



## Public Knowledge, Attitude, and Practice toward COVID-19 among the Iranian Population: A Systematic Review of the Literature

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### Abstract

**Background:** The COVID-19 pandemic has resulted in public health and humanitarian crises, affecting the health and livelihoods of people around the world. This study aims to investigate the knowledge, attitude, and practice (KAP) of the Iranian population and its related factors toward the COVID-19 pandemic.

**Materials and Methods:** In this systematic review, a search of online databases (Medline, EMBASE, Scopus, Web of Science, Cochrane Library, CIVILICA, and Google Scholar search engine) was conducted for related studies with no time limit up to July 2022. Two reviewers evaluated the quality of eligible studies. The quality of the information was evaluated using the STROBE tool.

**Results:** A total of 15 related studies were included. Overall, 73.17% of participants had appropriate knowledge (range: 56.5 to 73.17%), 72% had favorable attitudes (52.6-72%), and 91% had good practice (51.8-91%). Age, gender, marital status, number of households, education level, employment status, housewives, location of residence, social deprivation, and income level were determined as factors associated with the KAP of the population ( $p < 0.05$ ).

**Conclusion:** The mean scores of good knowledge, positive attitude, and good practice of the population were above average and estimated as 73.17%, 72%, and 91%, respectively. Providing correct scientific information through mass media and healthcare providers and continuous encouragement of people about the observance of preventive measures are emphasized.

**Key Words:** Attitude, COVID-19, Iran, General population, Knowledge, Practice.

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## 1- INTRODUCTION

COVID-19 is a highly contagious infectious disease, and the COVID-19 pandemic has disrupted the lives of people and led to the illness and death of thousands around the world, including Iran (1-4). The pandemic has resulted in public health and humanitarian crises, harming the lives, health, and livelihood of people in all countries (5). In Iran, the spread of the coronavirus began in the city of Qom, and many northern regions of the country and some provinces neighboring the city of Qom were quickly affected by the disease. The official declaration of the government about the pandemic came out at the beginning of March 2018, and by April 16, 2023, 7,597,982 people had been infected in Iran, and 145,571 had died (6). The emergence and widespread prevalence of coronavirus disease have resulted in severe consequences in different dimensions (7).

From an economic point of view, the spread of COVID-19 and the subsequent increase in the number of patients and disease complications have imposed overwhelming direct and indirect costs on patients, the health system, and governments (8). Experience has shown that assuming preventive measures to control the disease requires mass-scale social awareness on the part of government officials and people to handle the disease pandemic safely and quickly (9, 10).

Since the outbreak of COVID-19, extensive effort has been made to have a better understanding of the virus and control the disease in Iran. Several national and global KAP studies have investigated the relationship between the level of knowledge, attitude, or behavior and the disease of COVID-19. The results have shown that a higher level of knowledge has a positive relationship with preventive behaviors (11-18). It has further been shown that knowledge and attitude are related to the fear and panic of the COVID-19 disease, which can complicate

measures to control its spread (19, 20). Also, people's attitude has a positive effect on preventive behaviors (14, 15, 17, 18). Therefore, it is essential to evaluate knowledge and attitude to target education for the better implementation of health policies and, as a result, prevent disease transmission and spread (21). Understanding people's attitudes helps predict and influence their behavior (22).

Given the understanding of COVID-19 and the ongoing rapid outbreak, information gaps among people can lead to misperceptions, rumors, and panic. It is critical to gather and act on the feedback and concerns of the community to provide relevant life-saving information, adjust the operational response, and build long-term trust. Such assessments help in understanding the people's knowledge, beliefs, and actions in response to COVID-19 and are a community engagement tool to listen to people and improve the measures. Identifying people's level and body of information, their reactions to this information, and their reasons for resistance to change can help develop effective, targeted strategies, engage in dialogue with communities, and promote positive behavior (5).

The general population in Iran can be protected by determining the knowledge, attitude, and practice of people so the health providers know which areas of KAP to target or enhance (23). The present study aimed to review the Iranian population's knowledge, attitude, and practice and their related factors toward the COVID-19 pandemic.

## 2- MATERIALS AND METHODS

The Preferred Reporting Items for Systematic review and Meta-Analysis (PRISMA) checklist was used as the template for this review (24).

### 2-1. Eligibility criteria

Participants, interventions, comparators, and outcome (PICO) was used to formulate the review objective and inclusion criteria.

**2-1-1. Participants:** Iranian public population.

**2-1-2. Interventions:** The included studies are non-interventional, so a comparison group did not exist.

**2-1-3. Comparators:** See above.

**2-1-4. Outcomes:** KAP toward COVID-19

## **2-2. Inclusion criteria**

The review included studies that reported any form of quantitative assessment, measurement, and evaluation of KAP regarding COVID-19 in the general population in any region of Iran. The inclusion criteria were the focus on knowledge and/or attitude and/or practice towards COVID-19, being published up to December 2022, written in English or Persian, and published articles with full text available.

## **2-3. Exclusion criteria**

Studies were excluded if they were conducted only on some specific groups of people, such as healthcare workers, medical students, pregnant women, or people with comorbidities. Reviews or meta-analyses, letters to the editor, editorials, short reports, case reports, and briefs were also excluded.

## **2-4. Information sources**

A systemic search of electronic databases (Medline, EMBASE, Scopus, Web of Science, Cochrane Library, CIVILICA, and Google Scholar search engine) was conducted. The search was done independently and in duplication by two reviewers, and any disagreement between the reviewers was resolved by the supervisor.

## **2-5. Search**

The main keywords for the search strategy included 'knowledge', 'attitude', 'practice', 'Iran', and 'COVID-19'.

## **2-6. Study selection**

Database search was done for possible studies, study abstracts were screened for eligible studies, full-text articles were obtained and assessed, and a final list of included studies was made. This process was done independently and in duplication by two reviewers and any disagreement was resolved by the third reviewer. References were organized and managed using EndNote software (version X8).

## **2-7. Data collection process**

A researcher's form was developed and followed for each study. Two reviewers collected the data independently. The collected data were combined and compared for accuracy, and any discrepancies were solved by a third reviewer. The collected data included authors, publication period, study setting, design, and population, sample size, data collection tool, and main study findings.

## **2-8. Risk of bias in included studies**

The quality of cross-sectional studies was evaluated using the Newcastle-Ottawa Scale (NOS) for non-randomized studies (25). NOS uses a star system, where a study can have a maximum of nine stars after evaluation for three main categories: selection (a maximum of four stars), comparability (a maximum of two stars), and outcome (a maximum of three stars). The assessment was done by two reviewers independently and in duplication, and any discrepancies were resolved by the third reviewer.

