HEALTH PROMOTION

Factors associated to acceptance and willingness to pay for COVID vaccine in Nepal

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Summary

Introduction. *Corona virus disease (COVID-19) remains pandemic globally. Vaccination is considered one of the best means to control both morbidity and mortality of COVID-19. The study aims to find out the people's acceptance and willingness to pay for it.*

Methods. *The study used cross-sectional survey design. Data were collected using a survey questionnaire from 1072 respondents (age 20-60 years) from 14 districts of Nepal. Socio-demographic characteristics of the respondents were independent and acceptance of vaccine was the dependent variable.*

Results. *The study found that 84% of the respondents accepted the COVID vaccine. Only one out of six did not accept the COVID vaccine while 16% of the respondents stated that they would like to pay for the COVID vaccination. The average willingness to pay (WTP) for vaccination was NRs. 1053 (US$ 9) while median and mode remained the same NRs. 500. The middle age groups*

(30-49 years), respondents belonged to Madhesi, business people in terms of occupation and the respondents who had completed school level education had a higher acceptance rate than other categories. It was observed that place of residence in terms of provinces or districts, age group, caste/ethnicity, and educational level of the respondents were significantly associated with the acceptance of the COVID vaccine. Moreover, respondents residing from Lumbini Province, age group of 30-39 years, and having secondary or higher education were noticed as more likely to accept the COVID vaccine than the respective compared groups.

Conclusion. *Appropriate information, education and communication needs to disseminate to minimize the misinformation about the COVID and lack of trust in vaccine that may lead to low acceptance and poor WTP for vaccine. These findings could be considered while making COVID and the COVID vaccine-related interventions.*

Introduction

Novel coronavirus disease (COVID-19) has become a serious public health problem globally. About 17 million people were infected and more the 3.5 million people lost their life due to COVID-19 [1]. Three main preventive measures: control the reservoir of infection, protect the susceptible host, and blocking the mode of transmission are the main keys to overcoming communicable diseases. The COVID-19 is noticed as a highly spreadable airborne disease and also appeared as out of control in many countries. Therefore, many states followed the protective measures as per the WHO's recommendations: social/physical distancing, masking, hygiene/sanitizing, isolation for infected cases and quarantine for suspected cases [1]. These measures are not enough to control the pandemic situation. On the other side, new variants of virus which have been identified in India and other countries makes the situation worst.

Nepal could not be an exception in this situation. The first case was detected in January 2020. With Nepali workers returning from India to their home town/village, the disease rapidly spread in all seven provinces and 77 districts of Nepal. By the end of May 2021, more than half a million people were recorded with COVID

infection and more than seven thousand people lost their lives which accounts for 1.28 percent of the case fatality rate (CFR) [1]. Initially, the CFR was less than one percent but now it has appeared in an increasing trend which is making the government, public health experts and policymakers restless.

Observing such pandemic situation worldwide and as per the suggestion of WHO and public health experts, the Government of Nepal (GoN) imposed national level lockdown since 24th March 2020 and continued it 120 days up to 21st July 2020 [2, 3] 2019 (COVID-19). The second wave of COVID-19 pandemic in neighbouring countries is attributable to new variants of the virus, which are also responsible for the acceleration of the number of COVID cases in Nepal. With the rapid spread of the deadly virus in different parts of the country, the GoN imposed lockdown II on 28th April in almost all districts and was continued for a long time. The lockdown affected the daily routines of the people. Day to day life of country people adversely affected resulting in mental stress, suicidal tendencies, food insecurity, extreme poverty, inequality and difficulties in social services delivery system [4]. The government has been making its effort to inform and motivate people to follow protective measures such as physical distancing, improving hand

hygiene, wearing a facemask, avoiding crowded place, home quarantine and self-isolation through daily press meet and different mass media including radio and TV. People's unwillingness or hesitation to get vaccinated against COVID-19 may be due to misinformation and contagious [5]. Therefore, it needs time to time intervention for adequate and accurate information. The facts only cannot motivate people it needs mass campaigns to change or acceptance. Though vaccination could not be as a bullet to fight the COVID however vaccination and healthy behaviours, contact tracing with other combined efforts could eventually shrink the transmission of COVID [6].

Despite various efforts of the GoN and civil societies to curb the transmission of coronavirus infection, the situation could not be controlled. The situation not only affected the health of the people rather it affected the national economy, education and all other sectors. To date, no medicine is available to cure the diseases so preventive measures are key weapons to fight the disease pandemic. Therefore, only vaccination against COVID-19 is considered as a permanent solution to overcome the situation. However, there is much misinformation are also being spread. The misleading information could lead to mistrust, hesitancy, confusion and even rejection toward vaccination [7]. The trend showed that the GoN has been allocating nearly two to three percent of the total national budget on average for the health sector in the recent decade. The budget may not be enough to buy the COVID vaccine for all Nepalese people. In such instances, people participation would be compensated for health financing for buying the vaccine. However, we could not find any study regarding people's acceptance and willingness to pay for it in the context of Nepal. Therefore, the study aims to find out the people's acceptance and willingness to pay for the COVID vaccine.

Methods

RESEARCH DESIGN
The study used cross-sectional survey design.

