Public Awareness and Attitude towards COVID-19 Infection and Vaccines: A cross-sectional national survey in Nepal

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ABSTRACT

Background

To combat COVID-19, high vaccination rates are essential. However, challenges such as vaccine denial, lack of knowledge, and negative attitudes hinder progress. Assessing public understanding of vaccination is crucial to promote acceptance and reducing reluctance.

Objective

To understand people's awareness and attitude regarding COVID-19 infection and vaccines in Nepal.

Method

A cross-sectional web-based survey was conducted among the Nepali population of age 18 years and above in April 2021 during the early phase of vaccination deployment. A structured questionnaire was used to collect awareness data, and a five-point Likert scale was employed to assess participants' attitudes. The survey categorized participants into two groups based on whether their awareness level or attitude score was above or below the mean. The secondary outcome was the association between socio-demographic factors and COVID-19 awareness or attitude.

Result

Of 475 eligible participants, 46% had a low level of awareness on COVID-19 infection whereas 56% had low awareness on COVID-19 vaccines. Every six out of ten participants had a positive attitude towards the national COVID-19 vaccination program. Most of the participants had high awareness of COVID-19 symptoms and preventive measures (hand hygiene, physical distancing, mask), but two-thirds had a false perception of vaccine safety and contraindications. People's education status, occupation, province, and current/prior COVID-19 infection status were found to be significantly associated with their awareness regarding COVID-19 disease or vaccines.

Conclusion

The study revealed limited COVID-19 awareness among the Nepali population but a positive attitude toward the national vaccination program. Regular updates on COVID-19 and vaccines are important as new variants and vaccines emerge.

KEY WORDS

Attitude, COVID-19 virus, Public awareness, Vaccination

INTRODUCTION

According to the World Health Organization (WHO), there are currently more than 300 COVID-19 vaccine candidates under research, but as of 26 November 2021, only seven vaccines have obtained emergency use licenses (EUL) from the WHO.[1] While the global vaccine stakeholders are working closely with the governments, donor agencies, and philanthropists to facilitate equitable access to safe and effective COVID-19 vaccines for all people in all countries, the world data reports that, as of 25 December 2021, only 57% of the world's population have received at least one dose of COVID-19 vaccine, which includes just 8% of people living in low-income countries.[2] It should be noted that at the country level, an effective vaccination program should be guided by the local vaccine demand and needs, indicated by the distribution of target groups, vaccine awareness, and the local epidemiology of COVID-19 infection.[3]

At the population level, vaccine confidence should not be jeopardized by misinformation, suboptimal science communication, inadequate public engagement, or weak governance.[4] A global survey conducted in 19 countries across the world revealed that 71.5% of participants would be 'very or somewhat likely' to take a COVID-19 vaccine.[5] According to this survey, older people were more likely to report that they would take a vaccine, and people's trust in the government was found to be strongly associated with vaccine acceptance. Nonetheless, vaccine acceptance scenarios may be different in different countries.[6]

Among South Asian countries, India became the first country to launch a COVID-19 vaccination program, on 16 January 2021, approving Covishield (Oxford-AstraZeneca vaccine) and Covaxin for emergency use.[1] In Nepal, the Department of Drug Administration (DDA) approved the emergency use of Covishield on 15 January 2021 and vaccination started on 27 January 2020.[7] While Nepal roll out the COVID-19 vaccine in late January 2021, the level of public awareness and perception regarding COVID-19 infection and vaccine was unknown.

Several studies have shown that vaccine acceptance or hesitancy is associated with individuals' knowledge and perception about COVID-19 infection or vaccine, as well as, their decision-making process.[6] However, such studies were lacking in Nepal. This study is aimed to assess the level of awareness and attitude of the Nepali population regarding COVID-19 infection and vaccines during the early phase of vaccination deployment in the country.

METHODS

A cross-sectional web-based survey was conducted among the Nepali population with age 18 years and above who could read and understand the Nepali language and had access to an electronic device with an internet connection. The study was conducted from 02 April to 14 April 2021 in all seven provinces of Nepal. Multi-stage random sampling technique was used to produce representative data. The sample size was calculated using the formula z^2pq/e^2 (where Z= 2.54 at 99% confidence level; p= estimated proportion of the population infected by COVID-19 at the time of the study which was 774 per 100,000 population of the country; q=1-p; and e= margin of error at 1%. So, the required sample size was 495, and taking a 50% non-response rate, the final sample size was estimated to be 990 from seven provinces.