## **2-9. Synthesis of results**

Due to different reported results (percentage, mean  $\pm$  standard deviation), study population, and different data

collection tools, a meta-analysis was not conducted.

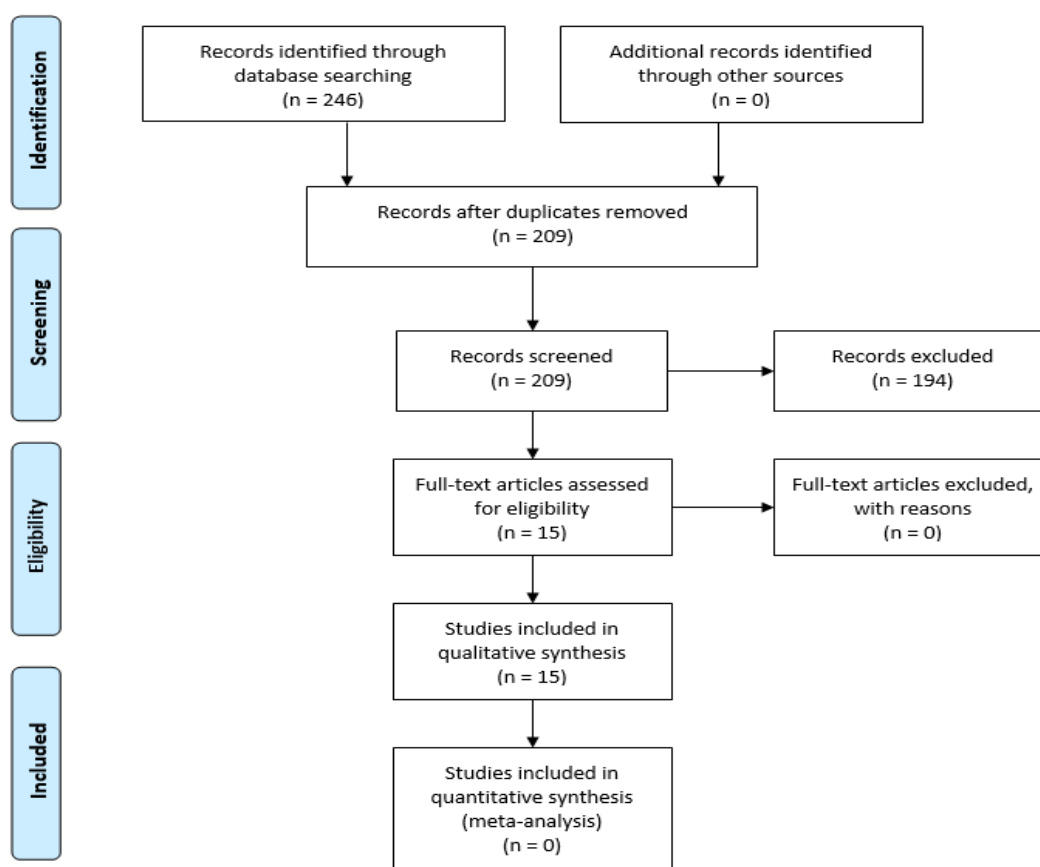
### 3- RESULTS

A total of 15 articles published between 1 January 2020 and 30 June 2021 were selected (Figure 1). Overall, the quality of the cross-sectional studies was moderate. Based on the results, the mean

scores of the level of knowledge, attitude, and practice of the population toward COVID-19 were above average. Some variables had a significant relationship with the population KAP toward COVID-19 (Table 1). The main characteristics of the selected studies are summarized in Table 2 and the following:

**Table 1:** Factors related to KAP among general population.

Variables related to Knowledge	Variables related to Attitude	Variables related to Practice
Gender, age, employment status, location of residence, education level, socially deprived, number of households, and marital status.	Gender, age, marital status, education level, location of residence, employment status, and housewives.	Gender, age, marital status, education level, and income level.



**Fig.1:** PRISMA flowchart.

**1.** A cross-sectional web-based study aimed to estimate COVID-19 awareness, attitude, and perceived anxiety among the general Iranian population. The results showed that most people had substantial knowledge about the disease, and 87.4% were aware of the virus transmission ways. Only 33% were aware of the major signs and symptoms of the infection. The majority of the participants in the study had a favorable attitude towards washing hands, social distancing, self-quarantine/isolation, and governmental policies regarding COVID-19 (26).

**2.** A descriptive cross-sectional study aimed to investigate the attitude, awareness, and preventive behaviors of people in Jahrom in southern Iran. The results showed that the mean scores of knowledge ( $68.14 \pm 8.57$ ), attitude ( $78.73 \pm 10.04$ ), and practice ( $79.68 \pm 11.44$ ) of participants were above average. The multiple linear regression of demographic variables revealed the significant inverse effect of the male gender and number of households on awareness, while age, education level, and marital status had a positive effect on the awareness level ( $p=0.001$ ,  $F=28.057$ ). Regarding the attitude variable, there was an inverse effect of the male gender and a direct effect of age and level of education ( $p=0.001$ ,  $F=6.78$ ). An inverse effect of the male gender was observed on the practice variable ( $p=0.002$ ,  $F=3.30$ ) (27).

**3.** A cross-sectional descriptive-correlational survey aimed to investigate KAP toward the COVID-19 infection among adults in Ardabil. The results showed that 73.17% of participants had appropriate knowledge, 61.19% had favorable attitudes, and 69.53% had adequate practice behavior. Knowledge was associated with gender, employment, and location of residence. Age, marital status, education level, and location of residence were associated with attitude, and age, gender, and marital status were

associated with behavior. The findings of linear regression analysis revealed that knowledge and attitude influenced behavior (28).

**4.** A cross-sectional descriptive-analytical study aimed to investigate Iranians' attitudes, practices, and perceived self-efficacy toward COVID-19 preventive behaviors. The results showed a significant direct correlation between the participants' attitude with practice ( $r=0.23$ ,  $p<0.05$ ), and perceived self-efficacy ( $r=0.21$ ,  $p<0.001$ ) regarding coronavirus preventive behaviors. There was also a significant direct relationship between self-efficacy and practice ( $r=0.46$ ,  $p<0.001$ ). The results of the univariate regression test showed that occupation, marital status, attitude, and self-efficacy were influential predictive variables of the participants' practice towards coronavirus preventive behaviors ( $p<0.05$ ) (29).

