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# COVID-19 Vaccine Acceptance and Its Associated Factors Among Young Adults

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## ABSTRACT

### Background

COVID-19 pandemic, which has rapidly spread throughout the globe in several waves and mutations, was initially identified in Wuhan, China, in late 2019. Vaccines against this deadly virus were developed quickly in about a year. Despite the availability of vaccines, acceptance of the vaccines among the general population is influenced by various factors and are important to be identified for a successful vaccination program. The objective of this study was to evaluate the COVID-19 vaccine acceptance among young adults and its associated factors.

### Methods

Nepalese young adults were surveyed online using a descriptive cross-sectional study approach. A bilingual, self-administered questionnaire consisting of six parts-socio-demographic information, health-related information, knowledge and attitude/ beliefs about COVID-19, perceived threat to COVID-19, beliefs about COVID-19 vaccination, and vaccine acceptability was used to collect data. The collected data was analysed using SPSS version 20.

### Results

Out of the 467 participants surveyed, most of them (94.2%) were willing to take the vaccine. Among them, 80.5% were willing to take it immediately. The main reason for COVID-19 vaccine refusal was because of doubt about the safety of the COVID-19 vaccine. The regression results showed that healthcare-related professionals/students and perceived benefits of the COVID-19 vaccine were significantly associated with vaccine acceptance.

### Conclusions

This study reflected the high acceptance of COVID-19 vaccination among Nepalese adults during the pandemic. Concerned authorities and health professionals should emphasize addressing concerns about vaccine safety and disseminating information about the benefits of vaccines to overcome vaccine hesitancy.

**Keywords:** attitude/beliefs; COVID-19 vaccine; knowledge; perceived threat; vaccine acceptance.

## INTRODUCTION

COVID-19 was first identified in Wuhan, China, and has since rapidly spread worldwide as a pandemic in various waves and variants of mutation.[1,2] Nepal reported its first verified case on 23rd January 2020, with more than 612,000 confirmed cases and 8506 deaths by 15th June, 2021.[3,4] This pandemic has a devastating effect on education, agriculture, politics, and economic growth in addition to physical and mental health.[5,6] COVID-19 vaccines were developed in less than a year as the safest way to control this pandemic.[7] However, vaccine acceptance is context-specific, directly affecting the success of the vaccination program.[8,9] The systemic review showed a wide range of variation across the countries, with the highest COVID-19 vaccine acceptance rate in Ecuador (97.0%) and the lowest in Kuwait (23.6%).[10] The issues of rapid development of COVID-19 vaccines, identification of new variants of coronavirus associated with increased transmissibility

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and death, re-infection with COVID-19, and post-vaccine infections seem to bear causing significant concerns.[7,11-13] Hence, this study aims to assess vaccine acceptance by Nepalese adults with its associated factors and explore the reasons for vaccine refusal.

## METHODS

An analytical cross-sectional study design was used to conduct an online survey among Nepalese adults of aged 18 years or above by using social media platform (Facebook, Viber, Twitter, What's App) or email, had not received the COVID-19 vaccine, and were willing to participate in the study with informed consent were selected as study participants. Ethical permission was obtained from Nepal Health Research Council (NHRC) (Reg. No. 391/2021) to conduct this study. Participants were automatically directed to the informed consent page followed by the survey questionnaire, which was presented in bilingual form (English and Nepali), after clicking the survey link. The sample size (n) was determined using the Cochrane formula,[14] assuming that 50% of general adults have a factor of interest in COVID-19 vaccines and 5% allowable error at a 95% confidence interval (CI). Sample size was 384 and after taking 20% non-response rate, sample size was 461 but this study was conducted 467. Participants were selected using the snowball sampling technique. The data was collected using a self-administered survey questionnaire developed in Google Forms based on previous studies to assess vaccine acceptance for COVID-19 and its associated factors.[15-18] The research instrument consisted of six parts: part I consist of socio-demographic information, part II consist of Health-related information (consisted of six questions), part III: Knowledge and attitude/ beliefs about COVID-19, part IV consist of perceived threat to COVID-19, part V: Beliefs about COVID-19 vaccination. Responses to part IV and part V were categorized as (3) Agree, (2) Neutral, and (1) Disagree. Negatively phrased items were recoded. Part VI: Questions related to vaccine acceptability. The instrument was then pre-tested on 46 participants (10% of the sample size) who were contacted through email. For clarity and convenience, both English and Nepali versions of the questionnaire were made available for data collection. The final dataset was imported and analyzed using Statistical Package for the Social Sciences (SPSS) version 20. The data were analyzed using descriptive and inferential statistics. Descriptive statistics such as frequency and percentage for categorical variables; and mean and standard deviation for continuous variables were used. Inferential statistics such as the Chi-square test and Fisher's exact test were used to find the association between independent variables with COVID-19 vaccine acceptance considering p-value <0.05 as significant. Then, logistic regression was used for finding predictors (factors) of COVID-19 vaccine acceptance considering a 95% confidence interval.

