

# The Influence of Sociodemographic Factors on Community Knowledge, Perceptions, Attitudes, and Practices towards COVID-19 Prevention Protocols : *A Scoping Review*

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## Abstract

**Background:** WHO declared COVID-19 as a global pandemic due to its rapid spread and has been confirmed worldwide. Preventive efforts are made to minimize the virus spread among the community. Sociodemographic factors play an integral role in determining the community knowledge, perception, attitudes, and practice towards COVID-19 prevention protocols.

**Methods:** This review was conducted on various journal articles to see the sociodemographic factors that influence the levels of knowledge, perceptions, attitudes, and practices of the community towards COVID-19 prevention protocols. Journal articles were selected under the PRISMA guidelines, from which 28 articles were found to meet the predetermined criteria.

**Result:** Several sociodemographic factors found to affect the levels of knowledge, attitudes, practices, and perceptions of respondents towards the COVID-19 prevention protocols were age, gender, education, marital status, occupation, socio economic status, area of residence, and nationality.

**Conclusion:** Education and socio economic status/monthly income were found to be the main factors that influenced the respondents' level of knowledge. Individuals with higher education tended to take health problems more seriously, as shown by their better scores of compliance with the COVID-19 prevention protocols, compared to the scores shown by other groups.

**Keywords:** Sociodemographic factors, knowledge, perception, attitudes, and practice, COVID-19

## Introduction

World Health Organization <sup>1</sup>declared COVID-19 as a global pandemic due to its rapid spread and has been confirmed worldwide. Preventive efforts are made

by many countries to minimize the virus spread among the community<sup>2</sup>. The effectiveness of these mitigation steps highly relies upon the cooperation and compliance of all community members. Knowledge, perceptions, attitudes, and practices towards COVID-19 play an integral role in determining the community's readiness to accept behavioral change and health authority actions<sup>3</sup>. Some research works indicate that public knowledge is important in dealing with the pandemic<sup>4</sup>.

People around the world have varied levels of knowledge, perceptions, attitudes, and practices towards the COVID-19 pandemic. They are influenced

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by various factors to form new habits as encouraged by policymakers. In the concept of health behavior, socio-demographic factors have a strong influence on the levels of knowledge, attitudes, and practices<sup>5</sup>. Assessing various socio-demographic factors inherent in society and influencing public awareness and knowledge about COVID-19 can provide deeper insights into community perceptions and practices in implementing the established prevention protocols<sup>6</sup>.

### Research Objectives

The aim of this scoping review was to critically synthesize scientific proofs of sociodemographic factors that affect the level of knowledge, perceptions, attitudes and practice of community towards COVID-19 prevention protocols. During the pandemic, information related to socio-demographic factors that affect knowledge, perceptions, attitudes, and practices is necessary. It is related to efforts to understand matters that affect the level of public awareness towards COVID-19 and the health protocols established by the authorities.

### Methods and Analysis

#### Search Strategy

A systematic search following the PRISMA guidelines (Fig. 1). The authors conducted a scoping review of journal articles with a focus on community knowledge, perceptions, attitudes, and practices towards COVID-19 prevention protocols. This study was conducted to determine the extent to which the factors influence the level of public knowledge, perceptions, attitudes, and practices towards the COVID-19 prevention protocol. Articles were derived from four electronic bibliography databases—PubMed, Science Direct, ProQuest, Scopus, EBSCO, and DOAJ—using the keywords “knowledge” OR “attitude” OR “practice”, “public perception”, AND “COVID 19”. The authors also searched extra articles with search engine Google Scholar by manually checking out the references of the review articles identified. Literature search was commenced in July 2020 and ended in October 2020. There was no

limit as to the dates and years of publications given that the COVID-19 pandemic was first confirmed at the end of 2019