**6.** A cross-sectional study aimed to determine the knowledge, attitude, and practice toward COVID-19 in the general population of Qazvin province. The results showed scores of 68%, 72%, and 91% for knowledge, attitudes, and practice, respectively. Knowledge ( $p=0.007$ ), and practice ( $p=0.028$ ) scores increased with age. Knowledge ( $p<0.001$ ) scores increased with higher education level, and attitude ( $p=0.001$ ) scores decreased. Male participants had significantly lower knowledge ( $p=0.002$ ), and practice ( $p<0.001$ ) scores, and rural residents had higher attitude scores than urban residents ( $p=0.002$ ) (30).

**7.** A cross-sectional descriptive study aimed to investigate the awareness, attitude, and practice of people in Mashhad toward COVID-19 in 2020. The results showed that the mean scores of the awareness, attitude, and practice of participants towards COVID-19 were higher than average and estimated at  $78.57 \pm 9.22$ ,  $78.68 \pm 9.78$ , and  $83.83 \pm 10.19$ , respectively. The average level of trust in

the media (radio, virtual media, magazines, and publications) was 50.31% (31).

**8.** A cross-sectional web-based nationwide study aimed to determine the KAP of the Iranian population in the context of COVID-19. The results showed mean knowledge scores of 23.2 (SD 4.3) out of 30. Participants' attitudes toward COVID-19 were mainly positive, and the majority believed that the COVID-19 pandemic would eventually be controlled. Participants' mean practice score was 20.7 (SD 2.2) out of 24. Almost none of the respondents went on a trip, and 92% washed their hands before touching their faces (32).

**9.** A cross-sectional analytical study aimed to investigate people's knowledge and behaviors toward COVID-19 and their views on the public policies against it in Maragheh, a city in the Northwest of Iran. The results showed that the mean scores of people's knowledge ( $6.42 \pm 1.2$  out of 9), and health behaviors ( $34.8 \pm 3.9$  out of 36) were moderate. Knowledge ( $\beta = 0.23$ ), and male gender ( $\beta = -0.27$ ) were the predictors of health behaviors ( $p < 0.001$ ,  $F = 12.47$ ). People's views on the COVID-19 control policies were assessed at the medium level ( $48.2 \pm 7.5$  of 65). The most effective policies against COVID-19 from the people's viewpoint were lockdown policies (96.4%), school closure (95.9%), and restrictions on intercity trips (91.3%) (33).

**10.** A cross-sectional study aimed to investigate the knowledge and preventive practices of Iranians toward the COVID-19 pandemic. The results showed a moderate level of knowledge and preventive practices regarding COVID-19 in most respondents (56.8% and 56.5%, respectively). According to the multiple regression analysis, knowledge had the highest effect on the practice of the participants ( $\beta = 0.479$ ). coefficient for the model ( $R^2 = 0.509$ ) showed that

approximately 51% of the variance in practice was explained by gender, occupational status, knowledge, cost of hand sanitizer, and belief in the effectiveness of using such necessities (34).

**11.** A cross-sectional study aimed to investigate the KAP of older Iranians toward COVID-19 disease. The results showed that the mean scores of knowledge, attitude, and practice of the older people were  $92.3 \pm 10.8$ ,  $89.1 \pm 14.3$ , and  $90.4 \pm 13.4$ , respectively, and not significantly differentiated by sex and history of underlying diseases ( $p > 0.05$ ). The generalized linear model indicated a significant relationship between the level of education and knowledge score ( $p < 0.001$ ), age with attitude, and age and practice ( $p < 0.5$ ) adjusted for age  $> 80$  years (35).

**12.** A cross-sectional population-based study in Shiraz aimed to determine peoples' knowledge, attitudes, risk perceptions, and practices to provide field-based evidence for policymakers and help them manage the COVID-19 pandemic. The results showed that the mean score of knowledge and practice was  $15.9 \pm 3.5$  and  $55.1 \pm 8.1$ , respectively, showing that 63% of participants had good knowledge, and 78% had good practice. Males, people with lower education, and the elderly had a lower level of knowledge and poorer practices. Knowledge was also lower in the marginalized (socially deprived) people. The answers by 69.1% of participants showed that the pandemic had extremely negative effects on their routine activities. The results indicate that adults' knowledge and practices about COVID-19 were reasonably appropriate, but practices were not related to knowledge in two-thirds of the participants (36).

**13.** A cross-sectional study aimed to assess the knowledge, attitude, practice,

The results showed that 56.5% of participants had adequate knowledge, 52.6% had a good attitude, and 51.8% had appropriate practices toward COVID-19. The Pearson's correlation test showed a significant positive correlation between knowledge and attitude ( $r=0.114$ ,  $p=0.026$ ), knowledge and practice ( $r=0.224$ ,  $p=0.011$ ), and attitude and practice ( $r=0.281$ ,  $p=0.005$ ). The knowledge of urban residents was significantly higher than the rural population ( $p=0.018$ ). The attitudes of married people ( $p=0.001$ ), employees, and housewives were also significantly higher than others ( $p=0.006$ ). People with lower income had poorer practices ( $p=0.001$ ) (37).

**14.** A cross-sectional web-based study aimed to investigate the KAP of the

general Iranian population during the COVID-19 pandemic. The results showed that people's knowledge, attitudes, and performances regarding the disease were high, but there were misconceptions (38).

**15.** A cross-sectional study on 471 citizens aged 15 years and older aimed to assess their knowledge, attitude, and behavior towards COVID-19 in Isfahan. The mean score of knowledge about COVID-19 was  $17.22 \pm 2.9$  (range: 5-21), the mean score of attitude was  $23.66 \pm 3.56$  (range: 13-30), and the average performance score was  $2.99 \pm 1.01$  (range: 0-5). It means that most people had a high level of knowledge and a positive attitude toward preventive measures and COVID-19-related concerns (39).