## RESULTS

A total of 467 individuals took part in this survey. More than two-thirds of the participants (68.3%) were between the ages of 21 and 30 years, with individuals over the age of 40 constituting only 2.8% of the study population. Similarly, more than half of the participants (59.5 %) were female, and the majority (78.8%) were unmarried. Likewise, most of the participants (89.7%) followed the Hindu religion, 77.7% were residing in Bagmati province, and 55% were from the Hilly region. More than one-third of the participants (35.5%) were related to the healthcare profession (Table 1). A large proportion of the participants (74.5%) reported having good health and no major illnesses/ comorbidities (94%). More than half of the participants (i.e., 52.2% and 53.1%) were not infected with COVID-19 and had not been exposed to a confirmed case of COVID-19 respectively. whereas, more than half of the participants (54.8%) responded that their family members were infected with COVID-19. Most of the participants (89.7%) had never received an influenza vaccine (Table 2).

Most of the participants (94.2%) were willing to vaccinate with the COVID-19 vaccine. Among them, 80.5% were willing to take it immediately, and the rest (19.5%) wanted to delay. The majority of them

(65.5%) expressed that they would pay for a vaccine out of pocket if the government did not provide it for free (Figure 1).

Regarding the reasons given by the 27 participants who refused to accept the COVID-19 vaccine, 51.9% were doubtful about its safety, 40.7% were concerned about its efficacy, and nearly 15% believed vaccination was unnecessary because they did not trust them (Figure 2).

**Table 1. Socio-demographic characteristics of the participants. (n=467)**

| Socio-demographic characteristics | Frequency (%) |
|---|---|
| **Age (in completed years)** | |
| 20 | 104 (22.3) |
| 21-30 | 319 (68.3) |
| 31-40 | 31(6.6) |
| >40 | 10 (2.8) |
| Mean age ± S.D | 24.04 ± 5.8 |
| **Sex** | |
| Female | 278(59.5) |
| Male | 189(40.5) |
| **Religion** | |
| Hinduism | 419(89.7) |
| Buddhism | 33(7.1) |
| Christianity | 10(2.1) |
| Atheism | 4(0.9) |
| Islam | 1(0.2) |
| **Currently residing Province** | |
| Province 1 | 37(7.9) |
| Province 2 | 14(3) |
| Bagmati Province | 363(77.7) |
| Gandaki Province | 34(7.3) |
| Lumbini Province | 12(2.6) |
| Karnali Province | 3(0.6) |
| Sudurpaschim Province | 4(0.9) |
| **Ecological Region** | |
| Terai Region | 201(43.1) |
| Hilly Region | 257(55) |
| Mountain Region | 9(1.9) |
| **Marital status** | |
| Unmarried | 368 (78.8) |
| Married | 98 (21) |
| Divorced | 1(0.2) |
| **Educational Level** | |
| No formal education | 2(0.4) |
| Primary level | 2(0.4) |
| Secondary level | 10(2.1) |
| Higher Secondary level | 105(22.5) |
| University level | 348(74.5) |
| **Employment status** | |
| Unemployed | 336(71.9) |
| Employed | 131(28.1) |
| **Healthcare professionals/ students** | |
| Yes | 166(35.5) |
| No | 301(64.5) |