#### Articles Selection and Restrictive Criteria

The title and abstract of every publication were to be screened to obtain a relevant article. The restrictive criteria in this scoping review consisted of inclusion and exclusion criteria. The inclusion and exclusion criteria were developed based on the PICOS (Population, Intervention, Comparison, Outcome, and Study Design) standard to include the following: 1) the populations and samples extracted were community groups in general during the COVID-19 pandemic; 2) the publications’ interventions took the form of questionnaires related to community knowledge, attitudes, practices, and perceptions on COVID-19, include sociodemography characteristics of the respondent; 3) the results were in the form of measurements articles on sociodemographic factors that affect the variables of knowledge, attitude, practice, and perception to the pandemic; and 4) the studies used the observational research design with a cross-sectional approach. Articles would not be considered meeting the criteria if they used focused on a specific group of populations (e.g., health service providers, health personnel, students, age groups, or patients with particular comorbidities).

#### Screening and Data Extraction

The manuscripts filtering and extraction to retrieve information covered the following six domains: 1) Lead authors; 2) Country/region 3.) Methodological characteristics (study design, study objectives, research questions or hypotheses, sample characteristics, sampling method, and statistical analysis); 4) Sample size; 5) Main findings, relationships between variables (e.g., the ratio at 95% confidence interval and  $p < 0.05$ ); 6) Conclusion. The data from all journal articles were summarized by category and conceptual framework. This process involved synthesis, analysis, and interpretation of the data from the studies to understand the mechanism of identified sociodemographic factors.

## Measurement Instruments

The majority of the studies measured sociodemographic factors and the level of knowledge, perceptions, attitudes, and practices on COVID-19 using online questionnaires. The questionnaires used Google Forms, Survey Monkey, Alphabet Inc, and Wenjuanxing links. The questionnaire links were spread via social media platforms such as Facebook, WhatsApp, Twitter, and WeChat app. Two articles distributed questionnaires directly to willing respondents. The research was conducted by spreading questionnaires to pedestrians and from door to door or at gathering points. Questionnaires were given to people who were willing to participate<sup>7,8</sup>.

## Results

### *Articles Selection*

Initial search gained a total of 945 studies from 4 databases, namely :PubMed, ProQuest, Science Direct and DOAJ. The authors also searched via search engine Google Scholar and found 10 additional articles. Before conducting a review on the articles, a duplication extraction process was completed. The selected duplication-free papers review process was performed in three stages: a review of the title, abstract, and the entire article. Out of 945 papers, 481 were excluded due to duplication. Upon complete screening, a total of 28 articles were found to meet the criteria for review.

### Research Characteristics

Study characteristic from 28 articles are presented in Table 1. The 28 journal articles averaged the sample sizes at 201, with the highest number of respondents being 6,910. The total number of participants in all articles was 48,338. The participants' average age was 12 years to 65 years old. Female participants (n: 26,994) outnumbered male participants (n: 21,344). The 28 articles were based in 18 different countries, namely Egypt (1 articles), Pakistan (1 articles), Saudi Arabia (3 articles), Nepal (2 articles), Malaysia (1 articles), Ecuador (1 articles), Lebanon (1 articles), Jordan (1 articles), Bangladesh (3 articles), India (3 articles),

Sudan (1 articles), Iran (1 articles), China (3 articles), Cameroon (1 articles), Vietnam (1 articles), Nigeria (1 articles), Indonesia (1 articles), and Ghana (1 articles). Sociodemographic factors in journal articles focus on age, gender, education, occupation, socio economic status/monthly income, marital status, and *region/area of residence*. Some journals involving more than 1 country, or involving foreigner in data collection, also study the nationality factor of the respondents.

### Measurement Instrument

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### *Sociodemographic Factors*

#### Age

Age can be a determining factor in taking health measures. Younger age is associated with higher access to social media, as a source of information, than older age<sup>9,10</sup>. Respondents from the older adult group who were over 50 years old had a lower level of knowledge, compared to the other age groups<sup>8,11</sup>. However, other studies found that those aged 30-50 years had a higher level of knowledge, compared to those in the 18-29 years age group<sup>3,6,12,13</sup>. The higher the age, the better the attitude shown towards the COVID-19<sup>13</sup>. This was in line with the practice shown by respondents aged over 30 years who tended to show higher prevention practices, compared to those in younger age groups<sup>8,9,13</sup>.

