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## Knowledge, practices and compliance related to COVID-19 among Nepalese population in Province 2, Nepal

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### ABSTRACT

**Aim:** The study aimed to access the knowledge, practice, and compliance related to COVID-19 among people residing in Province 2, Nepal.

**Materials and methods:** A descriptive cross-sectional study was conducted from October 2020 to March 2021. A total of 457 participants of eight districts of Province 2 were enrolled after obtaining consent. Data were collected by face-to-face interviews with participants. A total of 31 validated pre-structured questionnaires were asked to participants in which 11 questions were for knowledge, 12 questions were for practices, and 8 questions were for compliance related to COVID-19. For tool validation, pre-testing was done in 10.0% of individuals of the targeted study population of Mahottari district.

**Results:** Out of 457 participants, 353(77.2%) were male. The majority of the participants were unmarried (68.3%), had only school-level education (26.5%), Hindu by religion (89.7%), farmers (23.0%), and businessmen (23.0%). More than 75.0% of individuals had knowledge about the causative agent of COVID-19 symptoms and the purpose of isolation. About 53.8% of participants had good knowledge of social distancing, 31.1% had knowledge of masks, and 39.3% knew about sanitizer. Moreover, 94.3% of the respondents had good knowledge of hand-washing practice with soap-water and use of sanitizer, 89.1% had good knowledge of wearing masks and 82.9% followed social distancing. Compliance with standard procedures of sneezing was recorded in 43.1%, washing hands with soap water/sanitizer was 82.3%, and disposal of masks was 53.6%. A significant association was observed between gender with knowledge and compliance ( $p < 0.05$ ). District-wise association with knowledge, practice and compliance was found to be significant ( $p < 0.05$ ).

**Conclusion:** The findings suggest that participants have a good level of knowledge; however, the practice and compliances are considerably low related to COVID-19.

### 1. Introduction

Coronavirus disease (COVID-19) is caused by Severe Acute Respiratory Syndrome Corona Virus 2 (SARS-CoV-2) came with a total surprise in late 2019. It caused significant morbidity and mortality in humans, the virus allegedly transferred from bat [1]. The burden of COVID-19 is equal in both developed and developing countries. World Health Organization (WHO), Center for Disease Control and Prevention (CDC), and local governments have made specific guidelines to prevent the infection [2–4]. However, SARS-CoV-2 has been appeared at different time intervals in different countries with several mutations and become more infectious [5,6]. The SARS-

CoV-2 virus is easily transmitted airborne through respiratory secretions (generated via coughing and sneezing) of infected individuals, both symptomatic and asymptomatic individuals [7,8]. People can also get infection via the hands by touching surfaces contaminated with the virus or touching infected person's face (e.g., eyes, nose, and mouth) [9]. Globally, governments of different countries have imposed lockdowns at different time intervals to reduce the spread of infection [10,11]. Also, imposed strict rules such as use of face masks, maintain social distance, and follow periodic hand washing or using hand sanitizers, avoiding social gatherings, etc. However, the only use of the masks and social distancing are not enough to control the virus spread in communities. Proper knowledge

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about COVID-19, mode of transmission, preventive and precaution methods also play an important role to break the chain of virus transmission [12–14]. In addition, personal protective attitude and good practice and adequate knowledge are essential to curtail the current pandemic and the future waves of COVID-19 [15].

As of 7th January 2022, there were over 831 thousand confirmed cases of COVID-19 in Nepal with 813,709 recovered cases and more than 11,602 deaths [16]. Thus, it is essential to adhere to the recommended preventive measures by health authorities. In Nepal, several factors such as porous borders, mass gathering, and poor health care system have been responsible for the increased morbidity [17]. The Government of Nepal has urged to adopt social distancing, mask, and sanitizer (SMS) measures via audiovisual aid, radio jingle, etc. however, adherence to the safety measures are directly associated with knowledge, practice, and compliance (KPC) toward COVID-19 [15]. Nepal is a low-income country, has a limited health care facilities. Adequate knowledge about COVID-19 good practices and regulatory compliances could reduce the morbidity associated to the diseases. Thus, the present study aimed to investigate the KPC related to COVID-19 among Nepalese people of Province 2.