A structured questionnaire was used to collect data regarding public awareness about COVID-19 infection and vaccine, whereas a five-point Likert scale was used to collect data regarding their attitude towards the vaccination program. The questionnaire was developed based on the available literature on the study topic, whereas, the Likert scale was developed based on the publicly available standard tools - Oxford COVID-19 Vaccine Confidence and Complacency Scale and Vaccine Hesitancy Scale, rigorously modified to fit the local context.[8,9] The validity and reliability of the study tool were established by pre-testing it in 10% of the sample size but this data was not used in the main analysis.

Awareness in a participant was defined as having information about COVID-19 infection and vaccines, whereas, his/her attitude towards the vaccination program was defined as how he/she would perceive the COVID-19 vaccine. The participant's level of awareness was considered high or low based on whether his/her total knowledge score was above or below the mean score. Similarly, the participant's attitude would be either positive or negative based on the total attitude score either above or below the mean score. The minimum-maximum scores for awareness of COVID-19 infection (5 questions with multiple answers), awareness of COVID-19 vaccines (10 questions), and attitude towards vaccination (22 questions) were 0-19, 0-30, and 0-104 respectively.

Data were collected electronically using the KoBo toolbox. The survey link was sent to the public through social media platforms. The statistician cleaned the data, extracted it into the Excel sheet, and coded the variables accordingly. Data analysis was performed using the SPSS version 16.0 where the descriptive characteristics of independent and dependent variables were presented in frequency percentages, mean, and standard deviation. Descriptive statistics were used to determine the levels of awareness and attitude among study participants. Univariate and adjusted associations between different variables and awareness/attitude levels were estimated through logistic regression analysis.

Although there was no ethical issue or risk associated with study participation, informed consent was taken from all participants before collecting data. The study was approved by the Ethical Review Board of Nepal Health Research Council (Ref: NHRC ERB No. 54/2021 P). We used the SQUIRE checklist when writing this report.[10]

RESULTS

A total of 973 individuals were reached out electronically, out of which 23 did not provide consent for the study, which gave us a response rate of 98%. Of the 950 participants who provided consent, 458 (48%) had already been vaccinated, hence, the remaining 492 (52%) who were non-vaccinated became eligible to fill out the questionnaire about COVID-19 awareness and attitude towards vaccination. Among those 492 participants, 17 did not complete the questionnaire and were thus excluded from the study. Finally, the study analyzed the data collected from the 475 participants who completed the survey.

The majority (66%) of participants were of age ranging from 18-40 years. The majority (82%) were male. More than half (56%) of the participants had a higher level of education and the majority (65%) belonged to Brahmin/Chhetri ethnicity. More than half (52%) of the participants were from Bagmati province as their permanent address. Nearly 5% of the participants represented the first priority group (health care and sanitation workers) for the COVID-19 vaccination program. At the time of the survey, 12% of the participants had been infected with COVID-19 (past or current infection), whereas 67% had never been infected and 21% were unaware of their infection status. The detail of the socio-demographic characteristics of survey participants is given in table 1.

Majority (96%) of the participants were aware that SARS-CoV-2 virus originated from Wuhan, China and that droplet exposure was the main source of SARS-CoV-2 transmission from one person to another. Most of the participants knew how to prevent COVID-19 transmission and they were aware of the importance of hand hygiene (92%), physical distancing (85%), and wearing mask (87%) in preventing COVID-19 infection. From the perspective of general medical knowledge, majority of the participants (up to 92%) were aware of major symptoms of COVID-19 (fever, dry cough, difficulty breathing).

Around two third (65%) participants had false perception about the use and benefits of COVID-19 vaccine. They perceived this vaccine unsafe for pregnant and lactating women. Nearly half of the participants were unaware of the major contraindications of COVID-19 vaccine.