#### Gender

In some articles, there was no significant difference in the level of knowledge possessed by men and women<sup>7,9,12</sup>. However, other research stated that women had a better level of knowledge and attitudes than men

3,6,12,14,15. The majority of female respondents, compared to the male ones, paid more attention when filling out the questionnaire. This condition might affect their COVID-19-related attitude scores<sup>15</sup>. Female respondents also tended to have a positive attitude 1.9 times higher than that the men had. This was related to the habit of women to be responsible for maintaining family hygiene and teaching their children<sup>12</sup>. Men had a significant relationship to dangerous practices in dealing with COVID-19<sup>16</sup>.

### **Education**

Respondents' education level is affected their levels of knowledge. The study found that respondents with a bachelor's degree or higher education had a significantly higher level of knowledge, compared to those with less education<sup>6</sup>. The knowledge of respondents, towards COVID-19, with high school education was at least 4.7 times higher than that of those who did not have formal education<sup>10</sup>. Educational status was the strongest predictor of the levels of knowledge and perceptions of participants<sup>4,7,14,17,18</sup>.

### **Marital Status**

Respondents who were not married had a better level of knowledge than those who were married<sup>7</sup>. This could be related to their education level. Unmarried respondents tended to be young and have a higher educational background<sup>17</sup>. In other studies, it was found that married respondents showed better prevention practices than those unmarried<sup>14</sup>. Young and unmarried men showed lower prevention practices, compared to the other groups<sup>19</sup>. An optimistic attitude regarding the handling of COVID-19 was also shown by married respondents<sup>20</sup>.

### **Occupation**

Respondents with a scientific background or working in the health sector showed a better level of knowledge, perceptions, and attitudes than those without a background in the health sector<sup>10,13,14,18,21-23</sup>. There were surprising results regarding the occupation

and the level of attitude shown. The attitude score for respondents who worked as government staff was low, compared to that of domestic workers<sup>12</sup>.

### **Socio Economic Status/Monthly Income**

The respondents' levels of knowledge increased along with their income levels<sup>5,6,11,12,17,22-25</sup>. Likewise, an increase in positive attitudes and practices occurred in line with the increasing level of income<sup>6,22</sup>.

### **Region/Area of Residence**

Several articles in this review examined the area of residence as one of the sociodemographic aspects of the respondents<sup>3,5,20-29,6-9,13,15,16,19</sup>. The area where the respondent lived had a significant effect on knowledge, perceptions, and attitudes towards the risk factors for COVID-19<sup>24</sup>. People who lived in urban areas tended to have a higher level of knowledge than those who lived in villages<sup>11,24</sup>. Low levels of knowledge and perceptions occurred in the general public, especially those in rural areas and without internet access<sup>17</sup>. The compliance with the instruction to wear masks was lower by residents in areas with less serious cases of COVID-19, compared to residents in areas with high case rates. Residents living in areas with a low incidence of COVID-19 believed that they were at lower risk of contracting the COVID-19 virus<sup>16</sup>. The low incidence of transmission in the area at the time of the survey affected the level of community compliance with the COVID-19 prevention protocols<sup>7</sup>.

### **Nationality**

Studies involving two countries<sup>10</sup> that also included respondents with other nationalities considered nationality as one of the sociodemographic aspects of respondents that can affect the levels of knowledge, perceptions, attitudes, and practices of society towards COVID-19. In a study involving 2 countries, namely Nigeria and Egypt, it was found that the Nigerian population had a positive attitude which was 11x higher than that of the Egyptian population<sup>10</sup>. In a study that included respondents with foreign citizenship status, it was found that those who were native to that country

had more positive levels of knowledge and attitudes, compared to foreigners<sup>5</sup>.