## 2. Materials and Methods

### 2.1. Study design and study site

A cross-section community-based study was conducted among 18 and above age population residing in Province 2, Nepal from October 2020 to March 2021. Province 2 is Nepal's second most populous and smallest province and has 8 districts namely Sarlahi, Dhanusha, Bara, Rautahat, Saptari, Siraha, Mahottari and Parsa. It is located in the Southeastern region of Nepal with Province 1 to the east, Province 3 (Bagmati Pradesh) to the north, and India to the south between 84,027' & 86,054'30" East longitude and 26,023'38" & 27,028'17" North latitude. It has the lowest literacy rate according to human development index, Nepal [18].

### 2.2. Sample size

Non-probability sampling technique was used for convenient data generation. The sample size was calculated using the formula  $n = Z^2\alpha/2pqN/e^2 (N-1) + Z^2\alpha/2pq$ , where,  $\alpha/2 =$  level of significance at 95% confidence interval (or 5% level of significance),  $Z\alpha/2 = 1.96$ .  $P =$  proportion/prevalence of awareness about COVID-19 which is supposed to be 50%, thus  $p = 0.5$ ,  $q = 0.5$ ,  $N =$  Total population size of the study area,  $e =$  maximum allowance error which is assumed at 0.05. According to the Election of Members of the House of Representatives 2074 B.S. booklet, the total population of Province 2 was 2,807,378 [19]. After calculation, the minimum sample size was found to be 418. During the data collection period, we had approached 711 individuals to participate in this study but 457 individuals agreed to participate, thus the response rate was 64.2%. All data were collected by trained epidemiologists, pharmacists and enumerators.

### 2.3. Data collection

Around 10–15 min of face-to-face home interviews (community-based survey) were taken by the experienced enumerators following all the safety measures. Previously published articles related to COVID-19 indexed in PubMed, Medline, Scopus, Hinari, etc., were selected after an extensive review of the literature and following Nepal Health Research Council (NHRC), WHO and CDC guidelines for the development of questionnaires. The developed questionnaires were validated by experts such as epidemiologist, virologist, and public health professionals. The questionnaires were divided into two parts, one for demographic characteristics and another part for KPC associated with SMS. For demographic characteristics, 8 questions were asked. To access the KPC, 31 questionnaires were asked and questionnaires were further divided into three parts for knowledge (11), practices (12) and compliances (8). The drafted questionnaires were pre-tested on 42 individuals (10% of the population size) who were residing

in the Mahottari district. For knowledge, it consisted of 11 multiple-choice questions. The correct answer was given '1' point and an incorrect answer was given '0' point. The score ranged from 0 to 10, for knowledge, score of  $\geq 7$  was considered good. Also, attitudes and compliances consisted of 4 points Likert scale. Participants' response was from 5 to 25 and higher scores denoted a better attitude and compliances. Score  $\geq 18$  was rated as high, and  $\leq 17$  was rated as low for practice and compliances. For practices and compliances, 70.0% cut-off value was used on the basis of previously published studies [20–22]. The study tool was originally written in English and then translated into Nepali by an expert. For those participants who did not understand these two languages (English and Nepali), the data collector translated the questions into their understandable languages such as Maithili, Bhojpuri and Hindi. Respondents were not allowed to participate in the survey multiple times.

### 2.4. Ethical approval

The ethical approval was taken from the Ethical Review Board (Protocol registration number:624/2020P) of Nepal Health Research Council (NHRC), Kathmandu with reference number 968. Written and verbal consent were obtained from the participants and their personal information and response were kept confidential.

### 2.5. Data analysis

All data were entered and analyzed using SPSS version 20. Categorical variables were summarized through frequencies and percentages in tables. Continuous variables were expressed as means and their standard deviations. Chi-squared test and *t*-test were applied to generate data for non-parametric questions and to find the correlation between non-parametric variables. A *P*-value of less than 0.05 was considered statistically significant.