Overall, nearly 46% of the participants had low level of awareness on COVID-19 infection, with mean awareness score of 13.24 ± 4.34, as shown in table 2. Similarly, 56% had low level of awareness regarding COVID-19 vaccine, with a mean awareness score of 14.21 ± 7.55. Every 6 out of 10 participants had a positive attitude towards the COVID-19 vaccination program, with a mean score of 41.044 ± 13.48.

Factors associated with public awareness of COVID-19 infection and vaccines:

On performing logistic regression analysis, it was found that people's education status, the province where they reside,

Table 1. Socio-demographic characteristics of survey participants (N=475)

Variables	Number	Percentage
Age in years		
18 to 40	313	66.0
41 to 60	140	29.5
61 and above	22	4.6
Sex		
Male	391	82.3
Female	82	17.3
Others	2	0.4
Ethnicity		
Brahmin/Chhetri	307	64.6
Adibasi/Janajati	127	26.7
Madhesi	27	5.7
Dalit	9	1.9
Muslim	5	1.1
Food choice		
Vegetarian	73	15.4
Non-vegetarian	402	84.6
Marital status		
Unmarried	132	27.8
Married	333	70.1
Divorce/Separated	6	1.3
Widowed	4	0.8
Occupation		
Health worker (including public health)	21	4.4
Support staff (driver, sweeper and worker)	1	0.2
Public service (government employee)	18	3.8
Teaching-learning (teachers, students)	118	24.8
Agriculture	25	5.3
Business/Trade	89	18.7
Foreign employment	12	2.5
Other occupation	191	40.2
Educational status		
Informal education	17	3.6
Primary Level	7	1.5
Secondary Level	54	11.4
Higher Secondary	130	27.4
Bachelor or Above	267	56.2
Province		
Province 1	57	12.0
Madhesh Province	36	7.6
Bagmati Province	246	51.8
Gandaki Province	50	10.5
Lumbini Province	35	7.4
Karnali Province	19	4.0
Sudurpashchim Province	32	6.7
Past or current COVID-19 infection		
Yes	55	11.6
No	318	66.9
Don't Know	102	21.5

Table 2. Level of awareness on COVID-19 infection and vaccines among participants and their attitude toward vaccination program

	Mean score (minimum, maximum)	Low	High
Awareness about COVID-19 infection (N=475)	13.24 ± 4.34 (2, 19)	217 (46%)	258 (54%)
Awareness about COVID-19 vaccines (N=470; five missing values excluded)	14.21 ± 7.55 (0, 30)	263 (56%)	207 (44%)
		Negative	Positive
Attitude towards COVID-19 vaccination program (N=475)	41.044 ± 13.48 (15, 104)	188 (40%)	287 (60%)

Note: Low or negative signifies value below the mean score whereas high or positive signifies value above the mean.

and their current/prior COVID-19 infection status were significantly associated with their awareness regarding COVID-19 infection, p-value < 0.05 for each variable (table 3). When data were analyzed across the strata, people with primary to higher secondary level education had lower awareness levels compared to those with Bachelors's and above (adjusted odds ratio, aORs, 0.08 to 0.52, p-value < 0.05); and people who knew their COVID-19 infection status (yes or no) had higher odds (twice as likely) of having awareness compared to those who didn't know their status (aOR 2.571 [1.226, 5.390], p=0.012 and 2.070 [1.269, 3.376], p=0.004). COVID-19 awareness among people with Bachelor's & above education was fourfold compared to people with informal education (aOR 4.268 [1.362, 13.373], p=0.013), but there was no significant difference in awareness level across the provinces.

Similarly, people's occupation, education status, and prior/current COVID-19 infection were found to be significantly associated with their awareness regarding COVID-19 vaccines, p-value < 0.05 for each variable (Table 4). When data were analyzed across the education levels, no difference was found.

None of the socio-demographic factors were significantly associated with public attitude towards the national COVID-19 vaccination program.

