Cross-sectional Study

Knowledge, attitude, and practice of Nepalese residents in the prevention and control of COVID-19: A cross-sectional web-based survey

Manish Rajbanshi, Sandesh Bhusal, Kiran Paudel, Bikram Poudel, Amrit Gaire, Erina Khatri, Bhoj Raj Kalauni, Biplav Aryal, Ghanashyam Sharma, Namrata Karki

* Institute of Medicine, Tribhuvan University, Maharajgunj, Kathmandu, Nepal
b Research and Development Division, Dhulikhel Hospital, Kathmandu University, Nepal
c Nepal Health Frontiers, Tokha-5, Kathmandu, Nepal
d The Leprosy Mission, Nepal

e-mail addresses:
sandeshbhusal86@gmail.com, sandeshbhusal86@iom.edu.np (S. Bhusal).

ABSTRACT

Background: Coronavirus disease 2019 (COVID-19) has caused a global public health crisis. Preventive measures to tackle the deadly virus are influenced by people’s knowledge, attitude, and practice (KAP) toward COVID-19. This study aimed to assess the level of knowledge, attitude, and practice toward COVID-19 among Nepalese residents in Nepal.

Methodology: A web-based cross-sectional survey was conducted among 755 Nepalese residents across all seven provinces of Nepal. The questionnaire used to determine the KAP of the participants was derived from a previous study conducted in Nepal. Descriptive analysis was done to identify the distribution of socio-economic and demographic characteristics of participants. Factors associated with residents’ KAP regarding COVID-19 were examined using Chi-square tests at the significance level of 0.05.

Results: The mean age of the participants was 24.6 years. At the time of data collection, 8.2% of the participants had their families in isolation or quarantine center. In this study, 76.4%, 58.0%, and 63.6% of the participants had a good knowledge level, attitude level, and practice level respectively regarding COVID-19. Occupation and marital status were significantly associated with knowledge, attitude, and practice level. Age was significantly associated with knowledge and attitude level. Those participants who had their family members in quarantine were found to have a good level of preventive practice. The knowledge-attitude (r = 0.184, p < 0.001), attitude-practice (r = 0.125, p < 0.001) and knowledge-practice (r = 0.07, p < 0.05) were positively correlated in this study.

Conclusion: This study showed satisfactory awareness regarding COVID-19 among Nepalese residents. Community-based health education programs should be promoted to develop a positive attitude toward healthy practices to tackle the COVID-19 pandemic or any future health crisis.

1. Introduction

Coronavirus disease 2019 (COVID-19) is a global public health emergency detected on December 31, 2019, in Wuhan, China [1]. Nepal is no exception to this pandemic, with overwhelming effects on its economy and healthcare system [2,3]. Following the World Health Organization (WHO) declaration of the COVID-19 outbreak, countries around the globe, including Nepal, have been leaning on response plans to respond to the pandemic and contain the virus [4].

As of July 3, 2022, 979,694 cases and 11,952 deaths of COVID-19 had been reported in the country despite adopting preventive measures like stay-at-home mandates, quarantine, and social distancing [5]. The success or failure of these preventive measures implemented by the country or concerned organizations like WHO is largely dependent on public behavior [6]. Studies conducted during the early phase of the COVID-19 pandemic have shown that public knowledge, attitude, and practice toward the virus are important in tackling the pandemic [7]. By assessing public awareness and knowledge about COVID-19, deeper insights into existing public perception and practices can be gained, thereby helping to identify attributes that influence the public in
adapting healthy practices and responsive behavior [8].

Several studies have suggested a need to investigate the KAP towards COVID-19 among residents of low socioeconomic status countries like Nepal to encourage an optimistic attitude and maintain safe practices [9]. Assessing the public’s knowledge, attitude and practice are also important in identifying gaps and strengthening ongoing preventive efforts.

Therefore, this study aims to assess the KAP toward COVID-19 among the general public of Nepal. These findings are anticipated to aid authorities in better organizing public awareness programs to eliminate COVID-19-related myths and malpractices, potentially resulting in the disease being curtailed.

2. Materials and methodology

2.1. Study design and setting

A web-based cross-sectional study was carried out in all of the seven provinces in Nepal. Data were collected from the 10th to the 30th of December 2020.