STUDY SETTING AND PERIOD
The study covered all seven provinces of Nepal. We choose purposively two districts from each province. Therefore 14 districts were covered in this study. Sunsari and Dhankuta from Province one; Saptari and Parsa from Province two; Kathmandu and Chitwan from Bagmati; Baglung and Kaski from Gandaki; Rupandehi and Banke from Lumbini; Surkhet and Dailekh from Karnali; and Kailali and Bhajhang from Suderpaschim Province were purposively selected (Fig. 1). These districts were selected because the risk of COVID-19 was slightly higher compared to other districts in respective provinces. Fieldwork was started on 1st March 2021 and stopped on 27th April due to lockdown imposed by the GoN and local authorities.

Study population
People aged between 20-60 years living in the selected districts was the study population.
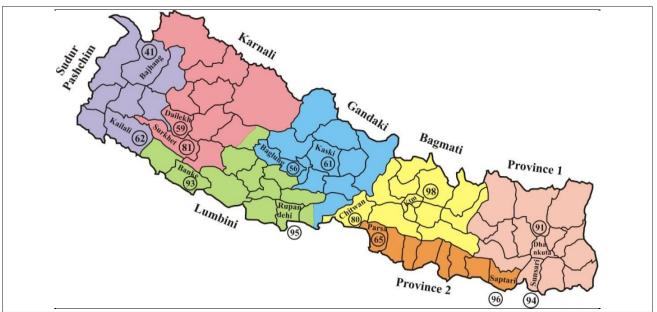
Sampling unit
Individuals of the household were the sampling unit. The ward of Rural Municipality (*Gaupalika*) and Urban Municipality (*Nagarpalika*) were the primary sampling unit (PSU) for the study.

Sample size
The required sample size was calculated using the formula [8].

$$n = \frac{t^2(p.q)}{d^2}.Def$$

Fig. 1. Sampling districts and sample size.

Tab. I. Background characteristics of the respondents.

Variables	Category	%	N
Province	Province 1	17.3	185
	Province 2	15.0	161
	Bagmati	16.6	178
	Gandaki	10.9	117
	Lumbini	17.5	188
	Karnali	13.1	140
	Sudur Pashchim	9.6	103
District	Sunsari	8.8	94
	Dhankuta	8.5	91
	Saptari	9.0	96
	Parsa	6.1	65
	Kathmandu	9.1	98
	Chitwan	7.5	80
	Baglung	5.2	56
	Kaski	5.7	61
	Rupandehi	8.9	95
	Banke	8.7	93
	Surkhet	7.6	81
	Dailekh	5.5	59
	Kailali	5.8	62
	Bajhang	3.8	41
Place of residence	Urban/Town	29.5	316
	Semi Urban/Small Town	26.3	282
	Rural Areas	44.2	474
Age group	20-29 yrs	42.9	460
	30-39 yrs	25.5	273
	40-49 yrs	17.6	189
	50 or more	14.0	150
Sex	Male	47.9	513
	Female	51.7	554
	Others	.5	5
Caste/Ethnicity	Brahman/Chhetri/Thakuri/Sanyasi	44.3	475
	Advantaged Janajatis	6.3	68
	Disadvantaged Janajatis	12.4	133
	Madhesi	23.2	249
	Muslim	3.1	33
	Dalit	10.2	109
	Others	.5	5
Main occupation	Subsistence Agriculture	25.3	271
	Cash crops/farming	7.9	85
	Business	8.9	95
	Service	26.5	284
	Foreign Employment	3.2	34
	Wage labour	8.5	91
	Housewife	10.9	117
	Other	8.9	95
Educational level	No education	8.7	93
	Basic education	15.2	163
	Secondary Education	40.4	433
	Higher education	35.7	383
Size of the family	Up to 5 members	48.1	516
	6 to 10 members	45.3	486
	11 or more members	6.5	70
Type of family	Nuclear	58.5	627
	Joint	41.5	445
Religion	Hindu	84.7	908
	Buddhist	6.2	66
	Islam	4.4	47
	Christianity	2.5	27
	Others	2.2	24
Chronic illness	No	77.1	827
	Yes	22.9	245

Where, n = size required; t = 95% confidence interval for cluster sampling (2.045) instead of (z = 1.96); p = estimated proportion of the variables = 0.5; $q = 1 - p$, d = the degree of accuracy (d = 0.05), and Def = design effect = 3. The total sample accounted for 1255. After adjusting the non-response rate of 10 percent, then the sample size accounted for 1394 for 14 districts (99.9~100 for each district), therefore, the required sample size reached 14*100 = 1400.

Sampling Technique

The multistage sampling technique was used in the process of selecting sampling units. In the first stage, 14 districts from 7 provinces were purposively selected. In the second stage, one rural municipality and one municipality were selected purposively as applicable. In the third stage, two primary sampling units (two clusters/wards) were randomly selected from each of selected rural/municipalities. A list of the adult population [20-60 years] who were available at the cluster were listed. In the fourth stage, 25 households from each cluster/PSU were randomly selected.

Criteria for sample selection

Persons aged 20-60 years living in households of PSU were eligible for sample selection. Those persons who were willing to participate in the COVID survey were selected for the structured interview. Age less than 20 or more than 60, and an individual who did not want to participate and the guests who came from other than sample districts were excluded.

DATA COLLECTION TOLL

The survey questionnaire was the tool for data collection.

