (24.29% vs. 59.44% in females) (Table 5).

## DISCUSSION

The results of the current study showed that 91.98% of respondents exceeded the mean score on knowledge about COVID-19 vaccination. A similar finding was noted in a similar online study done among 570 residents of Bosnia, where the mean score was 11.29 out of 15 [13]. Almost identical finding was noted in a web-based study done in Saudi Arabia among 2022 respondents, where 76.01% of respondents had satisfactory knowledge regarding the COVID-19 vaccine [14]. Likewise, a population-based study in Malawi among 3068 participants found that 95.69% knew about COVID-19 vaccination [15]. Another online cross-sectional study in Singapore among 869 participants showed that 66.63% had a good knowledge of vaccines [16]. These consistent findings may be due to the results of widespread public health campaigns and the extensive availability of information, both traditional and online.

However, a web-based study among 475 participants in Nepal found that 55.96% had low awareness of COVID-19 vaccination, with almost two-thirds having a false perception of vaccine safety and contraindications [17]. Another study among 293 Saudi mothers found that 45.05% had excellent knowledge of the COVID-19 vaccine [18]. A study in Ethiopia among 1361 participants found that 53.93% had adequate knowledge regarding the COVID-19 vaccine [19]. Another study in Bangladesh among 1658 people revealed inadequate knowledge but a positive

Table 4. Attitude and concerns regarding COVID-19 Vaccination among Respondents (n=424).

Variables	Strongly disagree n(%)	Disagree n(%)	Neither agree nor disagree n(%)	Agree n(%)	Strongly agree n(%)	Median (IQR)*
<b>Attitude regarding COVID-19 Vaccination</b>						
When my turn of vaccination comes, I am willing to take the COVID-19 vaccine.	0(0.00)	3(0.71)	19(4.48)	117(27.59)	285(67.22)	5.00(4.00-5.00)
I will prefer to acquire immunity against COVID-19 naturally (by having the disease/subclinical infection) rather than by vaccination.	24(5.66)	115(27.12)	116(27.36)	91(21.46)	78(18.40)	3.00(2.00-4.00)
I am willing to get the COVID-19 vaccine, even if I have to pay to get it.	17(4.00)	27(6.37)	93(21.93)	157(37.03)	130(30.67)	4.00(3.00-5.00)
I will recommend my family and friends to get vaccinated against COVID-19.	0(0.00)	4(0.94)	17(4.01)	146(34.43)	257(60.62)	5.00(4.00-5.00)
I think there is no harm in taking COVID-19 vaccine.	1(0.24)	14(3.30)	52(12.26)	181(42.69)	176(41.51)	4.00(4.00-5.00)
I believe COVID-19 vaccine will be useful in protecting me from the COVID-19 infection.	1(0.24)	8(1.89)	57(13.44)	177(41.74)	181(42.69)	4.00(4.00-5.00)
I take COVID vaccine because it is available free of cost.	0(0.00)	13(3.07)	29(6.84)	140(33.02)	242(57.07)	5.00(4.00-5.00)
I take COVID vaccine because my health professional/ doctor has recommended me for it.	7(1.66)	35(8.25)	51(12.03)	177(41.74)	154(36.32)	4.00(4.00-5.00)
I take COVID vaccine because I feel the benefits of taking vaccine outweighs the risks involved than not taking it.	6(1.41)	28(6.61)	45(10.62)	156(36.79)	189(44.57)	4.00(4.00-5.00)
I take COVID vaccine because it is my societal responsibility.	0(0.00)	12(2.83)	19(4.48)	176(41.51)	217(51.18)	5.00(4.00-5.00)
I take COVID vaccine because Nepal government has provided sufficient data regarding vaccine's safety and efficacy.	1(0.24)	29(6.84)	85(20.05)	170(40.09)	139(32.78)	4.00(3.00-5.00)
I take COVID vaccine because many people are taking the vaccine.	2(0.47)	18(4.24)	51(12.03)	184(43.40)	169(39.86)	4.00(4.00-5.00)
I take COVID vaccine because I think this will help in eradicating COVID-19 infection in future.	0(0.00)	20(4.71)	70(16.51)	179(42.22)	155(36.56)	4.00(4.00-5.00)
I take COVID vaccine because my role models/ political leaders/ senior doctors /scientists have taken the vaccine.	17(4.01)	18(4.24)	57(13.44)	171(40.34)	161(37.97)	4.00(4.00-5.00)
<b>Concerns regarding COVID-19 Vaccination</b>						
COVID-19 vaccine might not be easily available to me.	10(2.37)	40(9.43)	88(20.75)	207(48.82)	79(18.63)	4.00(3.00-4.00)
I might have immediate serious side effects after taking COVID-19 vaccine.	16(3.77)	80(18.87)	140(33.02)	146(34.43)	42(9.91)	3.00(3.00-4.00)
COVID-19 vaccine may be faulty or fake.	27(6.37)	123(29.01)	159(37.50)	79(18.63)	36(8.49)	3.00(2.00-4.00)
COVID-19 vaccine was rapidly developed and approved.	16(3.77)	91(21.46)	135(31.84)	121(28.54)	61(14.39)	3.00(2.00-4.00)
I might have some unforeseen future effects of the COVID-19 vaccine.	12(2.84)	91(21.46)	170(40.09)	105(24.76)	46(10.85)	3.00(3.00-4.00)
COVID-19 vaccine is being promoted for commercial gains of pharmaceutical companies.	32(7.55)	134(31.60)	138(32.55)	88(20.75)	32(7.55)	3.00(2.00-4.00)

Table 5. Overall knowledge, attitude and concerns regarding COVID-19 Vaccination among Respondents (n=424).