2.2. Study population and sampling

The study population was Nepalese residents (aged 18 years or above) across all the seven provinces of Nepal during COVID-19 pandemic. A convenience sampling procedure was adopted to collect the data. A total of 755 participants were recruited in the survey.

2.3. Measures

The study questionnaire was derived from the study conducted by Hussain et al. in the early phase of the COVID-19 pandemic in Nepal [10]. The online questionnaire consists of two sections, first is related to the socio-economic and demographic characteristics of the participants that includes; sex (male/female), age (in years), marital status (married/unmarried), occupation (health/non-health sector), family monthly income (≤ NRs. 40,000 (USD 310) and > NRs. 40,000 (USD 310)), and family member in quarantine or isolation (Yes/No).

The second section consists of questions on KAP on COVID-19. Altogether there were a total of 28 questions including 15 on knowledge, 6 on attitude, and 7 on practice. Knowledge-related questions were regarding cause, symptoms, transmission mode, incubation period, vulnerable group, and preventive measures. Attitude-related questions were regarding control of COVID-19, alcohol drinking as a protective measure, self-protection, and effectiveness of lockdown. Similarly, practice-related questions were regarding mask use, hand washing, social distancing, and following lockdown. Evaluation of knowledge, attitude, and practice was done by assigning ‘1’ for positive/correct answers and ‘0’ for negative/incorrect answers. A score of 13 or above was considered as a good knowledge level while respondents’ scores of 5 or above were considered good attitude levels. Similarly, a score of 5 or above was considered a good practice level in our study.

This study has been reported in line with the STROCSS criteria [11].

2.4. Data collection

Online Google forms questionnaire was administered to the participants through social media platforms to collect the data. Single response from each student was ensured via Google Forms by choosing ‘Limit to 1 response’.

2.5. Data management and analysis

Data from the Google forms were automatically recorded in Google sheets. All the collected information was systematically compiled, coded, checked, and edited before exporting to Statistical Package for the Social Sciences (SPSS) version 20 (IBM) for analysis. The respondents’ socio-economic and demographic characteristics were described using frequencies and percentages. Chi-square tests were performed to establish the association of KAP and demographic variables as appropriate. Pearson coefficient of correlation was used to determine the relationship between knowledge-attitude, attitude-practice, and knowledge-practice. The statistical significance was set at p-value < 0.05.

2.6. Ethical approval

The approval for this study was taken from the Institutional Review Committee, of the Institute of Medicine [Ref no: 109(6-1) E2077/078]. Study objectives were explained in the Google forms, and e-informed consent was taken from all the participants before the data collection (UIN no. researchregistry6325).

3. Results

3.1. Characteristics of the study participants

A total of 755 Nepalese residents participated in the study. An almost equal proportion of males (50.6%) and females (49.4%) participated in the study. The majority of the participants (68.6%) belonged to the age group below 25 years. Half of the participants were Brahmin/Chhetri (49.4%) ethnic group followed by Janajati (30.6%). In this study, more than one third of the participants were from Province One (38%) followed by Bagmati Province (23.6%) (Table 1).

| Table 1 Characteristics of the study participants. |
|-----------------------------------------------|
| Characteristics                  | Numbers (n) | Percentage (%) |
|-----------------------------------------------|
| Sex                               |              |                |
| Male                             | 382          | 50.6           |
| Female                           | 373          | 49.4           |
| Age group (in years)             |              |                |
| Below 25                         | 518          | 68.6           |
| 25 or above                      | 237          | 31.4           |
| Ethnicity                        |              |                |
| Brahmin/Chhetri                  | 373          | 49.4           |
| Janajati                         | 231          | 30.6           |
| Mulheshi                         | 121          | 16.0           |
| Others                           | 30           | 4.0            |
| Religion                         |              |                |
| Hindu                            | 691          | 91.5           |
| Others                           | 64           | 8.5            |
| Marital status                   |              |                |
| Married                          | 128          | 17.0           |
| Unmarried                        | 627          | 83.0           |
| Occupation                       |              |                |
| Health sector                    | 315          | 41.7           |
| Non-Health sector                | 440          | 58.3           |
| Province                         |              |                |
| Province no. 1                   | 287          | 38.0           |
| Madheshi Province                | 98           | 13.0           |
| Bagmati Province                 | 178          | 23.6           |
| Gandaki Province                 | 45           | 6.0            |
| Lumbini Province                 | 82           | 10.9           |
| Karnali Province                 | 14           | 1.9            |
| Sudurpaschim Province            | 51           | 6.8            |
| Monthly income of the family     |              |                |
| Below or equal to NRs.40,000 (USD 310) | 205        | 27.2           |
| Above NRs.40,000 (USD 310)       | 550          | 72.8           |
| Family members in quarantine or isolation |          |                |
| Yes                              | 62           | 8.2            |
| No                               | 693          | 91.8           |
3.2. Factors associated with knowledge of COVID-19 among the participants