**Table 2. Health-related information of the participants. (n=467)**

| Characteristics | Frequency (%) |
|---|---|
| **Self-reported health status** | |
| Excellent | 96(20.6) |
| Good | 348(74.5) |
| Poor | 23(4.9) |
| **Presence of major illness/comorbidity** | |
| No | 439(94) |
| Yes | 28(6) |
| **Self-infected with COVID-19** | |
| No | 244(52.2) |
| Yes | 74(15.8) |
| Maybe/not tested | 149(31.9) |
| **Exposed with a confirmed case of COVID-19** | |
| No | 248(53.1) |
| Yes | 219(46.9) |
| **Family member infected with COVID-19** | |
| No | 211(45.2) |
| Yes | 256(54.8) |
| **History of receiving Influenza vaccine** | |
| No | 419(89.7) |
| Yes | 48(10.3) |
| **Live with vulnerable/high-risk group** | |
| Yes | 229(49) |
| No | 238(51) |

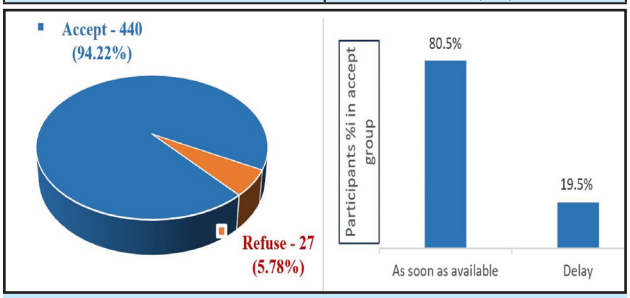


**Figure 1. Participants' Acceptability for COVID-19 Vaccine.**

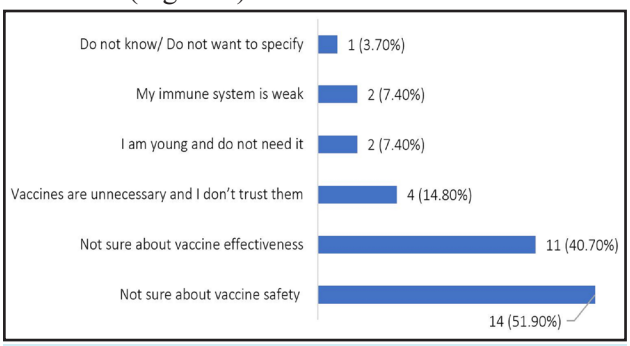


**Figure 2. Reasons for Vaccine Refusal (n=27).**

**Table 3. Association between Willingness to get COVID-19 Vaccination with the Different characteristics of Participants. (n= 467)**