VALIDITY AND RELIABILITY OF THE TOOL

The research tool was pretested in Kathmandu, Chitwan, Rupandehi, and Surkhet districts of Nepal. The final set of questionnaires was tested among 40 persons living in rural and urban areas which were not included in PSU. Cronbach's alpha was calculated and found 0.754 which was eligible to administrate [9]. A webinar-based discussion was conducted to revise the study tool. After conducting the pre-testing, we also consulted with statisticians then some questions are removed as well as added as per the field experience.

DATA COLLECTION TECHNIQUES

After selecting the sample, filed enumerators stated about the objective of the study, voluntary participation, right to reject any time, data confidentiality and anonymity to the respondents. Consent was taken prior to the interview and then collected the data from the respondents at their home or the place where they felt comfort response such as field, workplace. Data were collected by using mobile technology through application software KoBo Toolbox. Though estimated the sample size was 1400 but the GoN imposed lockdown since 28th April 2021 in many districts. Then, we could not be able to collect the all

data as per the plan after the date. Altogether, responses from 1072 samples were recorded. So, the study yielded 77 (actual 85%: 1072/1255) percent of response rate due to lockdown and COVID-19 pandemic situation.

Variables and measures

Socio-demographic characteristics of the respondents were independent, and acceptance and willingness to pay for the COVID vaccine were the dependent variables. Descriptive in terms of frequency and percentage, central tendency, and bivariate (chi-square test) analysis was performed to find out the association between the variables. For the statistical analysis, IBM SPSS statistics 20 was used.

Potential Biases

This was a quantitative survey, there might be selection bias of respondents and recall bias of information. There might be confirmation bias from the researcher side in order to favour particular assumptions. The field enumerators were oriented about these biases and the ways of minimizing these biases during the orientation and training. Moreover, they were oriented about probing techniques to minimize recall and other biases.

Ethical consideration

The study proposal was reviewed and approved by Nepal Health Research Council (NHRC) on 26th January 2021 (# 649/2020). The study followed all research ethics guidelines made by NHRC.

Results

Characteristics of the respondents

Though it was planned that a total of 200 respondents from each province. But due to the pandemic situation and the GoN and local authorities imposed lockdown we could not be able to collect the data after 28th April 2021. However, about 85 percent of the actual sample has been collected. Data were collected more than three-fourth of the total target sample. Of the total respondents, 44 percent were from rural areas and 30 percent from urban areas. The mean age of the respondent was 35 ± 11.29 years and 43 percent of the total samples were from 20 to 29 years of age. The majority (52%) of the respondents were female and 44 percent were from Brahmin, Chhetri, Dasnami and Thakuri. One-third of the respondents were involved in subsistence agriculture as the main occupation whereas 27 percent as in service. One out of ten (9%) of the respondents were illiterate but 36 percent had higher education degrees. Near to half (48%) of the respondents had up to five members in their family and 59 percent of the respondent were from nuclear families.

A vast majority (85%) of the respondent were Hindu and 23 percent of the respondents had some kind of chronic disease within family members.

Acceptance of the COVID vaccine

A majority (84%) of the respondent expressed that they would accept the COVID-19 vaccine. Nearly half (46%, n = 495) of the respondents indicated that they would accept vaccines if the vaccine was available at free of cost and only about 16 percent (n = 167) of the respondents stated that they would accept vaccines even if they have to pay. One fifth (21%, n = 228) of the respondents indicated that they will decide how much they want to pay after the vaccine is available.

Willingness to pay for COVID vaccine

Of the total respondents, only one out of six (16%) respondents wanted to pay for theCOVID vaccine. The mean willingness to pay (WTP) for the COVID vaccine was Nepali Rupees (NRs.) 1053 (US$ 9), median and mode of the WTP for the COVID vaccine was NRs. 500 each where minimum NRs. 50 to maximum NRs. 10,000. The WTP of the respondents for COVID vaccine was asymmetry nature.

Association of socio-demographic characteristics and acceptance of COVID vaccine

Almost all (97%) of the respondents from Lumbini province expressed that they would accept the COVID vaccine followed by 90 percent from Province One, 88 percent from Province Two, and only 69 percent of the respondents from Bagmati province would accept the vaccine which was the lowest acceptance among all provinces ($p < 0.001$). In the same way, the cent percent of the respondents from Rupandehi district accepted the COVID vaccine what was the highest acceptance whereas 59 percent of the respondents from Dailekh district stated that they would accept the COVID vaccine which was the lowest acceptance rate among the districts ($p < 0.001$).

The acceptance rate of the vaccine was higher in the semi-urban areas (87%) compared to rural (85%) and urban (81%) areas. That means respondents from urban areas had a low acceptance rate for the COVID vaccine. Interestingly middle age group (30-49 years) had more acceptance rate which accounted for 88 to 89 percent compared to other age groups (80-83%) ($p < 0.01$). In the same way, female respondents had a comparatively low acceptance rate (84%) compared to other (85%). The respondents who were Madhesi had a higher acceptance rate (91%) of COVID vaccine compared to other caste groups ($p < 0.001$). Only 82 percent of the respondents from Muslim expressed that they would accept the COVID vaccine. Similarly, the respondents who were involved in business had a higher acceptance rate for vaccines which accounted for 92 percent whereas the respondents who were housewives had a low acceptance rate (73%) ($p < 0.01$).