Table 2 shows that 76.4% of the Nepalese residents demonstrated a good knowledge level of COVID-19. The level of knowledge is significantly associated with age (OR = 1.49, CI: 1.05–2.12), sex (OR = 1.46, CI: 1.04–2.06), marital status (OR = 1.84, CI: 1.22–2.78), occupation (OR = 3.40, CI: 2.29–5.04) and monthly income of the family (OR = 1.50, CI: 1.0–2.24).

3.3. Factors associated with an attitude of participants towards COVID-19

In this study, 58% of the participants had a positive attitude level towards COVID-19. The attitude level of participants towards COVID-19 was found to be significant with age (OR = 1.89, CI: 1.38–2.58), marital status (OR = 1.72, CI: 1.17–2.52), and occupation (OR = 1.37, CI: 1.02–1.85) (Table 3).

3.4. Factors associated with the practice of participants toward COVID-19

In this study, almost two-thirds (63.6%) of the respondents demonstrated a good practice level towards COVID-19. Marital status (OR = 1.62, CI: 1.10–2.39), occupation (OR = 1.06, CI: 1.18–2.17) and family member in quarantine/isolation (OR = 0.58, CI: 0.34–0.98) were significantly associated to the practice level. (Table 4)

3.5. Correlation between knowledge, attitude, and practice of COVID-19

Table 5 shows that knowledge and attitude were positively correlated (r = 0.18) at <0.001 level of significance. While attitude and

Table 2
Factors associated with knowledge of COVID-19 among the participants.

| Characteristics                | Level of knowledge | p-value | Odds Ratio (95% CI) |
|-------------------------------|--------------------|---------|---------------------|
|                               | Good n (%)        | Poor n (%) |                   |
| Level of Knowledge            | 577 (76.4)        | 187 (23.6) |                   |
| Sex                           | Female            | 298 (79.9) | 279 (73.0)         | 0.03 | 1.46 (1.04-2.06) |
|                               | Male              | 103 (27.0) |                 |      |                |
| Age                           | Below 25          | 408 (78.8) | 110 (21.2)        | 0.02 | 1.49 (1.05-2.12) |
|                               | 25 or above       | 169 (68)  |                 |      |                |
| Marital status                | Unmarried         | 492 (78.5) | 135 (22.6)        | <0.001 | 1.84 (1.22-2.78) |
|                               | Married           | 85 (66.4)  |                 |      |                |
| Occupation                    | Health sector     | 277 (87.9) | 38 (12.1)        | <0.001 | 3.40 (2.29-5.04) |
|                               | Non- Health sector| 300 (68.2) | 140 (31.8)       |      |                |
| Monthly income of the family  | Above NRs. 40,000 | 410 (74.5) | 140 (25.5)       | 0.04 | 1.5 (1.0-2.24) |
|                               | USD 310           | 167 (81.5) | 38 (18.5)        |      |                |
|                               | Below or equal to | 110 (73.5) | 38 (26.5)        |      |                |
|                               | NRs.40,000 (USD   | 275 (81.5) | 65 (18.5)        |      |                |
|                               | 310)              | 167 (81.5) | 38 (18.5)        |      |                |

Table 3
Factors associated with an attitude toward COVID-19 among the participants.

