



ISSN: 2091-2889 (online)  
2091-2412 (print)

Received: 08 Sep 2025  
Accepted: 10 Jan 2026  
Published: 28 Feb 2026

DOI: [10.54530/jcmc.1839](https://doi.org/10.54530/jcmc.1839)



## Intention to accept Covid-19 vaccines and influencing factors among nursing students of Bagmati province, Nepal

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Peer reviewed

### Abstract

**Introduction:** The COVID-19 pandemic caused millions of infections and deaths globally. A safe and effective global vaccination coverage is crucial in controlling its spread. Cross-border movements and emerging variants remain significant threats. This study aimed to assess the intention to accept COVID-19 vaccines and the factors influencing it among nursing students in Bagmati Province, Nepal.

**Method:** A cross-sectional analytical study was conducted among nursing college students in Bagmati Province, Nepal, from Dec 2021 to Dec 2022. Students were selected using a proportionate random sampling technique from 13 nursing colleges across nine districts. Data were collected using a semi-structured self-administered questionnaire comprising socio-demographics, COVID-19 exposure, and fear of COVID-19, knowledge, perceived barriers, and vaccination intention. Ethical approval was obtained from the Nepal Health Research Council (NHRC Ref.no. 1484). Data were analysed using SPSS version 20. Descriptive statistics were presented as n(%). The chi-square test and binary logistic regression were used to identify associations. A  $p < 0.05$  was considered significant.

**Result:** Among 1,142 nursing students, 21 (2.8%) were unwilling to receive the COVID-19 vaccine. Good knowledge regarding COVID-19 was reported by 705 (61.7%). A statistically significant association was found between intention to receive COVID-19 vaccination and knowledge level ( $p < 0.001$ ) and perceived barriers to vaccination ( $p = 0.028$ ). Students' fear of COVID-19 was significantly associated with ethnicity ( $p = 0.004$ ), family income ( $p = 0.012$ ), and academic year ( $p < 0.001$ ).

**Conclusion:** Nursing students' COVID-19 vaccination acceptance was associated with knowledge, perceived barriers, and fear of COVID-19. Targeted vaccination campaigns are needed to improve nursing students' vaccine knowledge.

### How to cite

Ghimire B, Thapa N, Adhikari B, Upadhyay HP, Shrestha S, Sapkota S, et al. Intention to Accept Covid-19 Vaccines and Influencing Factors among Nursing Students of Bagmati Province, Nepal. *Journal of Chitwan Medical College*. 2026;16(57):136-146.

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## Introduction

The COVID-19, a fatal global pandemic of public health concern, caused over one million infections and thousands of deaths around the world. The maximum number of cases were in the South-East Asia Region.<sup>1-2</sup> Later, the worldwide case increase was driven by a 10 percent rise in the Eastern Mediterranean, and while small declines occurred in South-East Asia.<sup>3</sup> Achieving high vaccine uptake requires exploring the drivers of and barriers to vaccination for the proposed recipients. Major challenges of vaccination campaigns are access to and acceptance of vaccines.<sup>4-5</sup> With changes in variants, vaccine efficacy may pose risks to vaccinated individuals.<sup>6</sup> Limited vaccine supply raises questions about prioritization.<sup>7</sup> Adult vaccination coverage and the formation of herd immunity through vaccination are major concerns to overcome infection. Prioritizing vaccination for healthcare workers and nursing students is necessary.<sup>8</sup> This study aimed to assess the intention to accept COVID-19 vaccines and the factors influencing it among nursing students in Bagmati Province, Nepal.

## Method

A cross-sectional analytical study was conducted among nursing students in Bagmati Province, Nepal from Dec 2021 to Dec 2022. Ethical approval was obtained from the Nepal Health Research Council (NHRC Ref.no. 1484). Administrative approval was taken from each college. Written informed consent was obtained from all participants.