**Table 1: Study Characteristic**

Results of Variables Analysis	N
Knowledge towards COVID-19	28
Attitude towards COVID-19	24
Practice towards COVID-19	21
Public Perception towards COVID-19	8
Sociodemographic factors	27
Age	27
Gender	25
Education	9
Marital status	19
Occupation	21
Socio economic status/monthly income	21
Region/area of residence	3
Nationality	
Research Area	
Local	9
National	18
Multinational	1

## Discussion

### *Sociodemographic Factors towards Knowledge*

Several sociodemographic factors also influenced the level of public knowledge about COVID-19. Several articles showed that women were more knowledgeable and aware than male participants. This condition was linked to their innate concern for the condition of their children and their families, which prompted female participants to read and learn more about COVID-19<sup>30</sup>.

Low socioeconomic status was closely related to an individual's level of education. Individuals lacking formal education were more likely to be unemployed, which resulted in reduced income, resulting in poor health quality<sup>31</sup>. One of the articles reviewed revealed that the level of individual knowledge increased with their high income. Low scores of participants were known to come from those with low income, and the

highest scores were obtained from those categorized obtaining highincome<sup>6</sup>. The percentage of the high level of knowledge was also influenced by the level of education of the respondents; those who were university graduates and aged over 30 years had a good level of knowledge towards COVID-19<sup>16</sup>.

Low knowledge scores are associated with older respondents, who live in rural areas, with low levels of education and monthly income<sup>16</sup>. Most of the studies showed that the level of respondents' knowledge of COVID-19 was related to their access to social media as a source of information at a younger age<sup>30</sup>. A high level of knowledge also shows a positive relationship between respondents and their works, as a health worker, with high social status<sup>23</sup>. Respondents with non-working backgrounds have low scores on knowledge related to COVID-19<sup>23</sup>.

### **Sociodemographic Factorstowards Perception**

The education level and nationality of respondents influenced their perceptions of global and community responses to reduce the transmission of COVID-19 through various policies. Respondents with higher education and medical background showed positive perceptions of global responses<sup>10</sup>. Correct perceptions towards COVID-19 transmission, treatment, and prevention measures were shown by those with higher education. Besides, older age groups were associated with better perceptions<sup>13</sup>. Regarding the perception of prevention, women indicated that they were more committed to looking after their families through preventive measures<sup>9</sup>. Male respondents had perceptions related to higher barriers in implementing compliance with the COVID-19 protocols established by the government<sup>9</sup>. This might be related to men doing works outside the home.

### **Sociodemographic Factors towardsAttitudes**

Several articles also examined respondents' attitudes to government actions to deal with the COVID-19 pandemic that affected their confidence that this pandemic could be passed successfully<sup>20</sup>. Confidence in

the success of COVID-19 control increases with the age of respondents<sup>29</sup>. The group with a medical background also showed a high attitude of trust compared to the non-medical group<sup>21</sup>. It was related to a better level of knowledge about COVID-19<sup>16</sup>.

A positive attitude towards the COVID-19 prevention protocols was shown by women. Respondents who were married also showed better attitudes, compared to other groups<sup>9</sup>. Women and married individuals felt more responsible for maintaining family hygiene and teaching their children<sup>12</sup>. Respondents assumed that measures to prevent COVID-19 were a shared responsibility and commitment<sup>8</sup>. A better sense of responsibility was found in older adult respondents<sup>10</sup>.

### **Sociodemographic Factors towards Practices**

Practices are defined as individual behavior, which is influenced by individual attitudes and knowledge. Knowledge of COVID-19 relates to preventive practices carried out by respondents, such as reducing the intensity of going out and wearing masks<sup>15</sup>. However, in some articles observed, there was a gap in translating individual attitudes and knowledge into the practice of preventing COVID-19<sup>12</sup>. This might be due to the economic issues experienced by those who need daily wages<sup>10</sup>.

Practices against COVID-19 prevention were also linked to the area where respondents lived. The inability of various states and local governments to implement strict preventive measures including lockdowns, banning public gatherings, physical distancing, and wearing masks is a risky practice against COVID-19. Visiting the crowd, which is risky, was recorded as being carried out by respondents below 40 years of age. It was related to the work done by the respondents<sup>10</sup>. Most of the young people had to work outside the home for their daily survival even during the pandemic<sup>27</sup>.