**Table-2:** The general characteristics of included studies (n=15).

Authors, Reference	Study period	Setting	Study design	study population	sample size	Main findings
Ghasemi et al., 26	2020	Iran	cross-sectional web-based study	general population	375	Most people had substantial knowledge about the disease, and the majority of participants had a favorable attitude towards the prevention of COVID-19.
Kalani et al., 27	2020	Jahrom	cross-sectional study	general population	1570	The mean score of knowledge ( $68.14 \pm 8.57$ ), attitude ( $78.73 \pm 10.04$ ), and practice ( $79.68 \pm 11.44$ ) of participants were above average.
NeJhaddadgar et al., 28	2021	Ardabil	cross-sectional descriptive-correlational study	general population	384	Based on the results, 73.17% of participants had appropriate knowledge, 61.19% had favorable attitudes, and 69.53% had enough practice behavior.
Joveini et al., 29	2020	Iran	cross-sectional descriptive-analytical study	general population	387	The results indicated the participants' positive attitude, high self-efficacy, and proper practices in adopting preventive behaviors against COVID-19 disease.
Hosseinkhani et al., 30	2020	Qazvin province	cross-sectional study	general population	1223	The scores of knowledge, attitudes, and practice were 68%, 72% and 91%, respectively.
Ebrahimi et al., 31	2021	Mashhad	cross-sectional descriptive study	general population	614	The mean scores of the knowledge, attitude, and practice of participants towards COVID-19 were estimated at $78.57 \pm 9.22$ , $78.68 \pm 9.78$ , and $83.83 \pm 10.19$ , respectively.
Abbasi-Kangevari et al., 32	2020	Iran	cross-sectional web-based nationwide study	general population	12332	Knowledge of COVID-19 among people in Iran was nearly sufficient, their attitudes were mainly positive, and their practices were satisfactory.
Salavati et al., 33	2020	Maragheh	cross-sectional, analytical study	general population	672	The mean scores of people's knowledge ( $6.42 \pm 1.2$ ) out of 9, and health behaviors ( $34.8 \pm 3.9$ ) of 36, were moderate.
Heydari et al., 34	2020	Iran	cross-sectional web-based study	general population	925	Acceptable rates of knowledge and practice were observed in most Iranians.
Rahimi et al., 35	2020	Isfahan	cross sectional study	general population	249	The mean scores of knowledge, attitude and practice of the older people were $92.3 \pm 10.8$ , $89.1 \pm 14.3$ and $90.4 \pm 13.4$ , respectively, and were not significantly different from the sex

						and history of underlying diseases ( $p > 0.05$ ).
Honarvar et al., 36	2020	Shiraz	cross-sectional and population-based study	general population	1331	The mean score of knowledge was $15.9 \pm 3.5$ , while the mean score of practices was $55.1 \pm 8.1$ , showing 63% of participants had good knowledge and 78% good practice.
Nourmoradi et al., 37	2020	Iran	cross-sectional web-based study	general population	558	Based on the results, 56.5% of the participants had adequate knowledge, 52.6% had a good attitude, and 51.8% had appropriate practice related to COVID-19.
Kakemam et al., 38	2020	Iran	cross-sectional web-based study	general population	1,480	The people's knowledge and attitude toward COVID-19 at the time of its outbreak was at a high level.
Bahrami et al., 39	2020	Isfahan	cross-sectional study	general population	384	The knowledge, attitude and practice of the citizens of Isfahan in the use of electronic services are higher than average.

#### 4- DISCUSSION

COVID-19 is a highly contagious infectious disease. The COVID-19 pandemic disrupted the lives of people and caused the illness and death of thousands all over the world, including Iran (40-42). This systematic review aimed to investigate the general population's KAP and its related factors to the COVID-19 pandemic. The results indicated that the majority of participants had adequate knowledge, favorable attitudes, and appropriate practice behavior concerning COVID-19. In addition, knowledge was related to gender, employment status, education level, social privileges, number of households, marital status, and location of residence. Age, marital status, gender, education level, location of residence, employment status, and being a stay-at-home wife were connected with attitude. Age, gender, marital status, education level, and income level were related to the practice behavior.

The outbreak of the new coronavirus, which led to the third pandemic in the 21st century, has now turned into a global emergency. The disease affected 230 countries and challenged the global health and economic, psychological, and social foundations of the world (43, 44). The pandemic has affected many aspects of people's lives, including physical, social, emotional, behavioral, and economic health, and has become an international concern (45, 46). A fundamental measure

to control pandemics is increasing awareness and improving the attitude of people in society toward the disease. The lack of awareness and understanding of the disease has disturbed its prevention and increased its spread (47-50). Therefore, health education and awareness are important strategies for disease management (51-53). Since the outbreak of COVID-19, extensive efforts have been made to have a better understanding of the virus and control the disease in Iran, and public education has been cited as one of the most important effective measures in disease control (16). For better general education, it is necessary to know the KAP level of the target population regarding the subject in question.

The findings of this review indicated that the majority of the Iranian people had adequate knowledge about COVID-19 (73.17%). In a national study conducted online at the beginning of the pandemic in Iran, most people stated that they knew the common symptoms of the disease and the warning signs of hospitalization (18). Olapegba et al. showed that most Nigerians have relatively high knowledge about COVID-19, which is consistent with the present study (54). A study in Bangladesh showed that participants were highly aware of the transmission of COVID-19, but 14% did not have any knowledge about the symptoms of infection (55). In a study by Wolf et al. (2020) in the United States, the knowledge



of adults with underlying diseases on COVID-19 was estimated insufficient (56). In a study by Srichan et al. (2020), the knowledge of Thai people about COVID-19 was poor (57). A study by Roy et al. (2020) showed that Indians had moderate knowledge about the COVID-19 infection and its symptoms, but their knowledge of ways of preventing the disease was satisfactory (58). Li et al., in their study in Chinese provinces, demonstrated that Chinese people had a moderate level of knowledge about COVID-19 (59).

In the present study, most participants had a good attitude (72%) toward COVID-19 prevention, and the majority believed that the COVID-19 pandemic would eventually be controlled, which is similar to the results of a study in Wuhan, China (60). A study found that 86% of people in Egypt considered COVID-19 dangerous (61), but only 20% of participants in a study in Pakistan believed that the disease was dangerous (62). The findings of similar studies showed a good attitude among groups of society in various countries toward COVID-19 (63-69).

Currently, most Iranians have been vaccinated against the coronavirus, and the number of patients and hospitalizations are decreasing. This can create a more optimistic attitude toward the pandemic in the general population. Better knowledge of the disease, together with a positive attitude, helps curb the current pandemic (50). Studies on the level of awareness and attitude of people towards the COVID-19 pandemic and vaccine in Nigeria, Pakistan, and Egypt have found high awareness and positive, optimistic attitudes (50, 70, 71). In a systematic review, Hesaraki et al. showed that more than 70 percent of the respondents had a positive attitude toward COVID-19 (17).

The present study found that most participants had good practice regarding COVID-19 (91%). Also, attitude and

knowledge had a correlation with practice ( $p=0.001$ ). Olum et al. showed that 69% of people had sufficient knowledge, 21% had a positive attitude, and 74% had a proper performance regarding COVID-19 (72). In China, Wand et al. showed that most Chinese people, especially women, had reasonable knowledge, an optimistic attitude, and appropriate behaviors toward COVID-19, which is in line with the results of the present study (73). The prevention and control of COVID-19 necessitate, in addition to sufficient knowledge, a favorable attitude toward the preventive measures against the disease (74). Various studies reported good practices of protective behavior against COVID-19 (75-78). White et al. showed that their participants had good knowledge, attitude, and performance regarding the prevention of the coronavirus (79). However, in a study in Bangladesh, Haque found that the knowledge, attitude, and performance of Bangladeshi men were inadequate (80).