| Characteristics             | Level of attitude | p-value | Odds Ratio (95% CI) |
|-----------------------------|-------------------|---------|---------------------|
|                             | Good n (%)        | Poor n (%) |                   |
| Level of Attitude           | 438 (58.0)        | 317 (42.0) |                   |
| Sex                         | Female            | 227 (60.9) | 146 (39.1)        | 1.22 | 1.2 (0.94-1.68) |
|                             | Male              | 211 (55.2) | 171 (44.8)        |      |                |
| Age in years                | Below 25          | 326 (62.9) | 192 (37.1)        | <0.001 | 1.89 (1.38-2.58) |
|                             | 25 or above       | 112 (47.3) | 126 (52.7)        |      |                |
| Marital status              | Unmarried         | 378 (60.3) | 249 (39.7)        | <0.001 | 1.72 (1.17-2.52) |
|                             | Married           | 69 (46.9)  | 68 (53.1)         |      |                |
| Occupation                  | Health sector     | 197 (62.5) | 118 (37.5)        | 0.03 | 1.37 (1.02-1.85) |
|                             | Non- Health sector| 241 (54.8) | 199 (45.2)        |      |                |
| Monthly income of the family| Below or equal to | 112 (54.6) | 93 (45.4)        | 0.28 | 0.82 (0.59-1.14) |
|                             | NRs. 40,000 (USD  | 326 (59.3) | 224 (40.7)       |      |                |
|                             | 310)              |           |                  |      |                |
| Family member in quarantine | Yes               | 41 (66.1)  | 21 (33.9)         | 0.18 | 1.45 (0.84-2.51) |
| or isolation                | No                | 397 (57.3) | 296 (42.7)       |      |                |

Table 4
Factors associated with the practice of COVID-19 among the participants.

| Characteristics             | Level of practice | p-value | Odds Ratio (95% CI) |
|-----------------------------|-------------------|---------|---------------------|
|                             | Good n (%)        | Poor n (%) |                   |
| Level of practice           | 480 (63.6)        | 275 (36.4) |                   |
| Sex                         | Male              | 232 (60.7) | 150 (39.3)        | 0.10 | 1.28 (0.95-1.72) |
|                             | Female            | 248 (66.5) | 125 (33.5)        |      |                |
| Age                         | Below 25 years    | 335 (64.7) | 183 (35.3)        | 0.37 | 1.16 (0.84-1.59) |
|                             | 25 or above       | 145 (61.2) | 92 (38.8)         |      |                |
| Marital status              | Unmarried         | 411 (65.6) | 216 (34.4)        | 0.01 | 1.62 (1.10-2.39) |
|                             | Married           | 69 (53.9)  | 59 (46.1)         |      |                |
| Occupation                  | Health sector     | 220 (69.8) | 95 (30.2)        | <0.001 | 1.60 (1.18-2.17) |
|                             | Non- Health sector| 260 (59.1) | 180 (40.9)       |      |                |
| Monthly income of the family| Below or equal to | 132 (73.5) | 73 (26.5)        | 0.79 | 1.05 (0.75-1.46) |
|                             | NRs. 40,000       | (64.4) |                  |      |                |
|                             | Above NRs. 40,000 | 348 (63.3) | 202 (36.7)       |      |                |
| Family member in quarantine | Yes               | 448 (64.6) | 245 (35.4)       | 0.04 | 1.72 (1.02-2.94) |
| or isolation                | No                | 32 (31.6)  | 16 (68.4)         |      |                |
Platforms. Media platforms during the lockdown period [15, 18]. Participants in the higher age group with a good knowledge score. This higher knowledge level among Nepalese residents compared to studies conducted in Saudi Arabia [14] and Jordan [15]. This study reported a better knowledge level among Nepalese residents compared to studies conducted in Syria [16] and Thailand [17].

Table 5
Correlation between knowledge, attitude, and practice of COVID-19.

|          | Knowledge | Attitude | Practice |
|----------|-----------|----------|----------|
| Knowledge | Pearson Correlation coefficient | 1 | 0.18** | 0.07** |
| Attitude  | Pearson Correlation coefficient | 0.18** | 1 | 0.12** |
| Practice  | Pearson Correlation coefficient | 0.07** | 0.12** | 1 |

** p-value less than 0.001.
* p-value less than 0.05.

Females had 1.46 times higher odds of having a good knowledge level compared to their male counterparts. Studies conducted in Jordan [15], Saudi Arabia [14], and China [9] showed similar results as in our study. The finding of significantly lower knowledge scores among males is in line with previous studies reporting men are less health-conscious and more likely to engage in risk-taking behavior [19,20]. In contrast to our study males demonstrated higher knowledge levels in a similar study conducted in Ethiopia [8]. In our study, unmarried participants had higher odds of having a good knowledge, attitude, and practice level towards COVID-19. The possible reason behind this could be unmarried respondents might have spent more time on social media and benefited from the different COVID-19-related information spread during the period. Another reason might be the unmarried population are usually involved in academic institution keep updating themselves on health information. In contrast to our finding, study conducted by Akalu et al. [10] showed higher knowledge among the married population.