Married individuals and those with higher education tended to practice all prevention practices, while those who were young and male show low practice towards preventing COVID-19<sup>19</sup>. Compared to women, men

tended to engage in high-risk practices with the potential to contract COVID-19. Men were more likely to underestimate the severity of the virus's potential harm to them<sup>32</sup>.

The higher the education level of the respondents, the better the results of the practice carried out on the prevention of COVID-19<sup>24</sup>. Basic educational skills, including knowledge, reasoning skills, emotional self-regulation, and interaction skills, are essential components of health practice. Education is an essential component of health, and a major determinant of long-term health<sup>33</sup>.

### **Limitations of the Study**

The main limitation in writing this review was related to the scope of the discussion. Given the very wide range of factors that may affect the level of knowledge, perceptions, attitudes, and especially the practices of preventing COVID-19, the author only took merely sociodemographic factors. In this review, the author could not include other aspects that might be relevant to the participants' concepts of knowledge, perceptions, attitudes, and practices. such as frame work (regulation and policies, health care facilities, health promotion), interpersonal influence (social norms, source of information), public health (respondent or family comorbidity), and self efficacy.

### **Conclusion**

This review revealed that the education level of respondents is the most influential sociodemographic factor in all articles addressing the concept of knowledge, perceptions, attitudes, and community practices. It was found that individuals with higher education tended to take health problems more seriously than those with less education; individuals with higher education had higher scores in practicing the COVID-19 protocols, compared to other groups. The results of this study are expected to be used in making appropriate interventions to reduce the COVID-19 transmission and face health problems in the future.

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**Declaration of Interest:** All authors declare that we have no conflict of interest.

## Ethical Clearance

Due to the characteristic of this research design is a systematic review (use of secondary data) the ethical evaluation was not required. However, statement of research ethics in the journal articles would serve as a consideration of the use of the publication for this review.

## References

- World Health Organization. Coronavirus [Internet]. World Health Organization. 2020. Available from: [https://www.who.int/health-topics/coronavirus#tab=tab\\_1](https://www.who.int/health-topics/coronavirus#tab=tab_1)
- European Centre for Disease Prevention and Control. Considerations relating to social distancing measures in response to the COVID-19 epidemic. *Eur Cent Dis Prev Control* [Internet]. 2020;(March):1–10. Available from: <https://www.ecdc.europa.eu/en/publications-data/considerations-relating-social-distancing-measures-response-covid-19-second>
- Azlan AA, Hamzah MR, Sern TJ, Ayub SH, Mohamad E. Public knowledge, attitudes and practices towards COVID-19: A cross-sectional study in Malaysia. *PLoS One* [Internet]. 2020 May 1 [cited 2020 Sep 14];15(5):1–15. Available from: <http://dx.doi.org/10.1371/journal.pone.0233668>
- Khaled A, Siddiqua A, Makki S. The knowledge and attitude of the community from the aser region, Saudi Arabia, toward COVID-19 and their precautionary measures against the disease. *Risk Manag Healthc Policy*. 2020;13:1825–34.
- Almofada SK, Alherbisch RJ, Almuhray NA, Almeshary BN, Alrabiah B, Al Saffan A, et al. Knowledge, Attitudes, and Practices Toward COVID-19 in a Saudi Arabian Population: A Cross-Sectional Study. *Cureus*. 2020 Jun 29;2(6).
- Al-Hanawi MK, Angawi K, Alshareef N, Qattan AMNN, Helmy HZ, Abudawood Y, et al. Knowledge, Attitude and Practice Toward COVID-19 Among the Public in the Kingdom of Saudi Arabia: A Cross-Sectional Study. *Front Public Heal* [Internet]. 2020 May 27 [cited 2020 Sep 14];8(May):1–10. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/32574300>
- Nicholas T, Mandaah FV, Esemu SN, Vanessa ABT, Gilchrist KTD, Vanessa LF, et al. COVID-19 knowledge, attitudes and practices in a conflict affected area of the South West Region of Cameroon. *Pan Afr Med J*. 2020;35(2):1–8.
- 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* [Internet]. 2020 Jul 1 [cited 2020 Sep 14];65(6):731–9. Available from: <https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=85087083589&origin=inward>
- Ferdous MZ, Islam MS, Sikder MT, Mosaddek ASM, Zegarra-Valdivia JA, Gozal D. Knowledge, attitude, and practice regarding COVID-19 outbreak in Bangladesh: An online based cross-sectional study. *PLoS One* [Internet]. 2020;15(10):e0239254. Available from: <https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=85092752629&origin=inward>
- Hager E, Odetokun IA, Bolarinwa O, Zainab A, Okechukwu O, Al-Mustapha AI. Knowledge, attitude, and perceptions towards the 2019 Coronavirus Pandemic: A bi-national survey in Africa. *PLoS One* [Internet]. 2020 Jul 1 [cited 2020 Sep 14];15(7):e0236918. Available from: <http://dx.doi.org/10.1371/journal.pone.0236918>
- 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* [Internet]. 2020;45(5):881–90. Available from: <https://doi.org/10.1007/s10900-020-00827-7>
- Paul A, Sikdar D, Hossain MM, Amin MR, Deeba F, Mahanta J, et al. Knowledge, attitudes, and practices toward the novel coronavirus among Bangladeshis: Implications for mitigation