Variables		Male n(%)	Female n(%)	Total n(%)
Knowledge	Adequate ( $\geq 13.5$ )	100(23.58)	290(68.40)	390(91.98)
	Inadequate ( $< 13.5$ )	16(3.77)	18(4.25)	34(8.02)
Attitude	Favourable ( $\geq 35$ )	116(27.36)	308(72.64)	424(100.00)
	Unfavourable ( $< 35$ )	0(0.00)	0(0.00)	0(0.00)
Concerns	Positive ( $\leq 15$ )	13(3.07)	56(13.20)	69(16.27)
	Negative ( $> 15$ )	103(24.29)	252(59.44)	355(83.73)



attitude towards COVID-19 vaccination [20]. These contrasting findings might be due to the timeframe of the study being conducted at the initial phase of vaccine development.

In this study, it was found that 84.67% respondents were willing to receive the COVID-19 vaccine in the future and only 56.84% were willing to pay. Among those who are willing to pay, 58.51% are willing to pay less than Nrs. 400. An on-line study conducted among 26,852 individuals across 60 countries to assess the global willingness to receive vaccine found that vaccine acceptance rate ranging from 93% in Tonga to less than 43% in Egypt [21]. A study in Kazakhstan among 417 respondents found that 35.73% respondents were vaccine-hesitant [22]. Another study in Malaysia, among the 316 participants, 66.4% were willing to pay for the COVID-19 vaccine even if they had to pay any cost [23].

Likewise, a web-based study conducted in Bangladesh among 605 respondents found that 61.16% of the respondents were willing to take the COVID-19 vaccine [24]. A study conducted in an urban slum of India among 1342 participants found that 78.96% were willing to receive the COVID-19 vaccine if it were available, with two-thirds belonging to the low-income group [25]. This suggests that there is a potential discrepancy between willingness to receive the vaccine and desire to pay for it. The probable reasons might be availability of subsidized vaccines, economic constraints, perceived risk and benefits for expense.

All the participants in this study have a positive attitude towards vaccines, depicted by high motivation to get vaccinated, trust in vaccine safety, and efficacy. This suggests that policies promoting vaccine accessibility and addressing concerns about cost and safety can contribute to high vaccination rates. A study done in Saudi Arabia in 2022 found that 72.39% people had a positive attitude towards the use of COVID-19 vaccines [14]. Another survey among 293 Saudi mothers revealed a positive attitude to be 62.12% [18]. A study in Ethiopia among 1361 participants found that 47.10% participants had a positive attitude towards vaccination [19]. A similar study in the Philippines among 690 participants revealed that the overall mean attitude score of participants was  $2.76 \pm 0.47$ , which indicates a favorable attitude toward the COVID-19 vaccination [26].

Likewise, 87.73% of the population had negative concerns regarding COVID-19 vaccination in terms of availability, side effects, safety, and potential commercial interests. Interestingly, another online study done among 2,463 adults in China also revealed that 45.19% people were hesitant to vaccination [26]. Another study in Ethiopia among 1361 participants found that 64.44% participants were hesitant about receiving the COVID-19 vaccination. The most frequently reported reasons were a lack of trust in the vaccine (21.01%), doubts regarding the long-term side effects (18.07%), and refusal on religious grounds (13.67%) [19]. This might be due to widespread misinformation present in social media and online forums, and religious backgrounds leading to skepticism. It might also be due to personal experience of side effects during vaccination, thereby influencing perception of vaccine safety.

The study has several limitations. As an online survey, the study may not accurately represent older people or those without internet access. Having used the online self-reporting method, there might be a presence of recall bias. Since the study was cross-sectional, a cause-and-effect relationship could not be established. However, findings are still valuable for helping policymakers and administrators to plan COVID-19 vaccination programs in the future.

## CONCLUSION

The study revealed that people had adequate knowledge and favorable attitude towards COVID-19 vaccination in Nepal. Despite positive attitude, there exists a negative concern related to vaccination which needs to be addressed through targeted communication and interventions while framing and planning future COVID-19 vaccination deployment and immunization plan.

## DECLARATIONS

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## Author Contribution

PT conceptualized the research, designed the study, conducted literature searches, coordinated data collection, performed data analysis and interpretation, drafted the manuscript, reviewed its intellectual content, gave final approval for submission, agreed to be accountable for all aspects of the work, and handled correspondence with the journal. MKC, MS, CB, and JR contributed significantly to the concept and design of the research, data collection, analysis, interpretation, drafting and reviewing of the manuscript, and approving the final version. JP, SP, and EK contributed to the conceptualization of the research, design, literature search, analysis, interpretation, review, and approval of the submitted version, as well as taking responsibility for the integrity of the work. Each author's contributions were vital at every stage, ensuring the study's quality and integrity.

## Ethical Approval

This research was approved by ERB of Nepal Health Research Council (Reference number 1481).

## Consent

Digital information sheet containing the objectives of the study was explained to respondents through online link. A digital consent was taken from each participant before online questionnaire. After the permission of the participants, they were directed to the questionnaire section. If not willing to participate in study, they were terminated thankfully for their time and effort.

## Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon request.

## Conflicts of Interest

Author(s) declare no financial or non-financial conflict of interest.

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The study is self-funded by authors

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