In our study, participants belonging to the health sector had significantly higher odds of having good knowledge, attitude, and practice toward COVID-19. The findings of previous studies conducted in Nepal [10], Vietnam [21], and China [22,23] are consistent with our findings reflecting respondents from a health background had good knowledge scores. It may be due to health professionals being in an advantageous position to access and assimilate information on COVID-19 prevention and control [24]. This study showed knowledge level of a family with a higher income had greater odds of having good knowledge in comparison to a family with a lower income. This finding is supported by studies conducted in Syria [14], Pakistan [18], and Southern Ethiopia [8] where higher earners were more knowledgeable about COVID-19. People with higher socioeconomic levels are expected to have higher education levels and access to health information, this could be the reason behind higher knowledge of COVID-19 among those populations.

This study showed a better attitude level among Nepalese residents than the previous study conducted in Nepal [4], Ethiopia [13], and China [22]. These studies were conducted during the early phase of the COVID-19 pandemic, in that period information regarding COVID-19 was not accessible and available to the general population. So, people became more aware of COVID-19 and had a positive attitude level during the late period of the outbreak.

Almost 64% of the participants showed a good practice level in our study which is better than the study conducted among residents of Ethiopia [13]. It may be that the residents with good knowledge and a good attitude are more likely to follow good practices. Knowledge is the main modifier to bringing a positive attitude and then positive practice toward health among the public. Our study found better practice levels among the family having COVID-19 infected members. It might be that the family members are always more aware and conscious of transmission to prevent infection among the other family members.

This study showed a significant positive correlation between knowledge-attitude, knowledge-practice, and attitude-practice supporting the findings of similar studies conducted in Nepal [4], Bangladesh [25], and Syria [16]. A correlation between knowledge and practice was found to be weak, but it is hoped that it will lead to uncovering the cause of community disobedience in preventing COVID-19 transmission.

5. Strengths and limitations

This study included participants from all seven provinces of Nepal with a relatively bigger sample size (n = 755). Another strength of this study is that it was conducted during the peak of the COVID-19 pandemic in Nepal.

Despite its strength, this study has a few limitations. Firstly, all the measurements in this study were based on self-reports, which may have been prone to response and information bias. Secondly, this study was cross-sectional and, therefore, cannot demonstrate causality between the variables. Lastly, as this was a web-based survey, poor internet connection might have discouraged some participants to fill out the online questionnaire.

6. Conclusion

This study revealed a satisfactory level of knowledge, attitude, and practice toward COVID-19 during the pandemic. Based on these findings targeted community awareness intervention programs and effective health education that are aimed at improving knowledge, attitude, and practice toward disease outbreaks during the earliest phase to prevent further transmission might be useful. The findings may help local health authorities and policymakers to identify the target populations to conduct awareness programs in a future infectious disease outbreak. Collaborative efforts between health services providers, the ministry of health and population, local governments, development partners, and the media should be implemented as an effective tools that increase the KAP of individuals and households regarding infectious diseases like COVID-19.

Ethical approval

The approval for this study was taken from the Institutional Review Committee, of Institute of Medicine (Ref no: 109(6-1) E2077 /078. Study objectives were explained in the Google forms, and e-informed consent was taken from all the participants before the data collection.

Sources of funding

No funding was received for the study.
Author contribution
MR conceived the study, administered the project, conducted formal analysis, and wrote the first draft of the manuscript. SB and KP contributed in the methodology, formal analysis, writing original draft, reviewing, and editing. BP, EK, BRK, BA, AG, and GS wrote the first draft of the manuscript. NK supervised the whole study. All authors reviewed and approved the final version of the manuscript.

Consent
Study objectives were explained in the Google forms, and e-informed consent was taken from all the participants before the data collection.

Registration of research studies
1. Name of the registry: None
2. Unique Identifying number or registration ID: None
3. Hyperlink to your specific registration (must be publicly accessible and will be checked):

Guarantor
Sandesh Bhusal.

Provenance and peer review
Not commissioned, externally peer-reviewed.