- measures. PLoS One. 2020;15(9):e0238492.
13. Goruntla N, Pradeepkumar B, Dasartha J, Ramiah, Thummala J, Dasari LY, et al. Knowledge, perception, and practice towards COVID-19 pandemic among general public of india : A cross-sectional online survey. *Curr Med Res Pract.* 2020;10(2020):153–9.
  14. Elayeh E, Aleidi SM, Ya'acoub R, Haddadin RN. Before and after case reporting: A comparison of the knowledge, attitude and practices of the Jordanian population towards COVID-19. *PLoS One [Internet].* 2020;15(10 October):1–17. Available from: <http://dx.doi.org/10.1371/journal.pone.0240780>
  15. Yue S, Zhang J, Cao M, Chen B. Knowledge, Attitudes and Practices of COVID-19 Among Urban and Rural Residents in China: A Cross-sectional Study. *J Community Health [Internet].* 2020 [cited 2020 Sep 14];(0123456789):3–8. Available from: <https://doi.org/10.1007/s10900-020-00877-x>
  16. 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. *Int J Biol Sci [Internet].* 2020 [cited 2020 Sep 14];16(10):1745–52. Available from: <http://www.ijbs.com/v16p1745.htm>
  17. Singh DR, Sunuwar DR, Karki K, Ghimire S, Shrestha N. Knowledge and Perception Towards Universal Safety Precautions During Early Phase of the COVID-19 Outbreak in Nepal. *J Community Health [Internet].* 2020; Available from: <https://doi.org/10.1007/s10900-020-00839-3>
  18. Serwaa D, Lamptey E, Appiah AB, Senkyire EK, Ameyaw JK. Knowledge, risk perception and preparedness towards coronavirus disease-2019 (Covid-19) outbreak among ghanaians: A quick online cross-sectional survey. *Pan Afr Med J.* 2020;35(2):1–7.
  19. Van Nhu H, Tuyet-Hanh TT, Van NTA, Linh TNQ, Tien TQ. Knowledge, Attitudes, and Practices of the Vietnamese as Key Factors in Controlling COVID-19. *J Community Health [Internet].* 2020 Sep 7 [cited 2020 Sep 14]; Available from: <http://link.springer.com/10.1007/s10900-020-00919-4>
  20. Rahman A, Sathi NJ. Knowledge, attitude, and preventive practices toward COVID-19 among Bangladeshi internet users. *Electron J Gen Med [Internet].* 2020 Oct 1 [cited 2020 Sep 14];17(5). Available from: <https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=85085551496&origin=inward>
  21. Hussain A, Garima T, Singh BM, Ram R, Tripti RP. Knowledge, attitudes, and practices towards COVID-19 among Nepalese Residents: A quick online cross-sectional survey. *Asian J Med Sci.* 2020 May 1;11(3):6–11.
  22. Singh A, Ahuja R. Knowledge, Attitude, and Practice of General Public Towards COVID-19 in India: An Online Cross-Sectional Study. *Int J Innov Res Sci Eng Technol [Internet].* 2020 Jun 15 [cited 2020 Sep 14];09(06):5005–12. Available from: [http://www.ijirset.com/upload/2020/june/162\\_Knowledge\\_NC.PDF](http://www.ijirset.com/upload/2020/june/162_Knowledge_NC.PDF)
  23. Kartheek AV, K HG, Vanamali DR. Knowledge, attitude and practice toward COVID-19 among Indian residents during the pandemic : A cross-sectional online survey. *J Dr NTR Univ Heal Sci.* 2020;9(2):107–15.
  24. Afzal MS, Khan A, Qureshi UUR, Saleem S, Saqib MAN, Shabbir RMK, et al. Community-Based Assessment of Knowledge, Attitude, Practices and Risk Factors Regarding COVID-19 Among Pakistanis Residents During a Recent Outbreak: A Cross-Sectional Survey. *J Community Health [Internet].* 2020 [cited 2020 Sep 14];(0123456789). Available from: <https://doi.org/10.1007/s10900-020-00875-z>
  25. Domiati S, Itani M, Itani G. Knowledge, Attitude, and Practice of the Lebanese Community Toward COVID-19. *Front Med.* 2020 Aug 18;7(August):1–8.
  26. Sari DK, Amelia R, Dharmajaya R, Sari LM, Fitri NK. Positive Correlation Between General Public Knowledge and Attitudes Regarding COVID-19 Outbreak 1 Month After First Cases Reported in Indonesia. *J Community Health [Internet].* 2020 [cited 2020 Sep 14];(0123456789). Available from: <https://doi.org/10.1007/s10900-020-00866-0>
  27. Reuben RC, Danladi MMA, Saleh DA, Ejembi PE. Knowledge, Attitudes and Practices Towards COVID-19: An Epidemiological Survey in North-Central Nigeria. *J Community Health.* 2020;
  28. Lin Y, Hu Z, Alias H, Wong LP. Knowledge, Attitudes, Impact, and Anxiety Regarding COVID-19 Infection Among the Public in China.