Ninety percent of the respondents who completed secondary level of education had a higher acceptance rate which accounted for 90 percent compared to the respondents who had no formal education (76%) and higher education (79%) ($p < 0.001$). Data showed that the

higher the number of family size higher the acceptance for the COVID vaccine. It was observed that there was no difference of the acceptance rate of vaccines between nuclear and joint families. In the same way, there were no significant differences for the COVID vaccine acceptance rate among the religious groups and the family of the respondents having the chronic disease(s) within the family member(s) or not.

MULTIVARIATE ANALYSIS ON SOCIO-DEMOGRAPHIC CHARACTERISTICS AND ACCEPTANCE OF COVID VACCINE

Variables, that were found significant differences in bivariate analysis, were further analysed in the multivariate analysis except for districts. Before adjusting the variables in multivariate analysis some attributes were merged such as caste and occupation. In Model I, we presented the province and acceptance of the COVID vaccine, in Model II we adjusted age group and caste, and in Model III we adjusted occupation and education along with other variables. Nearly the same result was noticed in the tables but after adjusting the occupation and educational level of the respondent, the odds ratio of caste appeared in a fluctuated way.

It was noticed that the respondents from Bagmati province appeared 72% less likely to accept the COVID vaccine compared to the respondents from Province one (OR = 0.28, 95% CI: 0.15-0.52). In the same way, the respondents from Karnali Province noticed 59% less likely to accept the COVID vaccine compared to the respondents from Province one (OR = 0.41, 95% CI: 0.21-0.77). But, the respondents from Lumbini Province were observed almost 5.2 times more likely to accept the COVID vaccine compared to the respondents from Province one (OR = 5.20, 95%CI: 1.84-14.70).

The middle age group (30-39 years and 40-49 years) appeared 1.8 to 2.0 times more likely to accept the COVID vaccine compared to the age group of 20-29 years respectively (OR = 2.03, 95% CI: 1.26-3.27, and OR = 1.84, 95% CI: 1.04-3.25). In the same way, the respondents having secondary and higher education were noticed as more likely to accept the COVID vaccine compared to the respondents who had no education respectively (OR = 3.64, 95% CI: 1.78-7.42, and OR = 2.34, 95% CI: 1.14-4.89).

Discussion

The study found that a vast majority of the respondents accepted the COVID vaccine. Only one out of six did not accept the COVID vaccine while the same percentage of the respondents would like to pay for COVID vaccination. The average WTP for vaccination was NRs. 1053 (US$ 9) and median and mode of WTP remained the same NRs. 500. However, the range of WTP was NRs. 50-10,000. A high acceptance rate was found in Lumbini and a low acceptance rate was observed in Bagmati province. In the same way, a high acceptance rate was recorded in Rupandehi and a low in Dailekh

district. The middle age groups (30-49 years of age) had a higher acceptance rate of vaccination. Respondents who belonged to Madhesi and business people in terms of occupation had a higher acceptance rate than other related groups. The respondents who had completed school level education had a higher acceptance rate than others categories. The study revealed that place of residence in terms of provinces or districts, age group, caste/ethnicity, and educational level of the respondents were significantly associated with the acceptance of the COVID vaccine. Similarly, respondents from the Lumbini Province, the middle year of age 30-49 years, and secondary or higher education were noticed as more likely to accept the COVID vaccine compared to their respective attributes.

An e-survey conducted in Turkey showed that near to half (49.7%) of the respondents stated that they would be vaccinated [10] which was similar (42% acceptance rate) to the study from Russia [11]. Another study from France showed 77 percent of the respondents who were health workers would like to accept the COVID vaccination [12] which was lower than this study. The study further showed that gender, age and type of occupation were significantly associated with the acceptance of the COVID vaccine that was somehow similar result with the study [12]. In the initial days for the COVID vaccine, there was mistrust and hesitation to accept or be willing to participate in the vaccine trial. Nearly two-third (64-69%) of the respondents from China accepted for willingness for COVID vaccine trial [13,14] this paper aimed to describe the prevalence and correlates of willingness to participate in COVID-19 vaccine trials among university students in China. A cross-sectional survey with 1912 Chinese university students was conducted during March and April 2020. Bivariate and multivariate analyses were performed to identify variables associated with willingness to participate. The majority of participants (64.01%] similar to the study from Japan [15]. Nearly the same result was observed in the United States (US). Socio-demographic variables such as age, sex, ethnicity, education and income status were significantly associated with the intention to accept the COVID vaccine [16]. However, a systematic review showed that sex (female), age (younger), low social status (low economic and educational level), and caste (ethnic minority) were significantly associated with less likely to accept the CoViD vaccine [17].

The acceptance rate of the COVID vaccine was noticed to vary within a time interval. A longitudinal study conducted in the US showed that there was 71 percent vaccine acceptance rate was observed in April while it was declined to 54 percent in October 2020 [18]. So, the acceptance rate might be influenced not only by socio-demographic characteristics but also by the time interval. A prior study conducted in United Kingdoms showed that low socio-economic status, women and ethnic minorities appeared less likely to accept the COVID vaccine. Near to two-third (63.5%) of the respondents would like to accept the vaccine whereas about one fourth (22.5%) were unsure and 14 percent would like to reject

Tab. II. Acceptance of CoViD-19 vaccine.