Declaration of competing interest
Authors have no conflict of interest to declare.

References
[1] S. Rugarabamu, M. Ibrahim, A. Byanaku, Knowledge, Attitudes, and Practices (KAP) towards COVID-19: an Online Cross-Sectional Survey of Tanzanian Residents [Internet] [cited, medRxiv, 2021, p. 2020, 04.26.20080820. Available from: https://www.medrxiv.org/content/10.1101/2020.04.26.20080820v3. (Accessed 4 July 2022).
[2] L.M. Gir, K. Paudel, S. Bhushal, T.B. Adhikari, G. Gulis, Perceived stress, stigma, and social support among Nepali health care workers during COVID-19 pandemic: a cross-sectional web-based survey, PLOS Glob Public Health 2 (5) (2022 May 5), e0000458, https://doi.org/10.1371/journal.pghb.0000458. Available from:.
[3] K. Paudel, K. Paudel, E. Kham, B. Kory, B. Karkee, How does public knowledge, attitudes, and behaviors correlate in relation to COVID-19? A community-based cross-sectional study in Nepal, Front. Public Health 8 (2020), 589372, https://doi.org/10.3389/fpubh.2020.589372. Available from:.
[4] 62c164d40534b1_SitRep875_COVID-19_03-07-2022_EN.pdf [Internet] [cited 2022 Jul 4], Available from: https://covid19.mohp.gov.np/covid/englishSituationReport/62c164d40534b1_SitRep875_COVID-19_03-07-2022_EN.pdf.
[5] A. Gaire, B. Panthee, D. Basnyal, A. Paudel, S. Panthee, COVID-19 vaccine acceptance: a case study from Nepal, COVID 2 (8) (2022 Aug) 1014–1025, https://doi.org/10.1339/covid20200075. Available from:.
[6] J.A. Taddeese, Z.N. Arzene, M.W. Merid, A.G. Mulune, D.M. Geberu, G.M. Kassa, et al., Knowledge and attitude of the communities towards COVID-19 and associated factors among Gondar City residents, northwest Ethiopia: a community based cross-sectional study, PLoS One 16 (4) (2021 Apr 16), e0248021, https://doi.org/10.1371/journal.pone.0248021. Available from:.
[7] A. Joseph, A. Tamiso, A. Ejsjo, Knowledge, attitudes, and practices related to COVID-19 pandemic among adult population in Sidama Regional State, Southern Ethiopia: a community based cross-sectional study, PLoS One 16 (1) (2021 Jan 20), e0246283, https://doi.org/10.1371/journal.pone.0246283. Available from:.
[8] B.L. Zhong, W. Luo, H.M. Li, Q.H. Zhang, X.G. Liu, W.T. Li, et al., Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey, Int. J. Biol. Sci. 16 (10) (2020 Mar 15) 1745–1752, https://doi.org/10.7150/ijbs.45221. Available from:.
[9] A. Hussain, T. Garima, B.M. Singh, R. Ram, R.P. Tripti, Knowledge, attitudes, and practices towards COVID-19 among Nepalese Residents: a quick online cross-sectional survey, Asian J. Med. Sci. 11 (3) (2020 May 1) 6–11, https://doi.org/10.3126/ajms.v11i3.28485. Available from:.
[10] G. Mathew, R. Aga, STROCSS Group, S 2021: strengthening the reporting of cohort, cross-sectional and case-control studies in surgery, Int J Surg Lond Engl 96 (2021 Dec), 106165, https://doi.org/10.1016/j.ijsu.2021.106165. Available from:.
[11] A.A. Azlan, M.R. Hamzah, T.J. Serri, S.H. Ayub, E. Mohamad, Public knowledge, attitudes and practices towards COVID-19: a cross-sectional study in Malaysia, PLoS One 15 (5) (2020 May 21), e0233668, https://doi.org/10.1371/journal.pone.0233668. Available from:.
[12] Y. Akabi, B. Ayelign, M.D. Molla, Knowledge, attitude and practice towards COVID-19 among chronic disease patients at addis zemen hospital, northwest Ethiopia, Infect. Drug Resist. 13 (1949-60) (2020 Jun 24), https://doi.org/10.2147/IDR.S525736. Available from:.