- Front Public Heal. 2020 May 27;8(May):1–7.
29. Bates BR, Moncayo AL, Costales JA, Herrera-Cespedes CA, Grijalva MJ. Knowledge, Attitudes, and Practices Towards COVID-19 Among Ecuadorians During the Outbreak: An Online Cross-Sectional Survey. *J Community Health* [Internet]. 2020 Sep 11 [cited 2020 Sep 14];45(6):1158–67. Available from: <https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=85090523865&origin=inward>
  30. Hezima A, Aljafari AA, Aljafari AA, Mohammad A, Adel I. Knowledge, attitudes, and practices of sudanese residents towards covid-19. *East Mediterr Heal J*. 2020;26(6):646–51.
  31. He Z, Cheng Z, Shao T, Liu C, Shao P, Bishwajit G, et al. Factors influencing health knowledge and behaviors among the elderly in rural China. *Int J Environ Res Public Health*. 2016;13(10):1–16.
  32. Griffith DM, Sharma G, Holliday CS, Enyia OK, Valliere M, Semlow AR, et al. Men and COVID-19 : A Biopsychosocial Approach to Understanding Sex Differences in Mortality and Recommendations for Practice and Policy Interventions. 2020;1–9.
  33. Hahn RA, Truman BI. Education Improves Public Health and Promotes Health Equity. *Int J Heal Serv*. 2015;45(4):1–21.