DISCUSSION

This is among the very few national surveys about public awareness regarding and attitude towards COVID-19 infection and vaccines, which was conducted immediately after Nepal launched its vaccination program. At the time of the study, there was a suboptimal status of the general public around three main areas: knowledge about COVID-19 infection; awareness regarding COVID-19 vaccines; and awareness regarding contraindications of COVID-19 vaccine. Sixty percent of study participants were found to have a positive attitude towards national

Table 3. Factors associated with public awareness about COVID-19 infection

Variable	Unadjusted OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Age	0.957 (0.627, 1.459)	0.836		
Sex	0.960 (0.592, 1.558)	0.869		
Ethnic Group	0.849 (0.660, 1.092)	0.203		
Food Choice	0.921 (0.540, 1.569)	0.761		
Marital Status	1.016 (0.677, 1.525)	0.938		
Occupation	0.964 (0.872, 1.065)	0.468		
Education	1.628 (1.316, 2.015)	<0.001		
Informal education				Ref
Primary level			0.343 (0.028, 4.132)	0.400
Secondary level			1.395 (0.404, 4.819)	0.599
Higher sec level			2.220 (0.694, 7.101)	0.179
Bachelors and above			4.268 (1.362, 13.373)	0.013
Province	0.871 (0.843, 6.029)	0.033		
Sudurpaschim Province				Ref
Province 1			2.254 (0.843, 6.029)	0.105
Madhesh Province			1.167 (0.388, 3.509)	0.783
Bagmati Province			1.331 (0.583, 3.034)	0.497
Gandaki Province			0.922 (0.350, 2.428)	0.870
Lumbini Province			1.083 (0.370, 3.169)	0.884
Karnali Province			0.673 (0.193, 2.350)	0.534
Past or current COVID-19 infection	0.576 (0.408, 0.814)	0.002		
Don't know				Ref
Yes			2.571 (1.226, 5.390)	0.012
No			2.070 (1.269, 3.376)	0.004

Table 4. Factors associated with public awareness about COVID-19 vaccines

Variable	Unadjusted OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Age	0.927 (0.609, 1.412)	0.725		
Sex	1.371 (0.850, 2.211)	0.195		
Ethnic Group	1.153 (0.900, 1.477)	0.259		
Food Choice	0.693 (0.411, 1.167)	0.168		
Marital Status	0.818 (0.541, 1.236)	0.340		
Occupation	1.134 (1.025, 1.255)	0.015		
Other occupation				Ref
Health worker			0.044 (0.005, 0.375)	0.004
Support staff (driver, sweeper, sanitation worker)			4.878 (0.00)	1.000
Public service			1.039 (0.347, 0.108)	0.946
Teaching-learning (teacher or students)			0.713 (0.395, 1.287)	0.262
Agriculture			1.630 (0.634, 4.194)	0.311
Business/Trade			1.237 (0.707, 2.164)	0.456
Foreign employment			0.432 (0.110, 1.702)	0.230
Education	0.693 (0.566, 0.849)	<0.001		
Informal education				Ref
Primary level			5.522 (0.405, 75.220)	0.200
Secondary level			0.775 (0.237, 2.532)	0.673
Higher sec. level			0.821 (0.272, 2.476)	0.726
Bachelors and above			0.372 (0.126, 1.100)	0.074
Province	1.063 (0.936, 1.207)	0.347		
Past or current COVID-19 infection	1.447 (1.030, 2.033)	0.033		
Don't know				Ref
Yes			0.510 (0.242, 1.075)	0.077
No			0.584 (0.354, 0.965)	0.036

COVID-19 vaccination deployment, but two-thirds had the false perception that it is unsafe for pregnant or lactating women. In Nigeria, 99% of the survey participants had good knowledge of COVID-19 and 79% had positive attitudes towards adherence to the public health measures.[11] A single-center study in Nepal conducted among health workers found sufficient knowledge about COVID-19 infection but poor knowledge about the COVID-19 vaccine.[12] In Western India, the majority (95%) of health workers had excellent knowledge about COVID-19 infection and a neutral attitude towards COVID-19 vaccine.[13] More than 70% of the public in Saudi Arabia had satisfactory knowledge and a positive attitude towards the use of COVID-19 vaccines, 88% of the survey participants in Egypt would accept the vaccine, whereas, in the USA, only half of the survey participants said they would 'definitely or probably' get a vaccine if one were available for them.[14-17]