In Bagmati Province, there were 74 nursing colleges with a total of 4,125 nursing students across nine districts. From these, 13 nursing colleges were selected using simple random sampling. The list of selected colleges included institutions from Chitwan, Makawanpur, Nuwakot, Kathmandu, Lalitpur, Bhaktapur, Kavre, Sindupalchok, and Dolakha districts. Students currently enrolled in PCL Nursing, PBBN, and BSc Nursing programs were included in the study. A sampling frame was developed with the assistance of college coordinators. Using probability proportional to size sampling,

a total of 1,142 nursing students were selected from the 13 colleges.

A semi-structured self-administered questionnaire was designed covering socio-demographic characteristics, COVID-19 exposure, fear of COVID-19, knowledge, perceived barriers, and vaccination intention. Fear of COVID-19 was assessed using a validated seven-item scale with good internal consistency ( $\alpha=0.82$ ) and test-retest reliability (ICC=0.72).<sup>9</sup> Face validity of the questionnaire was checked through consultation with subject experts. A pilot study was conducted on 10 percent of the sample size (114 students) in a non-participating college to assess reliability and clarity.

Data were collected over four months. Completeness was checked daily, and data were entered in MS Excel 2016 and analyzed using SPSS version 20. Descriptive statistics were presented as frequency, percentage, mean, and standard deviation. The chi-square test was used to identify associations between categorical variables. An independent t-test was used to compare means between two groups after checking normality. Multivariable logistic regression analysis was performed to identify factors influencing intention to receive the COVID-19 vaccine. Odds ratios with 95 percent confidence intervals were calculated. A p-value less than 0.05 was considered statistically significant.

## Result

Out of 1,142 nursing students, 684 (59.9%) reported contact with COVID-19 patients, 302 (26.4%) had been infected, 100 (8.8%) had not been tested, and 434 (38%) had a family history of COVID-19. Regarding vaccination intention, 1,121 (97.2%) intended to get vaccinated against COVID-19, while 21 (2.8%) did not plan to get vaccinated, Table 1.

Reasons for vaccine hesitancy included fear of side effects 658 (57.6%), concerns over rapid vaccine development 215 (18.8%), lack of trust in government 165 (14.4%), preference for alternative precautions 150 (13.1%), fear of needles 129 (11.3%), not feeling at risk 126

(11%), delaying for safety monitoring 112 (9.8%), doubt about vaccine efficacy 103 (9%), belief that vaccine could cause COVID-19 75 (6.6%), and fear of high cost 73 (6.4%), Table 1. Students' fear of COVID-19 was good in 737 (64.5%) and poor in 405 (35.5%). Good

knowledge regarding COVID-19 was reported by 705 (61.7%) while 437 (38.3%) had poor knowledge. Perceived barriers to COVID-19 vaccination were poor in 426 (37.3%) and good in 716 (62.7%), Table 2.

**Table 1. COVID-19 exposure and vaccination intention among nursing students, n=1,142**

Variables	n(%)
<b>Contact with COVID-19 patients</b>	
Yes	684(59.9)
No	458(40.1)
<b>Infected with COVID-19 patients</b>	
No	740(64.8)
Yes	302(26.4)
Maybe/not tested	100(8.8)
<b>History of COVID-19 diagnosis in family</b>	
No	708(62.0)
Yes	434(38.0)
<b>Intend to get a COVID-19 Vaccination</b>	
Yes	1121(97.2)
No	21(2.8)
<b>Key reason for Vaccine hesitancy</b>	
Fear of side effects	658(57.6)
Delayed of safety monitoring	112(9.8)
Concerns over the rapid development of variant	215(18.8)
Belief that vaccine could cause covid-19	75(6.6)
Feared of high cost	73(6.4)
Preferred alternative precautions	150(13.1)
Don't feel at risk	126(11.0)
Fear with needles	129(11.3)
Lacked trust in government vaccine policy	165(14.4)
Doubted vaccine efficacy	103(9.0)