The evident difference in knowledge, attitude, and performance in different studies may be due to differences in timing and the composition of participants (81). The present study showed that the level of knowledge, attitude, and performance of people toward COVID-19 was appropriate. There was a significant difference between the level of knowledge, attitude, and performance of people based on age, gender, loss of a loved one to COVID-19, level of education, marital status, number of households, history of infection with COVID-19, income level, and place of residence ( $p<0.05$ ). The knowledge of female participants and people living in cities was higher than others. Males, married people, those with lower education, socially deprived people, and the elderly had a lower level of knowledge and poorer practices. People with a low income had weaker practices than others. The attitude scores of married people, the

elderly, employed people, rural residents, and stay-at-home wives were significantly higher than others.

The results of the present study showed that women's knowledge about COVID-19 was significantly higher than men. The reason for this higher awareness can be women's greater responsibility toward their own and their family's health. Therefore, educational and prevention programs should focus more on the male population. However, different studies in this field have reported varying findings (16, 82, 83).

According to the present study, the average knowledge of people about COVID-19 increased with age, and people under 20 years had the lowest knowledge. Older respondents also had acceptable levels of attitude and practice toward COVID-19. This increase in attitude and better performance is probably due to the higher sensitivity of people in their older age towards their health. In addition, married subjects had a more suitable attitude toward COVID-19 than single people, and marital status is one of the social determinants of health (84).

In the current study, individuals with moderate and good social and economic well-being had significantly better practices on COVID-19 prevention and control than others. Also, the attitude of rural residents was better than urban residents, despite having lower access to the Internet and social media in villages than in cities. Several studies have indicated that Internet access and penetration in the rural parts are poorer than in urban areas of Iran. The fundamental role of the Internet and virtual social networks in enhancing people's information about COVID-19 might mean a poorer knowledge of rural residents (85-87). Since the announcement of the COVID-19 outbreak in Iran, the Ministry of Health and Medical Education (MOHME) has developed extensive

instructions to fight the disease (88). The findings of the present study showed that the Iranian people have successfully followed the MOHME guidelines for the prevention and control of COVID-19.

## 5- CONCLUSION

The present study found that the majority of participants had adequate knowledge (73.17%), favorable attitudes (72%), and appropriate practice behavior (91%) toward COVID-19. In addition, knowledge was related to gender, employment status, education level, and social deprivation, number of households, marital status, and location of residence. Age, marital status, gender, education level, location of residence, employment status, and being a stay-at-home wife were connected with attitude. Age, gender, marital status, education level, and income level were related to the practice behavior.

The results show that although people had acceptable knowledge and attitude levels and favorable performance, the differences in the KAP of people due to numerous factors (age, gender, education, occupation, economic status, family dimension, and place of residence) necessitate the design and implementation of different educational programs based on the needs of the society. The fight against the spread of the coronavirus is simultaneously a medical province and a social and cultural responsibility on a wider level. The control of such collective behavior depends on the social participation of people to cut off the communication chain of the virus from various aspects.

**6- CONFLICT OF INTEREST:** None.

## 7- REFERENCES

1. Coronavirus disease (COVID-19). Available at: [https://www.who.int/health-topics/coronavirus#tab=tab\\_1\\_2021](https://www.who.int/health-topics/coronavirus#tab=tab_1_2021).

2. Kenneth Grace Mascarenhas Danaball1, Shiva Shankar Magesh1, Siddharth Saravanan1 and Vijayaprasad Gopichandran2 .Attitude towards COVID 19 vaccines and vaccine hesitancy in urban and rural communities in Tamil Nadu, India – a community based survey. *BMC Health Services Research* 2021; 21:994.
3. Crayne MP. The traumatic impact of job loss and job search in the aftermath of COVID -19. *Psychological Trauma: Theory, Research, Practice, and Policy* 2020; 12: 180 –82.
4. Akbari A, Fathabadi A, Razmi M, Zarifian A, Amiri M, Ghodsi A, et al. Characteristics, risk factors, and outcomes associated with readmission in COVID-19 patients: A systematic review and meta-analysis. *Am J Emerg Med.* 2022 Feb;52:166-173.
5. Knowledge, Attitudes and Practices (KAP) Assessment on Covid-19 (Round 3). Community Based Migration Programme Turkey, June 2021.
6. The Ministry of Health and Medical Education. Vice President of Health.
7. Ghiasvand, A., Mohammadtaghizadeh, M. Preventive Behaviors Toward COVID-19 Among Iranian People and the Factors Affecting It. *Journal of Social Problems of Iran*, 2021; 12(1): 205-237.
8. McArthur L, Sakthivel D, Ataide R, Chan F, Richards JS, Narh CA. Review of burden, clinical definitions, and management of COVID-19 cases. *The American journal of tropical medicine and hygiene.* 2020; 103: 625-38.
9. Signorelli C, Fara GM. COVID-19: Hygiene and Public Health to the front. *Acta Bio-medica: Atenei Parmensis.* 2020; 91: 7-8.
10. Arab-Zozani M, Ghoddoosi-Nejad D. COVID-19 in Iran: the Good, the Bad, and the Ugly Strategies for Preparedness–A Report from the Field. *Disaster Medicine and Public Health Preparedness.* 2020: 1-3.
11. Papagiannis D, Malli F, Raptis DG, Papatheanasiou IV, Fradelos EC, Daniil Z, et al. Assessment of knowledge, attitudes, and practices towards new coronavirus (SARS-CoV2) of health care professionals in Greece before the outbreak period. *International journal of environmental research and public health.* 2020; 17: 4925.
12. Alrubaiee GG, Al-Qalah TAH, Al-Aawar MSA. Knowledge, attitudes, anxiety, and preventive behaviours towards COVID-19 among health care providers in Yemen: an online cross-sectional survey. *BMC Public Health.* 2020; 20: 1-11.
13. Zhang M, Zhou M, Tang F, Wang Y, Nie H, Zhang L, et al. Knowledge, attitude, and practice regarding COVID-19 among healthcare workers in Henan, China. *Journal of Hospital Infection.* 2020; 105: 183-7.
14. Alzoubi H, Alnawaiseh N, Al-Mnayyis A, Lubad M, Aqel A, Al-Shagahin H. COVID-19-knowledge, attitude and practice among medical and non-medical University Students in Jordan. *J Pure Appl Microbiol.* 2020; 14: 17-24.
15. Zhong B-L, Luo W, Li H-M, Zhang Q-Q, Liu X-G, Li W-T, 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. *International journal of biological sciences.* 2020; 16: 1745.
16. Erfani A, Shahriarirad R, Ranjbar K, Mirahmadizadeh A, Moghadami M. Knowledge, Attitude and Practice toward the Novel Coronavirus (COVID-19) Outbreak: A Population-Based Survey in Iran. [Preprint]. *Bull World Health Organ.* E-pub: 30 March 2020. 10.2471/BLT.20.256651.
17. Hesaraki M, Akbarizadeh M, Ahmadidarrehsima S, Moghadam MP, Izadpanah F. Knowledge, attitude, practice and clinical recommendations of health care workers towards COVID-19: a systematic review. *Rev Environ Health.* 2020 Nov 23;36(3):345-57.
18. Kakemam E, Ghoddoosi-Nejad D, Chegini Z, Momeni K, Salehiniya H, Hassanipour S, Ameri H, Arab-Zozani M. Knowledge, Attitudes, and Practices Among the General Population During COVID-19 Outbreak in Iran: A National Cross-Sectional Online Survey. *Front Public Health.* 2020 Dec 10;8:585302.
19. Person B, Sy F, Holton K, Govert B, Liang A. Fear and stigma: the epidemic within the