## 3. Results

### 3.1. Demographic characteristics

The majority of participants were male and 21.0% were illiterate. The majority of participants were Hindus followed by Muslims and Buddhists. Around 50.0% of the participants were involved in business and agriculture. Interestingly, in female participants, 50.0% were housewives. Income-wise and age-wise distribution and other information regarding participants are shown in Table 1.

### 3.2. Knowledge of COVID-19 among respondents

In this study, we had selected the correct answer as "Knowledge" and the rest options as "No Knowledge". For those questions which have more than one correct answer, the same value was assigned for the correct one and indicated for "Knowledge". Participants had a good level of knowledge and understanding about COVID-19. The majority (78.8%) of the respondents had knowledge about microorganisms causing COVID-19 followed by knowledge on symptoms that appeared in the infection (78.3%). Participants had a good understanding of COVID-19 except for the knowledge about who should test for COVID-19. The details are shown in Table 2.

### 3.3. Practice related to COVID-19 among respondents

For practice related to preventive measures of COVID-19, it was found that 431 (94.3%) respondents washed their hands with soap water and used hand sanitizer from time to time. More than 83.8% of respondents sneezed in the right way (cover mouth and nose with a flexed elbow or tissue) as suggested by WHO and Ministry of Health and Population, Nepal, while 75.3% of the participants practiced wearing a mask while going outdoor or in crowded areas. It was found that in spite of having good knowledge and understanding of several aspects of COVID-19, 40.7% of the respondents had been involved in gatherings like marriage ceremonies,

**Table 1**  
Demographic characteristics of the participants (N = 457).

Variables	Frequency (n)	Percentage (%)
Gender		
Male	353	77.2
Female	104	22.8
Marital status		
Married	145	31.7
Unmarried	312	68.3
Education		
Illiterate	96	21.0
up to 5 (Primary)	55	12.0
up to 10 (Secondary)	121	26.5
+ 2 level (Intermediated)	102	22.3
Bachelor	64	14.0
Masters/PhD	19	4.2
Religion		
Hindu	410	89.7
Muslim	40	8.8
Buddhist	7	1.5
Occupation		
Business	105	23.0
Agriculture	105	23.0
Students	77	16.8
Others	61	13.3
Housewife	50	10.9
Government job	34	7.4
Daily wages	25	5.5
Income (NPRs)		
Up to 100,000	99	34.6
100,000 to 500,000	178	62.2
More than 500,000	9	3.1
Age in years		
Less than 20 years	63	13.8
20 to 29 years	144	31.5
30 to 39 years	102	22.3
More than 40 years	148	32.4

parties, meetings and programs during the lockdown. About 33.7% of respondents had reused masks, and only 17.1% had followed social distancing while moving outside as shown in Table 3.

**3.4. Compliance related to COVID-19 among respondents**

We had included 8 questions on compliance, and the correct answer according to WHO and the Government of Nepal guidelines was labeled for good compliance while the rest options were marked for bad compliance. Use of soap water and sanitizer time to time was found to be 94.3% and social distancing while going outdoor was 89.7% as shown in Table 4.

**Table 2**  
Knowledge of COVID-19 among study participants (N = 457).

Variables	Knowledge	No knowledge
	n(%)	n(%)
Which microorganism causes corona?	360(78.8)	97(21.2)
What are the symptoms of corona?	358(78.3)	99(21.7)
How long should a corona suspect is kept in isolation?	348(76.1)	109(23.9)
How is corona transfer from one person to another?	276(60.4)	181(39.6)
What precautionary measures should be taken to avoid infection from COVID-19?	270(59.1)	187(40.9)
What do you understand by sanitizer?	179(39.2)	278(60.8)
What do you understand by lockdown?	175(38.3)	282(61.7)
What do you understand by mask?	142(31.1)	315(68.9)
Who is more vulnerable to COVID-19?	138(30.2)	319(69.8)
Who should test for COVID-19?	29(6.3)	428(93.7)
What do you understand by social distancing?	246(53.8)	211(46.2)