| Characteristics | Willing to get COVID-19 vaccination | | $\chi^2$ (p-value) |
|---|---|---|---|
| | No | Yes | |
| **Age** | | | |
| Less than 25 | 17 | 307 | 0.56 |
| Equal to or above 25 | 10 | 133 | -0.46 |
| **Sex** | | | |
| Male | 15 | 174 | 2.7 |
| Female | 12 | 266 | -0.1 |
| **Province** | | | |
| Bagmati Province | 21 | 342 | 0 |
| Other | 6 | 98 | -0.99 |
| **Ecological region** | | | |
| Terai | 9 | 192 | 1.1 |
| Hilly/Mountain | 18 | 248 | -0.29 |
| **Marital status** | | | |
| Unmarried | 19 | 350 | 1.29 |
| Married | 8 | 90 | -0.26 |
| **Religion** | | | |
| Hinduism | 27 | 392 | - |
| Other | 0 | 48 | -0.1 |
| **Education** | | | |
| University level | 16 | 332 | 3.51 |
| Below University level | 11 | 108 | -0.06 |
| **Employment status** | | | |
| Employed | 14 | 117 | 8.04 |
| Unemployed | 13 | 323 | (0.005*) |
| **Profession** | | | |
| Health care | 1 | 165 | 12.68 |
| Other than health care | 26 | 275 | (< 0.001*) |
| **Self-reported health status** | | | |
| Poor | 0 | 23 | - |
| Good to Excellent | 27 | 417 | -0.39 |
| **Major illness/Co-morbidities** | | | |
| Absent | 23 | 416 | - |
| Present | 4 | 24 | -0.07 |
| **Self-Infected with COVID-19** | | | |
| No/not tested | 22 | 371 | - |
| Yes | 5 | 69 | -0.6 |
| **Family member infected with COVID-19** | | | |
| No | 15 | 196 | 1.25 |
| Yes | 12 | 244 | -0.26 |
| **Exposure with confirmed case of COVID-19** | | | |
| No | 10 | 238 | 2.97 |
| Yes | 17 | 202 | -0.09 |
| **History of Influenza vaccination** | | | |
| No | 24 | 395 | - |
| Yes | 3 | 45 | -0.75 |
| **Knowledge level** | | | |
| Poor | 4 | 43 | - |
| Good | 23 | 397 | -0.34 |
| **Attitude level** | | | |
| Negative | 10 | 79 | 6.01 |
| Positive | 17 | 361 | (0.014*) |
| **Perceived threat with COVID-19** | | | |
| Low | 3 | 19 | - |
| High | 24 | 421 | -0.13 |
| **Perceived benefit of COVID-19 Vaccine** | | | |
| Low | 7 | 17 | - |
| High | 20 | 423 | (< 0.001*) |
| **Perceived barriers to COVID-19 Vaccination** | | | |
| Low | 2 | 64 | - |
| High | 25 | 376 | -0.4 |

Note. *: significant < 0.05

Table 3 shows the bivariate associations between willingness to get the COVID-19 vaccine and the different characteristics of Nepalese adults. Unemployed status, health care professionals/students, positive attitude toward COVID-19, and high perceived benefit of COVID-19 vaccination were significantly associated with higher rates of COVID-19 vaccine acceptance. Table 4 shows the predictors associated with vaccine intention. Those who were related to health care professionals or students were 13.87 times more likely to be willing to receive the COVID-19 vaccine than those who were not (aOR: 13.87; 95%CI: 1.8-106.84, p = 0.012). Participants who perceived the vaccine to have high benefits were 6.73 times more likely to be willing to receive it (aOR: 6.73; 95%CI: 12.281-19.848, p = 0.001).

## DISCUSSION

The present study aims to assess the COVID-19 vaccine acceptance among Nepalese adults with its associated factors. Our study found high acceptance of COVID-19 vaccination among Nepalese adults during the pandemic. Most participants (94.2%) were willing to be vaccinated with the COVID-19 vaccine, and immediately (80.5%) if the vaccine was made available. The result is in accordance with the study conducted in low- and middle-income countries which reported that Nepal had the highest COVID-19 vaccine acceptance rate with an average acceptance rate of 80.3% for lower-middle-income countries.[19] The findings are also consistent with those obtained from the studies conducted in the People's Republic of China[20] and India.[21] The Chinese study found that 91.3% of Chinese adults would accept COVID-19 vaccination once it became available, with 52.2% wanting to be vaccinated as soon as possible, and others (47.8%) delaying vaccination until the vaccine's safety was confirmed.[20] Another study conducted in India stated that 86.3% of the population was willing to be vaccinated. However, only 65.8% of the participants responded that they would get vaccinated as soon as possible if the vaccine became available.[21] The vaccine acceptance (94.2%) of this study is much higher as compared to studies conducted in Bangladesh (74.6%),[22] United

| Table 4. (Logistic regression analysis) Predictors associated with intent to vaccinate. | | | |
|---|---|---|---|
| **Characteristics** | **Crude OR (95%CI)** | **Adjusted OR (95%CI)** | **p-value** |
| **Employment status** | | | |
| Unemployed | 2.973 (1.357-6.511) | 2.207 (0.949-5.134) | 0.066 |
| Employed | Ref | | |
| **Health care professionals/students** | | | |
| Yes | 15.6 (2.097-116.003) | 13.868 (1.800-106.835) | 0.012* |
| No | Ref | | |
| **Attitude level** | | | |
| Positive | 2.688 (1.186-6.092) | 2.415 (0.992-5.878) | 0.052 |
| Negative | Ref | | |
| **Perceived benefit of COVID-19 Vaccine** | | | |
| High | 8.709 (3.243-23.388) | 6.729 (2.281-19.848) | 0.001* |
| Low | Ref | | |