- SARS outbreak. *Emerging infectious diseases*. 2004; 10: 358.
20. Person B, Sy F, Holton K, Govert B, Liang A. NCID/SARS Community Outreach Team. Fear and stigma: the epidemic within the SARS outbreak. *Emerg Infect Dis*. 2004; 10: 358- 63.
21. Mazlumi S, Rezaee Pendari H, Shahbazi H. [Survey of knowledge, attitude and practice of the prople of Yazd city regarding swine flu in 2010 (Persian)]. *Tolo Health*. 2014; 13(1):80-92.
22. Seale H, Heywood AE, Leask J, Sheel M, Durrheim DN, Bolsewicz K, et al. Examining Australian public perceptions and behaviors towards a future COVID-19 vaccine. *BMC Infect Dis*. 2021; 21(1):120.
23. Moftakhar, L. and M. Seif, The Exponentially Increasing Rate of Patients Infected with COVID-19 285 in Iran. *Archives of Iranian medicine*, 2020. 23(4): 235.
24. Moher D, Shamseer L, Clarke M, et al. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Syst Rev* 2015; 4: 1.
25. Wells G, Shea B, O'Connell D, Peterson J, Welch V, Losos M, Tugwell P: The Newcastle-Ottawa Scale (NOS) for assessing the quality of non-randomised studies in meta-analyses. 2013, [http://www.ohri.ca/programs/clinical\\_epidemiology/oxford.asp](http://www.ohri.ca/programs/clinical_epidemiology/oxford.asp).
26. Ghasemi M, Roy D, Shabani M, Singh N, Pirzeh R, Kar SK. Awareness, attitude, and perceived anxiety about COVID-19 in the Iranian population: A cross-sectional questionnaire survey. *Int Soc Sci J*. 2022 Apr 4:10.1111/issj.12332.
27. Kalani N, Sadeghi SE, Hatami N, Zarenezhad M, Javdani F, Rahmanian M. Knowledge, Attitude and practice against the 2019 Novel Coronavirus (COVID-19) Among the Jahrom city people: A Cross-Sectional Study. *International Journal of Multidisciplinary Research and Analysis*, 2020;3(9): 126-33.
28. NeJhaddadgar N, Pirani N, Heydarian N, Ebadi Fard Azar AA, Yazdi F, Toghrol R, Chaboksavar F, Shalchi Oghli S, Kianipour N, Zokaei A, Foroughinia A. Knowledge, attitude, and practice toward the COVID-19 infection among adults Iran: A cross-sectional study. *J Public Health Res*. 2022 Oct 24;11(4).
29. Joveini H, Zare Z, Hashemian M, Mehri A, Shahrabadi R, Mahdavifar N, Aval HE. Investigating Iranians' Attitude, Practices, and Perceived Self-Efficacy towards Coronavirus Preventive Behaviors. doi: <https://doi.org/10.21203/rs.3.rs-74846/v1>.
30. Hosseinkhani, Z.; Abbasi, M.; Khaleghi, A.; Kakavand, E.; Yazdi, N.; Moein, H. R. M.. Knowledge, Attitude, and Practice toward SARS COV-2 in Qazvin Province: A Population-Based Study. *Iranian Journal of Epidemiology*; 2021; 17(2):105-15.
31. Ebrahimi, M., Khodabakhshian, Z., Reihani, H. R., Habibzadeh, S. R., Khadem rezaeian, M., Kalani, N., Foroughian, M. Evaluation of Awareness, Attitude, and Practice of Residents in Mashhad towards New Coronavirus Disease 2019 in 2020. *Navid No*, 2021; 24(77): 69-83.
32. Abbasi-Kangevari M, Kolahi AA, Ghamari SH, Hassanian-Moghaddam H. Public Knowledge, Attitudes, and Practices Related to COVID-19 in Iran: Questionnaire Study. *JMIR Public Health Surveill*. 2021 Feb 23;7(2):e21415. doi: 10.2196/21415.
33. Salavati S, Shokri H, Tanomand A, Shirvani Shiri M, Soleimani A, et al. Community Knowledge and Behavior About COVID-19 and Their Attitude Toward Public Policies Implemented Against This Pandemic in the Northwest of Iran. *Shiraz E-Med J*. 2021;22(12):e113890.
34. Heydari MR, Joulaei H, Zarei N, Fararouei M, Gheibi Z. An Online Investigation of Knowledge and Preventive Practices in Regard to COVID-19 in Iran. *Health Lit Res Pract*. 2021 Jan 11; 5(1):e15-e23.
35. Rahimi M, Maracy MR, Alirezaei Shahraki R. A survey of knowledge, attitude and practice of the older people about COVID-19 pandemic in Isfahan, Iran. *Journal of Gerontology and Geriatrics*, 2020;68(4):204.
36. Honarvar B, Lankarani KB, Kharmandar A, Shaygani F, Zahedroozgar M, Rahmanian Haghighi MR, et al. Knowledge, attitudes, risk perceptions, and practices of adults toward COVID-19: a population and field-based study