**Table 3**  
Practice related to COVID-19 among study population (N = 457).

Variables	Bad Practice	Good Practice
	n(%)	n(%)
Do you wash hands with soap water and use sanitizer time to time?	26(5.7)	431(94.3)
How many times do you wash your hand with soap water and use sanitizer in a day?	186(40.7)	271(59.3)
What is your sneezing style?	383(83.8)	74(16.2)
Where do you use mask?	344(75.3)	113(24.7)
How do you dispose of the used mask?	212(46.4)	245(53.6)
Did you Involve in gathering like marriage ceremonies, parties, meetings and programs during lock-down?	185(40.5)	272(59.5)
Have you reused the mask?	303(66.3)	154(33.7)
What is your method of wearing mask?	130(28.4)	327(71.6)
Do you follow social distancing while moving outdoor?	78(17.1)	379(82.9)
Do you mask while roaming outdoor?	50(10.9)	407(89.1)
Do you wear mask and follow social distancing while going outdoor?	47(10.3)	410(89.7)
What do you use during hand washing?	23(5.0)	434(95.0)

**3.5. Association score**

Among the 30 questions related to KPC related to COVID-19, 10 questions were related to the knowledge on COVID-19. The Mean ± SD of knowledge score was 11.72 ± 1.75. There was a significant association with knowledge score on COVID-19 among respondents. Similarly, 12 questions were related to practice. The Mean ± SD of practice score was 7.46 ± 1.93. There was a significant association with practice scores on COVID-19 among respondents. Likewise, 8 questions were related to compliance. The Mean ± SD of the compliance score was 7.46 ± 1.93. There was a significant association with compliance score on COVID-19 among respondents of Province 2 which is shown in Table 5.

**3.6. Correlation between demographic variables and KPC**

Table 6 shows a significant association between gender with knowledge and compliance  $p < 0.01$ , and with practice, no significant association was observed. Furthermore, the correlation between age and knowledge of COVID-19 was significant i.e.  $p < 0.01$  and no significant relation with practice and compliance was observed. There was a significant association between KPC with education ( $p < 0.05$ ).

**3.7. District-wise association**

The majority (94.3%) of the respondents of Siraha district had knowledge regarding COVID-19 followed by Parsa (86.0%), Dhanusha (76.8%), Bara (66.0%), Rautahat (63.3%), Sarlahi (56.9%), Mahottori (50.0%), Saptari (44.0%) respectively. Data showed that there was a significant

**Table 4**  
Compliance related to COVID-19 among respondents (N = 457).

Question on compliance	Bad Compliance	Good Compliance
	n(%)	n(%)
What is your sneezing style?	260(56.9)	197(43.1)
Do you wear mask and follow social distancing while going outdoor?	47(10.3)	410(89.7)
Do you wash your hand with soap water and use sanitizer time to time?	26(5.7)	431(94.3)
How do you dispose of the used mask?	212(46.4)	245(53.6)
How many people around you had used masks?	307(67.2)	150(32.8)
Did you involve in gathering like marriage ceremonies, parties, meetings and programs during lock-down?	185(40.5)	272(59.5)
What do you use during hand washing?	81(17.7)	376(82.3)
Did you find hand-wash station outside?	242(53.0)	215(47.0)

**Table 5**  
Mean score of knowledge, practice and compliance (N = 457).

Mean score	Mean	SD value	t-value	Sig. (2-tailed)
Knowledge score	11.72	1.75	143.18	<0.001
Practice score	7.46	1.93	82.62	<0.001
Compliance score	1.42	0.49	61.59	<0.001

**Table 6**  
Correlation between gender, education and age with knowledge, practices and compliances related to COVID-19.