Variable	Category	N	%
Acceptance of vaccine	No	169	15.8
	Yes	903	84.2
Accepted if (n = 903)	Available at free of cost	495	54.8
	Would pay if available	167	18.5
	Will decide after vaccine available	228	25.2
	Others	13	1.4

the vaccine [19]. A similar observation was found in Philadelphia that showed acceptance rate was 74 percent, 26 percent were unsure and 10 percent did not plan to the vaccine [20]. The prior study from France supports that gender, age and low education level were associated with the acceptance of the COVID vaccine [21]. The majority (64%) of the respondents from China expressed they would accept vaccines however lower socio-economic status and females were more likely to accept the COVID vaccine [22] which was somehow different from this study.

Surprisingly, near to half (46%) of the respondents from Egypt had hesitancy towards the COVID vaccine. Moreover, six percent each form respondents would like to accept as well as a reject [23]. Two-third (66%) and 14 percent of the respondents from the US would like to accept and reject the COVID vaccine respectively [24] which was near to similar with the study. More than half (56%) had a vaccine acceptance rate whereas the upper-income category(rich) had a higher chance to accept and health workers were appeared less likely to accept vaccines in the Democratic Republic of Congo [25]. Acceptance of COVID vaccine varies in time and place overall vaccine hesitancy rate appeared 9 to 43 percent in France [26]. A systematic reviews showed that the acceptance rate was varied from 28 to 78 percent in 33 different countries [27].

LIMITATIONS

We selected the districts purposively as per the magnitude of the problem so there may be selection bias. Similarly, response and recall biases may persist since we collected the data from the respondents in a single and first visit. Moreover, the cross-sectional study might not show the cause and effect relationship among the variables. Therefore, a mixed or multi-methods approach with wider perspectives would be better to study for acceptance and WTP for the COVID vaccine in near future.

Conclusion

A vast majority (8 out of 10) of the respondents accepted the COVID vaccine however only one out of six will pay for vaccination. Of the respondents, 16 percent did not accept the vaccine. Moreover, the average willingness to pay for the COVID vaccine was NRs. 1053 (US$ 9). These findings show that people do not want to pay but they would like to be vaccinated free of cost. Since the vaccination is in the initial phase globally. People may have misinformation and a lack of trust in it. Generally, negative information can spread faster than a positive message. Socio-demographic characteristics such as place of residence in terms of province and districts, age group of people, caste/ethnicity, occupation, educational level are significantly associated with the acceptance of the COVID vaccine. But, residence setting (in terms of Province and districts), age group, and educational status of the respondents were significant predictors for the acceptance of the COVID vaccine. The policymakers and stakeholders should take these findings into account while making COVID vaccine-related planning and intervention. Proper dissemination is required to minimize the COVID related misinformation and lack of trust in the COVID vaccine that would lead to higher acceptance and WTP for the vaccine.

Acknowledgements

Conflict of interest statement

The authors declare that they have no conflict of interest with this study.

Authors' contribution

DA: Design of the study, analysis of data, interpretation of data, drafting and approved the final version of the manuscript. CBB: Conception of the study, interpretation of data, revised the manuscript critically, approved the final version of the manuscript. SPK: Design of the study, acquisition of data, revised the manuscript critically, and approved the final version.

Tab. III. Willingness to pay for COVID vaccine.

Amount in NRs.	N	%	Mean	Median	Mode	SD	Minimum	Maximum	Range
Up to 500	105	63							
501 to 1000	30	18	1053	500	500	1761	50	10000	9950
More than 1000	32	19							
Total	167	100							

NRs: Nepalese Rupee [NRs 117.04 = 1 US$].

Tab. IV. Association of socio-demographic characteristics and acceptance of COVID vaccine.