Note. *: significant < 0.05

States (69%),[23] Saudi Arabia (64.7%),[24] Greece (57.7%),[25] Kuwait (53.1%),[26] and Russia (41.7%).[16] This shows that the vaccine acceptance rate varies greatly across the globe. The high level of acceptance for COVID-19 vaccination among Nepalese adults reflected the strong demand for the COVID-19 vaccine.The most common reasons for COVID-19 vaccine refusal among the participants in this study were because of doubts about vaccine safety, vaccine efficacy, and lack of trust. Such concerns about vaccine safety and effectiveness appear to be widespread, as reported by studies conducted in the United States,[23] Russia, [16] Kuwait,[26] and China.[20] Unemployment, healthcare-related professionals/ students, positive attitude toward COVID-19, and high perceived benefit of COVID-19 vaccination were found to be significantly associated with higher rates of COVID-19 vaccine acceptance in this study. Furthermore, those who were healthcare professionals or students were 13.87 times more likely to be willing to receive the COVID-19 vaccine. It was identified as one of the significant predictors associated with vaccine acceptance in a bivariate logistic regression analysis (aOR: 13.87; 95%CI: 1.8-106.84, p = 0.012). This is consistent with findings from an Indonesian study, which found a higher acceptance rate among Indonesian healthcare workers.[27] Another study conducted in China showed that the acceptance of healthcare workers was significantly higher than that of non-health-care workers (76.98 Vs 56.19%).[28] This could be because healthcare professionals have a more in-depth understanding of vaccine properties. This study also found that high perceived benefits of the vaccine were associated with COVID-19 vaccine acceptance (aOR: 6.73; 95%CI: 12.28-19.85, p = 0.001) which is consistent with the findings of many other studies.[29,30] The Malaysian study showed that the perceived benefits construct in the Health Belief Model had the highest intention to take the vaccine.[29] Similarly, in the Hong Kong study, perceived vaccine benefits were positively correlated with vaccine acceptance, along with other Health Belief Model constructs such as perceived severity, cues to action, self-reported health outcomes, and trust in the healthcare system or vaccine manufacturers.[30] This study provided baseline data for ongoing monitoring of public acceptance of COVID-19 vaccination in Nepal. This study examined the factors independently associated with potential vaccine uptake, which could help to understand priority groups in the vaccination campaign to design effective pandemic immunization strategies. However, this study has some limitations. The use of an online survey may limit the sample's representativeness in the present study. We only contacted those with internet access and used social media and email through the snowball sampling technique. Therefore, disparities in response rates were observed across the country. The Bagmati province had the highest response rate. Most young

adults (97.2%) with university-level education (74.5%) represented this study, and no senior citizen participated. Non-respondent bias occurs when participants who do not respond to the survey differ in their exposures/outcomes from those who do. Furthermore, because self-reported data can lead to information bias, the study findings may vary from the actual practice. Since the COVID-19 vaccine does not provide lifelong immunity, further studies are needed to investigate the changes in vaccination acceptance and its associated factors during different periods of the pandemic.

## CONCLUSIONS

This study reflected the high acceptance of COVID-19 vaccination among Nepalese adults during the pandemic. Moreover, the majority were willing to pay for a vaccine out of pocket. The safety concern seemed to be the main reason for the vaccine refusal. Concerned authorities and healthcare professionals should focus on addressing doubts regarding vaccine safety and disseminating information about the benefits of vaccines to overcome vaccination hesitancy.

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