Variables	Frequency n(%)	Knowledge n = 311 (%)	Practice n = 253 (%)	Compliance n = 195 (%)
Gender				
Male	353 (77.2)	250(70.82)	201(56.94)	156(44.19)
Female	104 (22.8)	61(58.65)	52(50)	39(37.5)
<i>p-value</i>		0.019	0.212	0.226
Education				
Illiterate	96 (21.0)	89(71.90)	71(58.67)	63(52.06)
up to 5 (Primary)	55 (12.0)	54(84.37)	50(78.12)	42(65.62)
up to 10 (Secondary)	121 (26.5)	32(33.33)	39(40.625)	15(15.625)
+ 2 level (Intermediated)	102 (22.3)	30(54.54)	23(41.8)	16(29.09)
Bachelor	64 (14.0)	87(58.29)	57(55.88)	47(46.07)
Masters/PhD	19 (4.2)	19(100)	13(68.42)	12(63.15)
<i>p-value</i>		<0.001	<0.001	<0.001
Age in years				
Less than 20 years	63 (13.8)	46(73.01)	32(50.7)	30(47.6)
20 to 29 years	144 (31.5)	113(78.47)	90(62.5)	68(47.2)
30 to 39 years	102 (22.3)	66(64.7)	55(53.9)	43(42.15)
More than 40 years	148 (32.4)	86(58.10)	76(51.35)	54(36.48)
<i>p-value</i>		0.002	0.208	0.243

association between respondents of 8 different districts with their KPC regarding COVID-19, i.e.,  $p < 0.001$  as shown in Table 7.

#### 4. Discussion

An unprecedented outbreak of COVID-19 has created a significant burden on public health, around 267,400,826 cases and 5,286,789 deaths were reported (12th December 2021) [23]. Limited supportive therapies like immunosuppressive agents, antibodies, plasma therapy, antibiotics, vitamins, and antiviral drugs have been used by clinicians [24]. Globally, Governments have imposed rules, awareness programs, and lockdowns on the public to break the chain of virus transmission. However, until now, no country has effectively eradicated the virus. So far, everyone is depending upon the vaccination for protection.

Nepal is a low-income country with limited trained manpower and inadequate health care facilities [25]. The Government of Nepal has also imposed different approaches such as awareness programs, social distancing, use of face masks and hand washing, and periodic lockdown to curb the spread of COVID-19 [26]. In this study, male respondents were higher in number and most of the participants were unmarried. More than 75.0%

of participants had good knowledge about COVID-19 agents, main symptoms and reasoning of isolation. A study has suggested that Nepalese students had good knowledge of COVID-19 [27]. Also, another study emphasized that >90.0% of participants were aware of the agent, route of transmission and clinical symptoms and 75.0% had knowledge about serious outcomes of COVID-19 in underlying clinical conditions [28]. Furthermore, a national survey found that 76.0% of frontline workers had adequate knowledge, 54.7% had a positive attitude, and 78.9% had appropriate practice related to COVID-19 [29]. Globally, social distancing is the most compelling approach to reduce respiratory virus transmission in the community [30]. Adequate knowledge and understanding of COVID-19 could help to minimize the SARS-CoV-2 transmission in the community. It was noted that adequate knowledge of health is associated with a positive attitude towards behavior in COVID-19[31–33]. In our study, 53.8% of participants had good knowledge of social distancing. The high level of knowledge in participants could be due to the awareness program overseen by the Government of Nepal through mobile phones, TV, radio, newspapers, social media, etc.