Variables	Category	Acceptance of COVID-19 vaccine				χ^2	ρ
		No		Yes			
		N	%	N	%		
Province	Province 1	19	10.3	166	89.7	74.470	< 0.001
	Province 2	20	12.4	141	87.6		
	Bagmati	55	30.9	123	69.1		
	Gandaki	17	14.5	100	85.5		
	Lumbini	5	2.7	183	97.3		
	Karnali	38	27.1	102	72.9		
	Sudur Pashchim	15	14.6	88	85.4		
District	Sunsari	5	5.3	89	94.7	107.339	< 0.001
	Dhankuta	14	15.4	77	84.6		
	Saptari	13	13.5	83	86.5		
	Parsa	7	10.8	58	89.2		
	Kathmandu	28	28.6	70	71.4		
	Chitwan	27	33.8	53	66.3		
	Baglung	1	1.8	55	98.2		
	Kaski	16	26.2	45	73.8		
	Rupandehi			95	100.0		
	Banke	5	5.4	88	94.6		
	Surkhet	14	17.3	67	82.7		
	Dailekh	24	40.7	35	59.3		
	Kailali	9	14.5	53	85.5		
	Bajhang	6	14.6	35	85.4		
Place of residence	Urban/Town	61	19.3	255	80.7	4.686	0.096
	Semi Urban/Small Town	37	13.1	245	86.9		
	Rural Areas	71	15.0	403	85.0		
Age group	20-29 yrs	90	19.6	370	80.4	11.699	0.008
	30-39 yrs	31	11.4	242	88.6		
	40-49 yrs	22	11.6	167	88.4		
	50 or more	26	17.3	124	82.7		
Sex	Female	90	16.2	464	83.8	0.199	0.655
	Others	79	15.3	439	84.7		
Caste	Brahman/Chhetri/Thakuri/Sanyasi	97	20.4	378	79.6	21.799	0.001
	Advantaged Janajatis	10	14.7	58	85.3		
	Disadvantaged Janajatis	13	9.8	120	90.2		
	Madhesi	23	9.2	226	90.8		
	Muslim	6	18.2	27	81.8		
	Dalit	18	16.5	91	83.5		
	Others	2	40.0	3	60.0		
Main occupation	Subsistence Agriculture	43	15.9	228	84.1	18.890	0.009
	Cash crops/farming	14	16.5	71	83.5		
	Business	8	8.4	87	91.6		
	Service	36	12.7	248	87.3		
	Foreign Employment	7	20.6	27	79.4		
	Wage labour	16	17.6	75	82.4		
	Housewife	32	27.4	85	72.6		
	Other	13	13.7	82	86.3		
Educational level	No education	22	23.7	71	76.3	21.972	< 0.001
	Basic education	22	13.5	141	86.5		
	Secondary Education	45	10.4	388	89.6		
	Higher education	80	20.9	303	79.1		
Size of the family	Up to 5 members	84	16.3	432	83.7	0.554	0.758
	6 to 10 members	76	15.6	410	84.4		
	11 or more members	9	12.9	61	87.1		
Type of family	Nuclear	98	15.6	529	84.4	0.021	0.886
	Joint	71	16.0	374	84.0		
Religion	Hindu	135	14.9	773	85.1	4.573	0.334
	Buddhist	14	21.2	52	78.8		
	Islam	11	23.4	36	76.6		
	Christianity	4	14.8	23	85.2		
	Others	5	20.8	19	79.2		
Chronic illness	No	128	15.5	699	84.5	0.225	0.635
	Yes	41	16.7	204	83.3		

Note: Bold face of p-value indicates statistically significant.

Tab. V. Multivariate analysis on socio-demographic characteristics and acceptance of CoViD vaccine.

Variables	Category	Model I			Model II			Model III		
		OR	95% CI		OR	95% CI		OR	95% CI	
			Lower	Upper		Lower	Upper		Lower	Upper
Province	Province 1 (Ref.)	1.00						1.00		
	Province 2	.807	.414	1.572				0.871	0.400	1.897
	Bagmati	**.256**	**.145**	**.453**				**0.280**	**0.151**	**0.518**
	Gandaki	.673	.334	1.356				0.801	0.388	1.655
	Lumbini	**4.189**	**1.530**	**11.470**				**5.195**	**1.835**	**14.704**
	Karnali	**.307**	**.168**	**.562**				**0.405**	**0.214**	**0.768**
	Sudur Pashchim	.671	.325	1.386				0.899	0.418	1.932
Age group	20-29 yrs (Ref.)				1.00			1.00		
	30-39 yrs				**1.882**	**1.210**	**2.927**	**2.025**	**1.256**	**3.267**
	40-49 yrs				**1.723**	**1.040**	**2.855**	**1.841**	**1.043**	**3.248**
	50 or more				1.059	.650	1.726	1.283	0.686	2.398
Caste	Brahmin/Chhhetri/Thakuri/Dashanami (Ref.)				1.00			1.00		
	Janajatis				**1.964**	**1.202**	**3.209**	1.345	0.780	2.319
	Others				**1.796**	**1.231**	**2.622**	1.067	0.627	1.813
Occupation	Agriculture, business (Ref.)							1.00		
	Service, wage, foreign job							0.849	0.573	1.258
	Others							1.649	0.819	3.324
Educational level	No education (Ref.)							1.00		
	Basic education							1.902	0.923	3.919
	Secondary Education							**3.635**	**1.781**	**7.417**
	Higher education							**2.336**	**1.115**	**4.894**

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Appendix I

Questionnaire
COVID-19 Behavioural Survey 2020

Section I: Respondents' Background Information

Q101 Where do you live?
        1. Province
        2. Province
        3. Province
        4. Province
        5. Province
        6. Province
        7. Province

Q102 What is your district name
        1. Sunasari
        2. Dhankuta
        3. Saptari
        4. Parsa
        5. Kathmandu
        6. Chitwan
        7. Baglung
        8. Kaski
        9. Rupandehi
        10. Banke
        11. Surkhet
        12. Dailekh
        13. Kailali
        14. Bajhang

Q103 Where do you live?
        1. Urban/Town
        2. Semi Urban/Small Town
        3. Rural Areas

Q104 What is your age? .... Years

Q105 What is your sex?
        1. Male
        2. Female
        3. Others

Q106 What is your caste/ethnicity?
        1. Brahman/Chhetri/Thakuri/Sanyais
        2. Advantaged Janajati
        3. Disadvantaged Janajati
        4. Madhesi
        5. Muslim
        6. Dalit
        7. Others

Q107 What is your main occupation
      1. Subsistence Agriculture
      2. Cash crops/farming
      3. Retail shop/business/Hotel
      4. Teacher/Government/Non-Government/Private Company Employee
      5. Foreign Employment
      6. Wage labour
      7. Housewife
      8. Other...............