- from Iran. *Int J Public Health*. 2020 Jul; 65(6):731-739.
37. Nourmoradi, H.; Kazembeigi, F.; Kakaei, H.; Jalilian, M.; Mirzaei, A.. Assessment of Knowledge, Attitude, and Practice toward COVID-19 among a Sample of Iranian General Population. *Open Access Macedonian Journal of Medical Sciences*, 2020; 8(T1):167.
  38. Kakemam E, Ghoddoosi-Nejad D, Chegini Z, Momeni K, Salehiniya H, Hassanipour S, et al. Knowledge, Attitudes, and Practices Among the General Population During COVID-19 Outbreak in Iran: A National Cross-Sectional Online Survey. *Front Public Health*. 2020 Dec 10;8: 585302.
  39. Bahrami M, Shamaei V. Study of Knowledge, Attitude and Practice of citizen of Isfahan towards Using Electronic Services during the Corona Outbreak (COVID-19). *JoC* 2021; 14 (S1): 23-31.
  40. Coronavirus disease (COVID -19). Available from: [https://www.who.int/health-topics/coronavirus#tab=tab\\_1](https://www.who.int/health-topics/coronavirus#tab=tab_1) 2021. Kenneth Grace Mascarenhas Danaball, Shiva Shankar Magesh1, Siddharth Saravanan1 and Vijayaprasad Gopichandran.
  41. Attitude towards COVID 19 vaccines and vaccine hesitancy in urban and rural communities in Tamil Nadu, India – a community based survey. *BMC Health Services Research* 2021; 21:994.
  42. Crayne MP. The traumatic impact of job loss and job search in the aftermath of COVID -19. *Psychological Trauma: Theory, Research, Practice, and Policy* 2020; 12: 180 –82.
  43. Chang D, Lin M, Wei L, et al. Epidemiologic and Clinical Characteristics of Novel Coronavirus Infections Involving 13 Patients Outside Wuhan, China. *JAMA*. 2020;323(11):1092–1093. doi:10.1001/jama.2020.1623.
  44. Meskarpour-Amiri, M., Shams, L., Nasiri, T. Identifying and Categorizing the Dimensions of Iran's Health System Response to the Covid-19 Pandemic. *Journal of Military Medicine*, 2022; 22(2): 108-114.
  45. Kumari A, Ranjan P, Chopra S, Kaur D, Upadhyay AD, Kaur T, et al. Development and validation of a questionnaire to assess knowl - edge, attitude, practices, and concerns regarding COVID-19 vaccina - tion among the general population. *Diabetes Metab Syndr*. 2021; 15(3):919-25.
  46. Omranzadeh A, Afzalzadeh M, Ghodsi A, Neshati H, Mahdavi Rashed M. Radiological features of COVID-19-associated mucormycosis: A report of 36 cases along with a literature review. *Clin Case Rep*. 2023 Nov 20;11(11):e8154.
  47. Ranjbar Roghani A, Nemati R, Fathi Y, Sheikhnavaaz Jahed S, Ajri Khamsloo F, Ajri Khamslou M. Knowledge and Attitude for Medical Students towards COVID-19. *IJN* 2020; 33 (126):44-57.
  48. Ghadamgahi F. Knowledge, attitude and self-efficacy of nursing staffs in hospital infections control. *J Mil Med*, 2011; 13(3): 167-72.
  49. Yakar B. , Öztürk Kaygusuz T. , Piriñçi E. , Önalın E. , Ertekin Y. H. Knowledge, attitude and anxiety of medical students about the current COVID-19 outbreak in Turkey. *Family Practice and Palliative Care*. 2020; 5(2): 36-44.
  50. Abdelhafiz AS, Mohammed Z, Ibrahim ME, Ziady HH, Alorabi M, Ayyad M, et al. Knowledge, perceptions, and attitude of Egyptians towards the novel coronavirus disease (COVID-19). *J Community Health*. 2020; 45(5):881-90.
  51. Suman R, Javaid M, Haleem A, et al. Sustainability of coro- navirus on different surfaces. *J Clin Exp Hepatol* 2020; 10(4): 386–90.
  52. Gorbalenya AE, Baker SC, Baric R, et al. Severe acute respira- tory syndrome-related coronavirus: the species and its viruses– a statement of the coronavirus study group. *Nat Microbiol* 2020. doi: 10.1101/2020.02.07.937862.
  53. Adli I, Widyahening IS, Lazarus G, et al. Knowledge, atti- tude, and practice related to the COVID-19 pandemic among undergraduate medical students in Indonesia: a nationwide cross-sectional study. *PLoS One* 2022; 17(1): e0262827.
  54. Olapegba, Peter O. and Ayandele, Olusola and Kolawole, Samson O. and Oguntayo, Rotimi and Gandi, Joshua C. and Dangiwa, Abdullahi L. and Ottu, Iboro F. A. and Iorfa,

Steven Kator, A Preliminary Assessment of Novel Coronavirus (COVID-19) Knowledge and Perceptions in Nigeria. Available at SSRN: <https://ssrn.com/abstract=3584408> or <http://dx.doi.org/10.2139/ssrn.3584408>

55. Patwary MM, Disha AS, Bardhan M, et al. Knowledge, attitudes, and practices toward coronavirus and associated anxiety symptoms among university students: a cross-sectional study during the early stages of the COVID-19 pandemic in Bangladesh. *Front Psychiatry* 2022; 13: 856202.

56. Wolf MS, Serper M, Opsasnick L, O'Connor RM, Curtis LM, Benavente JY, Wismer G, Batio S, Eifler M, Zheng P, Russell A. Awareness, attitudes, and actions related to COVID-19 among adults with chronic conditions at the onset of the US outbreak: A cross-sectional survey. *Ann Intern Med*. 2020;173(2):100-9.

57. Srichan P, Apidechkul T, Tamornpark R, Yeemard F, Khunthason S, Kitchanapaiboon S, 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. *SSRN Electron J*. 2020;1:3546046. <https://doi.org/10.2139/ssrn.3546046>.

58. Roy D, Tripathy S, Kar SK, Sharma N, Verma SK, Kaushal V. Study of knowledge, attitude, anxiety and perceived mental healthcare need in Indian population during COVID-19 pandemic. *Asian J Psychiatry*. 2020;51:102083.

59. Li J-B, Yang A, Dou K et al. Chinese public's knowledge, perceived severity, and perceived controllability of the COVID-19 and their associations with emotional and behavioural reactions, social participation, and precautionary behaviour: a national survey, 2020. [10.31234/osf.io/5tmsh](https://doi.org/10.31234/osf.io/5tmsh).

60. Zhong B, Luo W, Li H, Zhang Q, Liu X, Li W, 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* 2020;16(10):1745-1752.