In this study, practices related to the prevention of COVID-19, 94.3% of participants were good for hand-washing with soap water, 95.0% using sanitizer and 82.9% following social distancing. A similar study showed that 85.7% of participants wash their hands after sneezing or coughing and 93.7% cover their mouth and nose with elbows or tissue during sneezing and coughing [34]. In our study, the correlation of gender and age-wise distribution with practice was statistically insignificant while the correlation of education level with practice was found significant ( $p < 0.001$ ). However, another study showed that there was a significant association of gender and education level with the practice of touching face parts [35]. This may be due to the knowledge being directly related to practice in general public. In order to reduce COVID-19 morbidity, a high level of compliances is required, and low-level compliances may be to fatigue and reluctance caused by long-term lockdown and deprived economic status [36]. In our study, 43.1% had good compliance with the sneezing style, 82.3% had good compliance of washing hands with soap water/sanitizer, and 53.6% had good compliance with the use of disposal masks. In spite of strict lockdown and restriction, 59.5% of the respondents participated in gatherings like marriage, party meetings, and programs. With regards to compliances, the association between gender and age with compliance was insignificant ( $p > 0.2$ ), while with education, it was found significant ( $p < 0.001$ ). A study from Ethiopia showed that overall compliance was 55.0% towards the prevention and control of SARS-CoV-2[37]. In our study, we found that mean  $\pm$  SD of knowledge score was  $11.72 \pm 1.75$ , mean  $\pm$  SD of practice score was  $7.46 \pm 1.93$  and mean  $\pm$  SD of the compliance score was  $7.46 \pm 1.93$  related to COVID-19. District-wise association of KPC was found significant ( $p < 0.001$ ). In Siraha district, KPC found the highest level 94.3%, 84.3% and 77.1% respectively.

Meanwhile, the community spread of SARS-CoV-2 might be high due to negligence and poor practice of non-pharmaceutical measures. The bad compliance of sneezing style may increase the COVID-19 droplets in the air and spread the infection. Various misconceptions related to masks and sanitizer, lack of proper communication about the standard guidelines and methods might be the reasons behind the lesser practice of SMS despite

**Table 7**  
District-wise knowledge, practice and compliance score and its association with COVID-19.

District name	No knowledge n (%)	Knowledge n (%)	Low practice n (%)	High practice n (%)	Low compliance n (%)	High compliance n (%)
Bara (N = 50)	17(34.0)	33(66.0)	28(56.0)	22(44.0)	34(68.0)	16(32.0)
Dhanusha (N = 69)	16(23.2)	53(76.8)	29(42.0)	40(58.0)	45(65.2)	24(34.8)
Mahottari(N = 68)	34(50)	34(50)	40(58.8)	28(41.2)	51(75.0)	17(25.0)
Parsa (N = 50)	7(14.0)	43(86.0)	10(20.0)	40(80.0)	27(54.0)	23(46.0)
Rautahat (N = 49)	18(36.7)	31(63.3)	24(49.0)	25(51.0)	29(59.2)	20(40.8)
Saptari (N = 50)	28(56.0)	22(44.0)	20(40)	30(60)	23(46.0)	27(54.0)
Sarlahi (N = 51)	22(43.1)	29(56.9)	42(82.4)	9(17.6)	37(72.5)	14(27.5)
Siraha (N = 70)	4(5.7)	66(94.3)	11(15.7)	59(84.3)	16(22.9)	54(77.1)
Total	146(31.9)	311(68.1)	204(44.6)	253(55.4)	262(57.3)	195(42.7)
$\chi^2, p-value$	59.1, $p < 0.001$		74.4, $p < 0.001$		54.5, $p < 0.001$	

having good knowledge. This study was limited only to adult individuals residing in Province 2 and data generated from this report does not represent the entire population of Province 2.

## 5. Conclusion

This study provides a comprehensive assessment of KPC related to COVID-19 among the public of Province 2. Participants have a good level of knowledge of COVID-19 but lesser preventive practices and compliances. More prompt and strict implementation of public health policies and programs including extensive awareness programs are necessary to manage similar crises in the future.

## Data availability

The authors agree that anyone interested in accessing the raw data from the research can be provided upon reasonable request.

## Author's contribution

PS, AKM and BS were responsible for the overall study design, data collection, and data analysis. SKY and SKS were responsible for study modification and data collection. BS performed the literature review and drafted the manuscript. BS and PS performed the manuscript writing and data validation. MG and SKK provided critical comments on the draft. All authors have read and approved the final manuscript.

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## Declaration of Competing Interest

No conflict of interest.

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