Q108 What is your level of education ....

Q109 How many people are there in your family? .... Persons

Q110 Type of your family?
      1. Nuclear
      2. Joint

Q111 Which religions do you follow?
      1.   Hindu
      2.   Buddhist
      3.   Islam
      4.   Christianity
      5.   Others

Q112 Do you have any family member with chronic diseases who needs to take regular medicine?
      1. Yes
      0. No

Q112.1 If yes which disease related? (Multiple Response)
      1. Cancer
      2. Heart related diseases
      3. COPD
      4. Arthritis/Joint Related
      5. Gastritis
      6. Diabetes
      7. Kidney related .
      8. Uric Acid
      9. Mental related
      10. Thyroid related
      11. Others………. Specify…..........

Q113 Has anyone of your family recently returned to home from India or foreign country or corona epidemic area?
      1 Yes
      0. No

Q114 Have you recently returned to home from foreign country or India?
      1. Yes
      0. No

Q115 If Yes, did you stay in quarantine?
      1. Yes, Quarantine center
      2. Yes, Home Quarantine
      3. No

Section II: COVID-19 Communication and Knowledge/Awareness

Q201 Have your heard of coronavirus disease (COVID-19)?
        1. Yes
        0. No

Q202 Have you heard or seen any messages related to coronavirus disease within a last month?
        1. Yes
        0. No

Q203 What is your sources of information/message about coronavirus disease?

		Always	Often	Rarely	Never
1	Radio/FM				
2	TV				
3	Facebook and social media				
4	Online media				
5	Telephone ringtone				
6	Daily newspaper, posters and other printed media				
7	Gov, Health Minister and NHEICC Website				
8	Doctor, Nurses and health service providers				
9	Teachers				
10	Local Leaders				
11	Social and Development Workers				
12	Family members and friends				
13	Police and Security Personnnel				

Q204 It is difficult to decide which information I receive about the coronavirus is real, fake, or just rumors
        1. Agree
        2. Disagree
        3. Unknown

Q205 What is your most trusted source of information about coronavirus disease?
        Radio
        TV
        Newspaper
        Poster Pamphlet/Display Board
        Teachers
        Doctor/Health Worker
        Political Leader
        FCHV
        Relative
        Neighbour
        Family Member
        Friends
        Social/Online Media
        Others

Q206 Based on your responses to COVID-19 communication and media, what do you think of the following statements?

SN	Statements	Agree	Disagree	Not sure/No idea
01	Different media have increased public awareness and concern over coronavirus disease			
02	The information in the media are adequate to motivate people to follow protective behaviour/government recommendations			
03	I am still in confusion about prevention and treatment of coronavirus diseases due to socio-culturally inappropriate language and terms used by media and government press meet			
04	Biased information of media has increased stigma and discrimination against people infected with coronavirus			
05	Media is helping us to fight against coronavirus disease by creating awareness			

Q207 How do you feel about coronavirus disease?
1. Very Fearful
2. Fearful
3. Not fearful
4. Fearful but optimistic

Q208 How much are you worried about getting coronavirus disease yourself?
1. Very worried
2. Moderately worried
3. Not worried

Q209 How does coronavirus spread among people?
1. Through air
2. Through vegetables, fruits and other goods coming from epidemic area
3. Contact or close contact with infected persons
4. Respiratory droplets of infected persons
5. While touching surfaces around infected persons and things used/touched by infected persons
6. No/No responses

Q210 Can you tell me symptoms of coronavirus disease?
1. Fever
2. Headache
3. Dry cough
4. Running stuffy nose
5. Sore throat
6. Loss of smell and taste
7. Tiredness
8. Diarrhea
9. Shortness of breath
10. No symptoms
11. No/ No responses

Q211 Perceived Invulnerability

SN		Strongly Disagree	Disagree	Not sure	Agree	Strongly Agree
1	I am less likely than most people to get COVID-19					
2	People like me don't get COVID-19					
3	My body could fight off COVID-19 infection					
4	There is little chance that I could get or spread COVID-19 from what I do in my everyday life					

Q212 Perceived Susceptibility

SN		Strongly Disagree	Disagree	Not sure	Agree	Strongly Agree
1	I am likely to be infected with corona virus					
2	My family members are likely to be infected with corona virus					
3	People coming from India or foreign and persons close contact with them are more likely to be infected with corona virus					
4	I will be infected with corona if I visit visit family members of infected persons					
5	Corona virus can easily transmit in crowded place					

Q213 Perceived Severity

SN	Statement	Strongly Disagree	Disagree	Not sure	Agree	Strongly Agree
1	I may die if get infected with coronavirus					
2	Corona is fetal and danger disease					
3	It makes serious illness only older, weak and already ill persons					
4	Young and healthy people are less likely to be ill even if they get infected					
5	If I were infected with corona virus, I will recovery without treatment					

Q214 Perceived Barriers

SN	Statement	Strongly Disagree	Disagree	Not sure	Agree	Strongly Agree
1	I cannot wash hand with soap frequently due to lack of hand washing facilities					
2	I cannot use hand sanitizer regularly					
3	I cannot use facemask properly and regularly					
4	My family cannot afford to buy sanitizer and facemask all family members					
5	I cannot maintain physical distance in market and work place					
6	Always forget about hand hygiene, physical distance and covering nose and mouth					