61. Abdelhafiz AS, Mohammed Z, Ibrahim ME, Ziady HH, Alorabi M, Ayyad M, et al.

Knowledge, Perceptions, and Attitude of Egyptians Towards the Novel Coronavirus Disease (COVID-19). *J Community Health* 2020 Oct 21;45(5):881-90.

62. Salman M, Mustafa ZU, Asif N, Zaidi HA, Hussain K, Shehzadi N, et al. Knowledge, attitude and preventive practices related to COVID-19: a cross-sectional study in two Pakistani university populations. *Drugs Ther Perspect* 2020 May 09:1-7.

63. Giao H, Han NT, Van Khanh T, Ngan VK, Van Tam V, Le An P. Knowledge and attitude toward COVID-19 among healthcare workers at district 2 hospital, Ho Chi Minh city. *Asian Pac J Trop Med*. 2020;1:13.

64. Zhong BL, Luo W, Li HM, Zhang QQ, Liu XG, Li WT, 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*. 2020;16(10):1745-52.

65. Taghrir MH, Borazjani R, Shiraly R. COVID-19 and Iranian medical students; a survey on their related-knowledge, preventive behaviors and risk perception. *Arch Iran Med*. 2020;23(4):249-54.

66. Zhou M, Tang F, Wang Y, Nie H, Zhang L, You G, et al. Knowledge, attitude and practice regarding COVID-19 among health care workers in Henan, China. *J Hosp Infect*. 2020;105(2):183-7.

67. Kamate SK, Sharma S, Thakar S, Srivastava D, Sengupta K, Hadi AJ, et al. Assessing Knowledge, Attitudes and Practices of dental practitioners regarding the COVID-19 pandemic: A multinational study. *Dent Med Probl*. 2020;57(1):11-7.

68. Mousa, K.N.A.A.; Saad, M.M.Y.; Abdelghafor, M.T.B. Knowledge, attitudes, and practices surrounding COVID-19 among Sudan citizens during the pandemic: An online cross-sectional study. *Sudan J. Med. Sci*. 2020, 15, 32–45.

69. Shi Y, Wang J, Yang Y, Wang Z, Wang G, Hashimoto K, Zhang K, Liu H. Knowledge and attitudes of medical staff in Chinese psychiatric hospitals regarding COVID-19. *Brain Behav Immun Health*. 2020 Apr;4:100064.

70. Habib MA, Dayyab FM, Iliyasu G, Habib AG. Knowledge, attitude and practice survey of COVID-19 pandemic in Northern Nigeria. *Plos One*. 2021; 16(1):e0245176. DOI:10.1371/journal.pone.0245176.
71. Hussain T, Gilani US, Khan S, Raza SMM. Assessment of general awareness among Pakistani students regarding COVID-19 outbreak. *Child Youth Serv Rev*. 2021; 121:105830.
72. Olum R, Bongomin F. Social media platforms for health communication and research in the face of COVID-19 pandemic: a cross sectional survey in Uganda. *MedRxiv*. 2020; 4:30.
73. Wand AP, Zhong BL, Chiu HF, Draper B, De Leo D. Covid-19: the implications for suicide in older adults. *Int Psychogeriatr*. 2020; 30:1-6.
74. Glanz K, Rimer BK, Viswanath K, editors. *Health Behavior and Health Education: Theory, Research, and Practice*. Hoboken, New Jersey: John Wiley and Sons; 2008.
75. Zhou M, Tang F, Wang Y, Nie H, Zhang L, You G, et al. Knowledge, attitude and practice regarding COVID-19 among health care workers in Henan, China. *J Hosp Infect*. 2020;105(2):183-7.
76. Srichan P, Apidechkul T, Tamornpark R, Yeemard F, Khunthason S, Kitchanapaiboon S, 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. *SSRN Electron J*. 2020;1:3546046.
77. Peng Y, Pei C, Zheng Y, Wang J, Zhang K, Zheng Z, et al. Knowledge, Attitude and Practice Associated with COVID-19 among University Students: A Cross-sectional Survey in China. *China: Fourth Military Medical University*; 2020. <https://doi.org/10.21203/rs.3.rs-21185/v1>.
78. Taghrir MH, Borazjani R, Shiraly R. COVID-19 and Iranian medical students; a survey on their related-knowledge, preventive behaviors and risk perception. *Arch Iran Med*. 2020;23(4):249-54.
79. White MS, Omer M, Mohammad GN. Knowledge, attitude and practice on prevention of airborne and droplet infections during the outbreak of corona virus among the college students in university of Bisha, Saudi Arabia. *Int J Contempor Res Rev*. 2020; 11(4):20773-6.
80. Haque T, Hossain KM, Bhuiyan MM, Ananna SA, Chowdhury SH, Ahmed A, et al. Knowledge, attitude and practices (KAP) towards COVID-19 and assessment of risks of infection by SARS-CoV-2 among the Bangladeshi population: an online cross sectional survey. *Res Square*. 2020; 3:1-16.
81. Ioannidis JPA. Coronavirus disease 2019: the harms of exaggerated information and non-evidence-based measures. *Eur J Clin Invest* 2020; e13223.
82. Moradzadeh R, Nazari J, Shamsi M, Amini S. Knowledge, Attitudes, and Practices Toward Coronavirus Disease 2019 in the Central Area of Iran: A Population-Based Study. *Frontiers in public health*. 2020; 8: 862.
83. Chen Y, Jin YL, Zhu LJ, Fang ZM, Wu N, Du MX, et al. The network investigation on knowledge, attitude and practice about COVID-19 of the residents in Anhui Province. *Zhonghua Yu Fang Yi Xue Za Zhi*. 2020 Apr 6;54(4):367-73. Chinese. doi: 10.3760/cma.j.cn112150-20200205-00069.
84. Wyke S, Ford G. Competing explanations for associations between marital status and health. *Soc Sci Med*. 1992;34:523-32. [https://doi/10.1016/0277-9536\(92\)90208-8](https://doi/10.1016/0277-9536(92)90208-8).
85. Zahnd WE, Scaife SL, Francis ML. Health literacy skills in rural and urban populations. *Am J Health Behav*. 2009;33(5):550-7.
86. Salmani B, Mohammadzadeh P, Zoolghadr H. Investigating the effect of economic factors on Internet diffusion in developing countries. *Q J Appl Theories Econ*. 2015;2(2):81-102.
87. Zarabi V, Khorasani IM, Maddah M. Predicting the Internet diffusion rate in Iran by providing a Fuzzy-diffusion model. *J Technol Dev Manag*. 2013;3:123-51.
88. The Ministry of Health and Medical Education. Vice President of Health, Infectious Diseases Management Center. <https://icdc.behdasht.gov.ir/>.