\*Multiple responses possible

**Table 2. Students' fear, knowledge and perceived barriers of COVID-19 vaccination, n=1,142**

Variables	n(%)
<b>Students' fear of COVID-19</b>	
No (<50%)	405(35.5)
Yes (≥50%)	737(64.5)
<b>Knowledge towards COVID-19</b>	
Poor (Mean <6)	437(38.3)
Good (Mean ≥6)	705(61.7)
<b>Perceived barriers of COVID-19 vaccination</b>	
Poor (<50%)	426(37.3)
Good (≥50%)	716(62.7)

A statistically significant association was found between intention to get COVID-19 vaccination and knowledge level ( $p < 0.001$ ) and perceived barriers of vaccination ( $p = 0.028$ ). No significant association was found with fear of COVID-19 ( $p = 0.32$ ), Table 3.

Students' fear of COVID-19 was significantly associated with ethnicity ( $p = 0.004$ ), family income ( $p = 0.012$ ), and academic year ( $p < 0.001$ ), Table 4.

Binary logistic regression showed that students with good knowledge had 3.46 times higher odds of intending to get COVID-19 vaccination compared to those with poor knowledge (OR=3.46, 95% CI: 1.62-7.39,  $p = 0.001$ ). Students with poor perceived barriers had 2.28 times higher odds of intending to get vaccinated compared to those with good perceived barriers (OR=2.28, 95% CI: 0.92-5.66,  $p = 0.077$ ), Table 5.

Regarding fear of COVID-19, Janjati students had 2.32 times higher odds of fear compared to

Dalit students (OR=2.32, 95% CI: 1.06-5.09,  $p = 0.035$ ). Students with family income 50,000-100,000 had 2.36 times higher odds of fear (OR=2.36, 95% CI: 1.24-4.49,  $p = 0.009$ ) and those with income 100,000-150,000 had 2.30 times higher odds of fear (OR=2.30, 95% CI: 1.17-4.49,  $p = 0.015$ ) compared to those with income >150,000. Second year students had 1.83 times higher odds of fear (OR=1.83, 95% CI: 1.18-2.84,  $p = 0.007$ ) and third year students had 1.82 times higher odds of fear (OR=1.82, 95% CI: 1.23-2.70,  $p = 0.003$ ) compared to first year students, Table 6.

The Hosmer-Lemeshow test showed good model fit for vaccination intention ( $\chi^2 = 1.84$ ,  $df = 5$ ,  $p = 0.871$ ) and for fear of COVID-19 ( $\chi^2 = 13.57$ ,  $df = 8$ ,  $p = 0.097$ ). Nagelkerke  $R^2$  values were 0.142 for vaccination intention and 0.133 for fear of COVID-19, indicating that 14.2 percent and 13.3 percent of the variation in dependent variables were explained by the models respectively. All VIF values were below 10, indicating no multicollinearity.

**Table 3. Association between intention to get COVID-19 vaccination and students' fear, knowledge and perceived barriers, n=1,142**

Variables	Intend to get a COVID-19 vaccination		Chi-square	p-value
	No	Yes		
<b>Level of students' fear of COVID-19</b>				
Poor	14(3.5)	391(96.5)	0.998	0.32
Good	18(2.4)	719(97.6)		
<b>Level of knowledge</b>				
Poor	22(5)	415(95)	12.95	<0.001
Good	10(1.4)	695(98.6)		
<b>Perceived barriers of COVID-19 Vaccination</b>				
No	6(1.4)	420(98.6)	4.85	0.028
Yes	26(3.6)	690(96.4)		

Statistically significant ( $p < 0.05$ )