Forty percent of the participants did not have a positive attitude toward the national COVID-19 vaccination deployment in Nepal. Similar findings were reported by studies conducted in neighboring countries like Bangladesh, Malaysia, and Lebanon.[18-21] In contrast, another study from Nepal reported a high vaccine hesitancy rate (62%) despite the participants being healthcare workers of a teaching hospital.[22] Studies from the USA and Canada reported vaccine hesitancy rates to be 27% and 64% respectively.[23,24] These people probably or definitely would not get a COVID-19 vaccine even if doses were available for free and deemed safe by scientists. Vaccine hesitancy was relatively low in the neighboring country of India.[6]

In this study, around two third of the participants had a false perception about the use and benefits of COVID-19 vaccines. The Canadian study also found that vaccine-hesitant people were concerned about the side effects of vaccines and that they had low trust in health professionals and the government.[24] Only a quarter of the survey participants in Bangladesh thought that the COVID-19 vaccine available to them (Oxford-AstraZeneca at the time of the study) was safe.[25] Vaccine safety was the main reason for the unwillingness to take COVID-19 in Oman too.[26] Nearly half of the participants in this study were unaware of the side effects or major contraindications of the COVID-19 vaccine. Had they known about it, their attitude towards the vaccine and acceptance rate could be lower. Around 65% of the participants perceived that the vaccine is unsafe for pregnant and lactating women. Contrary to our findings, 89% of the survey population in Egypt believed that it is safe to use for pregnant women and chronic disease patients.[16]

The state of public awareness and perception about COVID-19 infection and vaccines is dynamic, with rapid updates and new information circulating through news portals and social media. This study found a relatively lower level of public awareness but a positive perception towards vaccines in Nepal, but the figures might have changed with time as more vaccine types and doses have been imported into the country, with gradually increasing full-dose coverage nationally. A study conducted in Poland compared the level of public attitudes towards vaccination before and after vaccination deployment in the country (between late 2020 and early 2021), which found a slight increase in willingness to get vaccinated over time.[27] The Polish study reported that healthcare workers, women, highly educated people, and residents of large cities had favorable attitudes, increasing over time, towards the COVID-19 vaccine.

Several countries have studied the factors associated with high or low compliance to COVID-19 containment measures, which could be linked to the compliance behavior to vaccination too. A cross-sectional study conducted in 12 Asian countries found that people following preventive public health measures (social distancing, wearing masks), preferring online news and social media as sources of information, and high psychological well-being accounted for high compliance behavior against COVID-19.[28] In our study, people's education status, occupation, residence (province), and current/prior COVID-19 infection status were found to be significantly associated with their awareness on COVID-19 infection or vaccines. People's knowledge directly affected both attitudes and practices regarding infection prevention and control (IPC) behaviors such as personal hygiene, masks, and social distancing in South Korea.[29] In Nigeria, the majority (79%) of survey participants had a positive attitude towards adherence to government-announced IPC measures.[11] The present study did not find any socio-demographic variables to be significantly associated with people's attitudes toward the COVID-19 vaccination program. However, as new types of vaccine, as well as additional doses, have been introduced into the country, larger studies are needed at national and subnational levels to understand the factors associated with vaccine compliance, hesitance, and trust.

In the new context, as global leaders are optimistic about providing booster doses to all eligible people, the trend of vaccine hesitancy among populations may keep changing with time. One reason for such change could be the foreseen requirement of out-of-pocket expenditures for additional doses in some countries. Moreover, with the global introduction of new virus variants that have a high potential of spreading faster and causing serious illness in humans, the longitudinal studies may help the countries not only explore people's knowledge and awareness about new variants and available vaccines but also their compliance behavior and attitudes towards COVID-19 containment measures and national vaccination programs. Furthermore, evidence-based communication, mass media strategies, and policy measures may remain the important tools for the successful deployment of the COVID-19 vaccination program in a country, with a focus on public awareness regarding different types of vaccines under use and their efficacy-safety profile.

One significant limitation of this study arises from the utilization of a web-based survey methodology, which introduces the potential for participant bias that cannot be definitively excluded.

CONCLUSION

These findings highlight the importance of relaying, evidence-based messages to the public so that COVID-19 awareness is improved in the communities, particularly in the context of new and highly transmissible virus variants circulating globally. Moreover, as new vaccines, as well as additional doses, are arriving in the country, it is important not only to raise public awareness about vaccine safety but also to get regular updates regarding changing trend of vaccine acceptance.

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