Q215 Perceived Benefits

SN	Statements	Strongly Disagree	Disagree	Not sure	Agree	Strongly Agree
1	Hand hygiene (frequent hand washing/frequent use of sanitizer) will protect me completely from coronavirus infection					
2	I feel safe from infection by cleaning hands and wearing mask					
3	Physical distancing protects from corona infection					
4	Feel safe from infection by applying societal spacing					

Q216 Perceived Self-Efficacy

SN	Statements	Strongly Disagree	Disagree	Not sure	Agree
1	I will eat healthy diet to prevent the coronavirus infection				
2	I can wash hand frequently to prevent the coronavirus infection				
3	I can prevent myself from coronavirus infection by applying protective measures/guidelines				
4	I will not go outside home/crowded area unless I have essential/urgent work				
5	I can use facemask properly while going to market/crowded area				
6	I will maintain physical distance while going to market/bank and workplace				

Perceive level of effectiveness

Q217 How effective do you think washing your hands more frequently would be in preventing the disease?
   0. Do not know
   2. Not at all effective
   3. A little effective
   4. Moderately effective
   5. Very effective

Q218 How effective do you think wearing a face mask would be in preventing disease?
   0. Do not know
   2. Not at all effective
   3. A little effective
   4. Moderately effective
   5. Very effective

Q219 How effective do you think isolating yourself from others/social distancing would be in preventing disease?
   0. Do not know
   2. Not at all effective
   3. A little effective
   4. Moderately effective
   5. Very effective

Q220 Perceptions on Quarantine

SN	Statement	Agree	Disagree	Not sure/No idea
1	Home quarantine/isolation for suspected case is essential to prevent spread of coronavirus			
2	Home isolation of infected cases/suspected cases can help to prevent the spread of the disease			
3	All the people coming from India/Abroad should be kept in quarantine for 14 days			
4	Existing quarantine center cannot control the spread of coronavirus infection due to poor management			

Q221 Intention to take precautionary action

SN	Statement	Strongly Disagree	Disagree	Not sure	Agree	Strongly Agree
1	I intend to practice social/physical distancing					
2	I intend to wash my hands frequently					
3	I intend to buy and wear a surgical mask					

Section III: Protective Behaviour

Q301 Do you wash hand with soap and water daily?
      1. Yes
      0. No

Q302 When do you wash hand with soap and water?
      1. Before meal
      2. After using toilet
      3. After touching surface, materials or public transportation touched or used by others
      4. After returning home from outside/market/workplace
      5. After touching animal/pets
      6. After caring sick persons or visiting clinic/hospital

Q303 How many times do you wash your hands with soap and water in a day?

Q304 Do you wash your hands more frequently than usual?
      1. Yes
      0. No

Q305 What problem are you facing to wash hand with soap frequently?
      1. Hand washing facilities are not available outside home/public place/workplace
      2. Soap is not always available at hand washing place
      2. Lack of money to buy soap
      3. No need to wash unless there is visible dirt on hands
      4. It is not convenient to wash hand frequently

Q306 How often do you use face mask while going outside home?
      1. Always
      2. Often
      3. Rarely
      4. Never

Q307 How often do you cover your nose and mouth while coughing and sneezing?
      1. Always
      2. Often
      3. Rarely
      4. Never

Q308 How often do you use hand sanitizer?
      1. Always
      2. Often
      3. Rarely
      4. Never

Q309 How often do you maintain physical distance of one meter in public and work place?
      1. Always
      2. Often
      3. Rarely
      4. Never

Q310 What measuring are you currently taking to protect yourself from coronavirus infection?
      1. Washing hands more frequently
      2. Using hand sanitizer
      3. Wearing face mask
      4. Avoiding touching eyes, nose and mouth with hand/fingers
      5. Using disinfectant to clean surface of house/room
      6. Giving more attention to cleanliness
      7. Avoiding crowed place/large gathering
      8. Maintaining physical distance
      9. Avoiding close contact with suspected persons or persons having flu like symptoms
      10. Avoiding/reducing travel by public transportation
      11. Eating balanced and healthy diets

12. Drinking hot water daily
13. Using herbal drinking

Q311 What will you do if you experience some symptoms of coronavirus disease in future?
1. Continue my work
2. Stay at home and isolate myself to protect others
3. Not tell anybody about it to avoid discrimination/stigma
4. Report my condition to the nearest healthcare provider/health facility
5. Drink hot water/turmeric water
6. Use herbal drink
7. Do not know

Q312 Had any of your family member suffered coronavirus disease?
1. Yes, conformed by test
2. Yes, suspected
3. No

Q313 Have you ever infected with coronavirus disease??
1. Yes, conformed by test
2. Yes, suspected
3. No

Section IV: Intention towards vaccine

Q314 Do you want to use/inject vaccine if available?
1.   Yes
2.   No

Q315 If yes, in which condition would you take vaccine?
1.   if available at free of cost
2.   I would pay if available
3.   I will decide after vaccine available
4.   Others…

Q316 How much rupees do you want to pay for vaccine against COVID-19? Amount in (Nepali Rupee per individual)
…….
Name of Enumerator ………….