**Table 4. Association between students' fear of COVID-19 and socio-demographic variables, n=1,142**

Variables	Students' fear of COVID-19		Chi-square	p-value
	Poor	Good		
<b>Age (In years)</b>				
15-25	363(35.8)	652(64.2)	0.358	0.55
25-35	42(33.1)	85(66.9)		
<b>Religion</b>				
Hinduism	356(36.7)	613(63.3)		
Buddhism	41(29.9)	96(70.1)	6.66	0.83
Christianity	4(16)	21(84)		
Kirati	4(36.4)	7(63.6)		
<b>Ethnicity</b>				
Dalit	16(55.2)	13(44.8)		
Janjati	166(31.8)	356(68.2)	15.5	0.004*
Madhesi	17(35.40)	31(64.6)		
Bhramin/Chhetri	202(39.1)	315(60.9)		
Others (Thakuri)	4(15.4)	22(84.6)		
<b>Family Income (Rs/month)</b>				
<50000	263(34.1)	508(65.9)	10.92	0.012*
50000-10000	111(36.5)	193(63.5)		
100000-150000	5(23.8)	16(76.2)		
>150000	26(56.5)	20(43.5)		
<b>Academic year of the respondents</b>				
First year	65(46.4)	75(53.6)		
Second year	81(31.4)	177(68.6)	22.73	<0.001*
Third year	179(31.3)	393(68.7)		
Fourth year	80(46.5)	92(53.5)		

Statistically significant (p<0.05)

**Table 5. Logistic regression for intention to get COVID-19 vaccination, n=1,142**

Variables	B	S.E.	Wald	p-value	OR	95% C.I. for OR	
						Lower	Upper
<b>Fear on COVID-19</b>							
No	0.194	0.369	.277	0.599	1.214	0.590	2.500
Yes (ref.)							
<b>Level of knowledge</b>							
Poor	10.241	0.388	10.234	0.001	3.457	1.617	7.393
Good (ref)							
<b>Perceived barriers of COVID-19 vaccination</b>							
Poor	0.822	0.465	3.128	0.077	2.275	0.915	5.655
Good (ref)							

Statistically significant (p<0.05)

**Table 6. Logistic regression of fear on COVID-19 vaccination, n=1,142**

Variables	B	S.E.	Wald	p-value	OR	95% C.I.(OR)	
						Lower	Upper
<b>Ethnicity</b>							
Dalit (ref)			12.738	0.013			
Janjati	0.842	0.400	4.428	0.035	2.321	1.059	5.085
Madhesi	0.928	0.508	3.343	0.067	2.531	0.935	60.847
Bhramin/Chhetri	0.597	0.398	2.250	0.134	1.816	0.833	30.959
Others(Thakuri)	20.022	0.672	9.047	0.003	7.551	2.022	28.190
<b>Family Income</b>							
<50000			9.724	0.021			
50000-100000	0.858	0.329	6.796	0.009	2.357	1.237	4.492
100000-150000	0.831	0.342	5.905	0.015	2.296	1.174	4.489
>150000 (ref.)	10.718	0.615	7.799	0.005	5.571	1.669	18.595
<b>Academic year of the respondents</b>							
first year (ref)			16.570	0.001			
second year	0.605	0.224	7.280	0.007	1.831	1.180	2.843
third year	0.599	0.201	8.883	0.003	1.821	1.228	2.701
fourth year	0.050	0.238	0.044	0.835	1.051	0.659	1.675
Constant	-1.396	.511	7.451	0.006	.248		

Statistically significant (p<0.05)

## Discussion

This study found that 97.2% of nursing students in Bagmati Province intended to accept COVID-19 vaccination, while 2.8% were unwilling. Good knowledge regarding COVID-19 was reported by 61.7% of students. Knowledge level (p<0.001) and perceived barriers (p=0.028) were significantly associated with vaccination intention. Students' fear of COVID-19 was significantly associated with ethnicity, family income, and academic year.

The vaccination acceptance rate of 97.2% in this study is higher than other countries. Studies from Bulgaria reported 38.3% acceptance among medical, dental, and pharmacy students,<sup>10</sup> while Jordan reported 72.3% acceptance.<sup>11</sup> A systematic review of healthcare workers found 56.0% intended to get vaccinated, ranging from 28.0% to 82.0% across studies.<sup>12</sup> In contrast, a study in Italy showed only 13.9% of university students intended to vaccinate during the pandemic.<sup>13</sup> These differences may be attributed to variations in study populations, morbidity and mortality

rates across countries, and different time periods of data collection during the pandemic.