[13] M.K. Al-Hunawi, K. Angawi, N. Alsharief, A.M.N. Qattan, H.Z. Helmy, Y. Adhawood, et al., Knowledge, Attitude and Practice COVID-19 Among the Public in the Kingdom of Saudi Arabia: A Cross-Sectional Study. Front Public Health [Internet] [cited, 2020, 0. Available from: https://www.frontiersin.org/article/10.3389/fpubh.2020.00217/full. (Accessed 4 July 2022).
[14] A.M. Al-Snadi, M.I. Tawalbeh, A. Asbeer, A. Shajrawi, O. Gammoh, N. Abu-Al-Rous, Public knowledge, attitudes, and practice about COVID-19 pandemic, J. Publ. Health Afr. 12 (2) (2021 Jan 29) 1519, https://doi.org/10.4081/jpha.2021.1519. Available from:.
[15] S. Al abdah, A. Al-shammari, A. Al-abdulhadi, A. Al-sherief, A. Ghamdi, A. Ab-Rahman, A. Al-Hussein, A. Al-Hammadi, A. Al-Shaibi, Knowledge, attitude and practice of COVID-19 among the residents of Jeddah city, Asia. Pac. J. Trop. Med. 13 (6) (2020 Jun 1) 260, https://doi.org/10.1111/jan.14718. Available from:.
[16] N. Duell, J. Steinberg, G. Icenogle, J. Chein, J. Rous, Public knowledge, attitudes, and practice about COVID-19 pandemic, J. Publ Health Afr. 12 (2) (2021 Jan 29) 1519, https://doi.org/10.4081/jpha.2021.1519. Available from:.
[17] K.D. Cobey, F. Lian, G. Stulp, A.P. Buunk, T.V. Pollet, Sex differences in risk taking behavior among Dutch cyclists, Evol. Psychol. 11 (2) (2013 Apr 1), 1470494113502020, https://doi.org/10.1177/1470494113502020. Available from:.
[18] F. Chirchir, T. Apidechukul, R. Tamorpark, F. Yeemard, S. Khunthason, S. Kitchanapalboon, et al., Knowledge, Attitude and Preparedness to Respond to the 2019 Novel Coronavirus (COVID-19) Among the Bordered Population of Northern Thailand in the Early Period of the Outbreak: A Cross-Sectional Study, 2020, https://doi.org/10.21190/smr.354066. Available from:.
[19] S. Tarig, S. Tariq, M. Baig, M. Saeed, Knowledge, awareness, and practices regarding the novel Coronavirus among a sample of a Pakistani population: a cross-sectional study, Disaster Med. Public Health Prep. 16 (3) (2022 Jun) 934–939, https://doi.org/10.1017/dmp.2020.408. Available from:.
[20] N. Duell, I. Steinberg, G. Icenogle, J. Chein, N. Chaudhry, L. Di Giunta, et al., in: Knowledge, Attitude and Preparedness to Respond to the 2019 Novel Coronavirus (COVID-19) Among the Bordered Population of Nepal and India During the Rapid Rise Period of the COVID-19 Outbreak: A Cross-Sectional Survey, 2020, https://doi.org/10.2139/ssrn.3546046. Available from:.
[21] M. Zhang, M. Zhou, F. Tang, Y. Wang, H. Nie, L. Zhang, et al., Knowledge, attitude, and practice regarding COVID-19 among healthcare workers in Henan, China, J. Hosp. Infect. 105 (2) (2020 Jun) 183–189, https://doi.org/10.1016/j.jhin.2020.04.012. Available from:.
[22] G. Huyhnh, T.N.H. Nguyen, V.K. Tran, K.N. Vo, V.T. Vo, L.A. Pham, Knowledge and attitude towards COVID-19 among healthcare workers at district 2 hospital, Ho Chi Minh city, Asian Pac. J. Trop. Med. 13 (6) (2020 Jun 1) 260, https://doi.org/10.4103/1995-7645.280396. Available from:.
[23] M. P. Ferdous, M.S. Islam, M.T. Sikder, A.S.M. Mousaddek, J.A. Zegarra-Valdivia, D. Goraz, Knowledge, attitude, and practice regarding COVID-19 outbreak in Bangladesh: an online-based cross-sectional study, PLoS One 15 (10) (2020 Oct 9), e0239254, https://doi.org/10.1371/journal.pone.0239254. Available from:.