The proportion of students unwilling to receive the COVID-19 vaccine was 2.8% in this study, which is lower than a study on Chinese nursing students reporting 4.7% unwillingness.<sup>14</sup> The higher acceptance rate in Nepal may reflect effective vaccination campaigns or a greater perceived threat of COVID-19 during the study period.

Fear of COVID-19 was associated with ethnicity, family income, and academic year in this study. However, a study on undergraduate nursing students in western Rajasthan, India, found no association between fear of COVID-19 and demographic variables.<sup>15</sup> This discrepancy may be due to cultural differences or varying pandemic experiences between the two countries.

Knowledge was a significant predictor of vaccination intention in this study, with students having good knowledge showing 3.46 times higher odds of intending to get vaccinated. This finding is consistent with

previous research where knowledge about COVID-19 and vaccines influenced acceptance rates.<sup>12,15</sup> Similarly, perceived barriers were significantly associated with vaccination intention, with students having poor perceived barriers showing higher odds of acceptance, though this did not reach statistical significance in multivariate analysis ( $p=0.077$ ).

The study found no significant association between socio-demographic variables and vaccination intention, which aligns with previous research showing no statistical difference between level of education and vaccination intention.<sup>15</sup> This suggests that cognitive factors such as knowledge and perceptions may be more important determinants of vaccine acceptance than demographic characteristics.

This study has several limitations. The results are specific to specific group and may not be generalized to all nursing colleges or university students in Nepal. A cross-sectional design does not allow for causal inferences regarding the factors influencing COVID-19 vaccination intentions. Self-reported data may be subject to recall and social desirability bias. The study was conducted during a specific time period of the pandemic, and attitudes may have changed with subsequent waves and vaccine developments. Despite these limitations, the large sample size of 1,142 students and the rigorous proportionate random sampling technique strengthen the validity and reliability of the findings.

## Conclusion

Among nursing students in Bagmati Province, 2.8% were unwilling to receive the COVID-19 vaccine. Knowledge level and perceived barriers were significantly associated with vaccination intention. Students' fear of COVID-19 was associated with ethnicity, family income, and academic year. Targeted vaccination campaigns and health promotion interventions are essential to improve nursing students' knowledge about vaccines. Such measures will not only enhance vaccine coverage among nursing students but also enable them to

positively influence their patients' vaccination decisions. Collaborative efforts from government bodies and colleges are crucial to overcoming COVID-19 and boosting vaccine uptake among nursing students.

## Conflict of interest

None

## Funding

This research received grant (Ref.no.1484) from Nepal Health Research Council, Kathmandu.

## Supplementary material

Data and supplementary material that support the findings of this study are available from the corresponding author upon reasonable request.

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## Tools/Questionnaire

### RESEARCH TOOL

A semi structured self-administered questionnaire on Intention to accept COVID-19 vaccines and its influencing factors among nursing students of Bagmati Province, Nepal. Questionnaire consists of two parts:

Part I: Related to Socio- demographic characteristics and influencing factors

Part II: Related to intention to accept covid-19 vaccine among nursing students

Direction: Tick ( ✓ ) for the appropriate answer provided to the closed ended questions, according to your viewpoint and fills the answer within space provided to the open ended questions.

Code no.....

Date of collection date:

#### Part I: Questions related to Socio–demographic characteristics and influencing factors

1. What is your age? ..... (in completed years)
2. What is your sex?
3. a. Male b. Female c. Others, Please specify.....

4. Which religion do you follow?
  - a. Hinduism b. Buddhism c. Christianity d. Islam e. Others, please specify.....
5. What is your ethnicity?
6. Dalit b. Janjati c. Madhesi d. Muslim e. Brahmin/Chhetri f. Others, please specify.....
7. What is your marital status?
  - a. Married b. Unmarried c. Divorced/Separated d. Widow/Widower
8. In which faculty do you study?
  - a. PCL b. B.Sc. c. BN
9. What is your academic year? .....
10. What is your employment status?
  - a. Employed b. unemployed c. Others, please specify
11. if employed, what is your income per month? Rs.....
12. What is your family income per month? Rs.....
13. What is your source of information about COVID-19 vaccine?(You may have Multiple selection)
  - a. Family
  - b. Friends
  - c. Social media
  - d. Teachers
  - e. Television/Redio
  - f. Others, please specify
14. Do you have any co-morbidities (diseases/conditions)?(You may have Multiple selection)
  - a. Heart disease
  - b. Chronic lung disease
  - c. Chronic kidney disease
  - d. Diabetes
  - e. Receipt of transplant or immunosuppressive therapy
  - f. pregnant
  - g. Tuberculosis
  - h. Hypertension
  - i. None
15. Have you ever been contact with COVID-19 patients?
  - a. Yes b. No
16. Have you ever been infected with COVID-19?
  - a. Yes b. No c. May be/Not tested
17. Do you have history of COVID-19 diagnosis in family?
  - a. Yes b. No
18. Students' fear of COVID-19 scale (five- item Likert type scale)

SN	Statements	strongly disagree	disagree	neutral	agree	strongly agree
1.	I am most afraid of COVID-19					
2.	It makes me uncomfortable to think about COVID-19					
3.	My hands become					

	clammy when I think about COVID-19					
4.	I am afraid of losing my life because of COVID-19					
5.	When watching news and stories about COVID-19 on social media, I become nervous or anxious					
6.	I cannot sleep because I'm worrying about getting COVID-19					
7.	My heart races or palpitates when I think about getting COVID-19					

## 19. Knowledge towards COVID-19

I. Is COVID-19 a lethal infectious disease?

a. Yes b. No c. Don't know

II. Can COVID-19 spread from one person to another person by contact?

a. Yes b. No c. Don't know

III. Is COVID-19 caused by the same virus that causes influenza (flu)?

a. Yes b. No c. Don't know

IV. Are the symptoms of COVID-19 similar to influenza (flu)?

a. Yes b. No c. Don't know

V. Does COVID-19 cause symptoms like diarrhoea, loss of taste and smell?

a. Yes b. No c. Don't know

VI. Is COVID-19 preventable disease?

a. Yes b. No c. Don't know

VII. There is currently no effective cure of COVID-19, but early symptomatic and supportive treatment can help most patients recover from the infection.

a. Yes b. No c. Don't know

VIII. Isolation and treatment of people who are infected with the COVID-19 virus are effective ways to reduce the spread of the virus.

a. Yes b. No c. Don't know

## 20. Perceived barrier to COVID-19 vaccination

SN	Statements	Agree	Neutral	Disagree
1.	There is not sufficient information about the safety and effectiveness of the new vaccine			

2.	The COVID-19 vaccine might transmit virus to me			
3.	There are many serious side effects of COVID-19 vaccine			
4.	It is difficult to get vaccinated as limited place are allocated for vaccination			
5.	I would get a COVID-19 vaccine if my friends/ relatives got it			
6	My acceptability of the vaccines will be affected by the country that produces it.			

**Part II: Questions related to intention to accept covid-19 vaccines among nursing students**

1. Will you intend to get a COVID-19 vaccination when it becomes available?
  - Yes
  - No
2. If you are unwilling to get a vaccine, what are your reason for not accepting a vaccine?  
(you can choose many options)
  - Afraid of the side effects
  - A desire to delay and follow up on the safety of the vaccine
  - Afraid of the process of new vaccine development is too quickly
  - The vaccines could lead to COVID-19
  - Afraid of the expensive vaccination costs
  - Having a plan to use other preventive measures such as masks, washing hands, social distance, avoid crowded places
  - Not in the high-risk group
  - Afraid of needles
  - Do not trust the government
  - Vaccines are not effective
  - Others Please Specify: