
RESEARCH ARTICLES

Knowledge, attitudes and practices towards COVID-19 among populations of Islamabad and Rawalpindi during lockdown: A cross-sectional survey

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Abstract

In Pakistan, the first confirmed case of COVID-19 was reported on 26 February 2020, having the travel history from Iran. Islamabad and Rawalpindi have also been affected by COVID-19 epidemic. On 23 March 2020, the Government of Pakistan has declared smart lockdown all over the country including Islamabad and Rawalpindi. The aim of the study was to identify the status of the knowledge, attitudes and practices regarding COVID-19 among the general population of the twin cities (Islamabad and Rawalpindi) in Pakistan during the COVID-19 outbreak. A cross-sectional web-based survey was conducted from 5 to 19 May 2020, the week during smart lockdown in Islamabad and Rawalpindi. Demographic characteristics were compared with independent-samples t-test, one-way, or Chi-square test. Multivariable linear regression analysis was used to identify factors associated with low knowledge score. Data analyses were conducted with SPSS version 21.0. A total of 1,282 participants completed the questionnaire. Among this final sample, the average age was 30.65 years. Among the survey respondents, 680 (53%) were women, 1096 (86%) held a bachelor's degree or above, 634 (50%) were engaged with the government and private sector and 606 (47%) were married. The overall correct rate of knowledge was 70%. The majority of the respondents agreed that COVID-19 will finally be successfully controlled (59%). Most of the participants had not visited any crowded place (74%) and 95% responded that they have reduced their outdoor activities. In response to precaution measures, 86% stated that they would isolate themselves if they ever felt a fever or cough. The study findings suggest that residents of the two cities have reasonable levels of knowledge on COVID-19. However, it is necessary to launch health education and awareness campaigns to improve the knowledge and practices about COVID-19, to control its transmission.

Key words: COVID-19; KAP; Rawalpindi; Islamabad; Pakistan.

Introduction

The coronavirus disease 2019 (COVID-19) is an emerging viral respiratory disease first reported in December 2019 in Wuhan, China, and has spread worldwide (1). The COVID-19 is highly contagious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS CoV-2) (2). The SARS CoV-2 belongs to a wide ranging family of virus, containing positive-sense single standard RNA, and genetically close to bat coronavirus (3). Due to rapid spread of this deadly disease to many countries, the World Health Organization (WHO) declared it as Public Health Emergency of International Concern (PHEIC) on 30 January 2020. Later, on March 11, the WHO declared COVID-19 as a pandemic, after affecting over 110 countries and territories around the world (4). As of 18 August 2021, the global count of COVID-19 confirmed cases are 209,413,871 with 4,395,176 deaths (5).

In Pakistan, the first confirmed case of COVID-19 was reported on 26 February 2020, in an individual with a travel history to Iran. By 20 May 2020, Pakistan had

45,898 laboratory confirmed cases with 985 COVID-19 associated deaths. Sindh Province had the highest number of cases (n=17,947) followed by Punjab (n=16,685), Khyber Pakhtunkhwa (n=6,554), Baluchistan (n=2,885), Islamabad (n=1,138), Gilgit Baltistan (n=556), and Azad Jammu Kashmir (n=133) (6).

COVID-19 can spread through direct, indirect and close contact with an infected person through saliva or droplets, when an infected person coughs, sneezes and talks. The incubation period of the virus is 4-14 days (7). The main clinical symptoms of COVID-19 are fever, dry cough, fatigue, myalgia and difficulty in breathing (8). Other symptoms like loss of the senses of smell and taste were also reported in some cases (9), while some people have experienced nasal congestion, diarrhea and runny nose (10).

The elderly and persons with chronic medical ailments like diabetes, cancer and cardiovascular diseases are more likely to get severe infection (11). Several vaccines are being used to prevent and control COVID-19 all over

the countries (12). Infection can also be prevented as per recommendations including frequent hand washing with soap and water or alcohol-based sanitizers, maintaining physical distancing from others, covering coughs and sneezes to protect others and avoiding hands away from mouth, nose and eyes (12,13).

Islamabad and Rawalpindi have also been affected by COVID-19 epidemic. Many preventive measures have been adopted to control the virus in the twin cities including suspension of local transport, closing of public places, ban on crowds, establishment of the quarantine centers and isolation facilities. On 23 March 2020, the Government of Pakistan declared a smart lockdown all over the country including Islamabad and Rawalpindi (14).

The residents of Islamabad and Rawalpindi were advised to stay at home to avoid close contact with others. To ensure the ultimate success, the citizen's devotion to these control measures is important which is generally influenced by their knowledge, attitudes and practices (KAP) to COVID-19 according to KAP theory (15).

The aim of the study was to identify the current status of the knowledge, attitudes and practices regarding COVID-19 among general population of twin cities in Pakistan during the rapid rise period of the COVID-19 outbreak.

Methodology

Participants

This cross-sectional survey was conducted from 5 to 19 May 2020, the week during smart lockdown in Islamabad and Rawalpindi, Pakistan. Because it was not feasible to do a community-based national sampling survey during this special period, we decided to collect the data online.

This web-based survey was carried out through various social media platforms by relying on the authors' networks with local people living in the twin cities. By clicking on the link, the participants could view the questions and answer them. A three-page questionnaire was posted/reposted on groups of their WhatsApp and Facebook accounts. This questionnaire contained a brief introduction on the background, objective, procedures, voluntary nature of participation, declarations of anonymity and confidentiality, and notes for filling in the questionnaire, as well as the link and quick response (QR) code of the online questionnaire. Persons who were of Pakistani nationality, were aged 18 years or more, understood the content of the poster, and agreed to participate in the study were instructed to complete the questionnaire via clicking the link or scanning the QR code. The questionnaire was distributed by local residents; only residents from Islamabad and Rawalpindi were given access to fill this questionnaire.

The Ethics Committee of the National Institute of Health (NIH) approved our study protocol and procedures of informed consent before the formal survey. Participants had to answer a yes-no question to confirm their willingness to participate voluntarily. After

confirmation of the question, the participant was directed to complete the self-report questionnaire.

Measures

The questionnaire consisted of two parts: demographics and KAP. Demographic variables included age, gender, marital status, education, occupation, and place of current residence (area). The survey was answered by 1,282 participants anonymously during the above-mentioned period.

According to guidelines for social distancing, wearing face mask, home isolation, and clinical management of COVID-19 by the Ministry of Health Services Regulation and coordination – Government of Pakistan (GoV), a COVID-19 knowledge, attitude and practice questionnaire was developed by the authors. The questionnaire had 14 questions (Table: 1): 5 regarding clinical presentations (K1-K5), 6 regarding prevention, control and transmission (K6-K11), 1 regarding isolation (K12) and 1 regarding vaccine of COVID-19. These questions were answered on a true/false basis with an additional "I don't know" option. A correct answer was assigned 1 point and an incorrect/unknown answer was assigned 0 points. The total knowledge score ranged from 0 to 14, with a higher score denoting a better knowledge of COVID-19. The Cronbach's alpha coefficient of the knowledge questionnaire was 0.71 in our sample, indicating acceptable internal consistency.

Statistical analysis

Frequencies of correct knowledge answers and various attitudes and practices were described. Knowledge scores, attitudes and practices of different persons according to demographic characteristics were compared with independent-samples *t* test, one-way analysis of variance (ANOVA), or Chi-square test as appropriate. Multivariable linear regression analysis using all the demographic variables as independent variables and knowledge score as the outcome variable was conducted to identify factors associated with knowledge regarding COVID-19. Data analyses were conducted with SPSS version 21.0. The statistical significance level was set at $p < 0.05$ (two-sided).

Results

A total of 1,282 participants completed the survey questionnaire. Among this final sample, the average age was 30.65 years (standard deviation (SD): 10.42, range: (16-73) and 764 (60%) belonged to age group 16-30 years, 680 (53%) were women, 1,096 (86%) held a bachelor's degree or above, 634 (50%) were engaged with government and private sector and 606 (47%) were married (Table 2). The correct answer rates of the 13 questions on the COVID-19 knowledge questionnaire were 68.3-96.6% (Table 1).

Table 1. KAP questionnaire

Knowledge (True, False, Don't know)	Percentage (%)
K1: The main clinical symptoms of COVID-19 are fever, cough, and breathing difficulty.	95
K2: Do you think runny nose and sneezing are also symptoms of COVID-19 virus.	39
K3: Do you think early deduction and supportive treatment can recover patients from the infection?	90
K4: Persons with COVID-19 cannot infect to others when fever is not present. (6%)	6
K5: The COVID-19 spreads through coughing, sneezing and touching contaminated objects.	96
K6: Surgical mask could be used to prevent COVID-19?	84
K7: To prevent the infection, individuals should avoid going to crowded places such as train stations, shopping malls and avoid taking public transportations.	98
K8: It is not necessary for children and young adults to take social distance measure to prevent the infection by COVID-19.	16
K9: Isolation (social distancing and stay at home) is an effective way to reduce the spread of the virus.	98
K10: The COVID-19 will be controlled by practicing hand washing, social distancing, and staying at home.	98
K11: The COVID-19 will be controlled by avoiding travelling across/within country during this outbreak.	94
K12: People having contact with COVID-19 patient should be immediately isolated in a proper place.	96
K13: The COVID-19 vaccine is available against this virus.	4
Attitude (Agree, Disagree, Don't know)	
A14: Do you agree that lockdown strategy can finally controlled the spread of COVID-19 virus?	41
A15: Do you have confidence that Pakistan can win the battle against the COVID-19 virus?	59
Practice (Yes, No)	
P16: In recent days, have you gone to any crowded (social or religious) place?	25
P17: If you have fever or cough, would you like to isolate/quarantine yourself?	86
P18: During COVID-19 outbreak, have you reduced the outdoor activities?	95

Table 2. Characteristics of participants

Characteristics		Number of participants (%)	Mean knowledge score \pm standard deviation	<i>p</i> -value
Gender	Male	602 (47)	9.01 \pm 1.62	0.031*
	Female	680 (53)	9.27 \pm 0.99	
Age-group (years)	(16-30)	764 (60)	9.15 \pm 1.14	0.036*
	(31-45)	388 (30)	9.21 \pm 1.06	
	(46+)	130 (10.1)	8.89 \pm 1.822	
Marital status	Married	606 (47.3)	9.17 \pm 1.25	0.0345*
	Unmarried	654 (51)	9.09 \pm 1.18	
	Others^	22 (1.7)	9 \pm 0.27	
Education	Intermediate and below	186 (14.5)	8.83 \pm 1.38	0.001***
	Graduate	558 (43.5)	9.19 \pm 1.21	
	Higher (masters & above)	538 (42)	9.18 \pm 1.12	
Occupation	Employed	634 (49.5)	9.17 \pm 1.28	0.315
	Unemployment	276 (21.5)	9.15 \pm 1.14	
	Student	372 (29)	9.05 \pm 1.28	
Area of Residence	Urban	1050 (82)	9.10 \pm 1.18	0.399
	Rural	232 (18)	9.14 \pm 1.21	

Multiple linear regression analysis showed that male gender (vs. female, β : -0.191, $p < 0.001$), age-group of 46 and above years (vs. 31-45 years, β : -0.313, $p < 0.05$), education of intermediate and below (vs. higher (master degree & above), β : -0.302, $p < 0.05$), and area of residence urban (vs. rural β : -0.029, $p < 0.05$) were significantly associated with lower knowledge score, however occupations: employment (vs. unemployment β : 0.006, $p > 0.05$), student (vs. unemployment β : -0.014, $p > 0.05$) and marital status: married (vs. unmarried β : 0.113, $p > 0.05$), others (included separated, widowed and divorced) (vs. unmarried β : 0.368, $p > 0.05$) had no significant effect on poor knowledge score. (Table 3).

Approximately half of the respondents agreed that COVID-19 will finally be successfully controlled (41%) and half of the respondents disagreed (40%). The attitude towards the final success in controlling COVID-19 significantly differed across genders, education levels, occupation categories, marital status and residence places ($p < 0.05$) (Table 4).

The majority of the respondents agreed that COVID-19 will finally be successfully controlled (59%). Percentages of reporting “disagree” and “I don’t know” were 23% and 18%, respectively. The attitude towards the final success in controlling COVID-19 significantly differed across genders, age groups, education levels, occupation

categories, marital status and residence places ($p < 0.05$) (Table 4).

The majority of the participants had not visited any crowded place (74%), isolated their selves in case of fever/cough (86%) and reduced outdoor activities (95%) during study period. The practice attribute of respondents: visiting to any crowded (social or religious) place significantly differed across gender i.e. ($p < 0.05$). Likewise, the attribute of adopting isolation/quarantine in case having cough or fever differed significantly across gender and area of residence ($p < 0.05$). Similarly, the practice attribute of reducing outdoor activities significantly differed across gender, marital status and education level i.e. ($p < 0.05$) (Table 5).

Discussion

COVID-19 spread in the vulnerable population due to less knowledge and very diverse public opinion about the disease. (10). There has been limited published data on population knowledge, attitudes and practices toward COVID-19, especially in Pakistan. A lot of misinformation and uncertainty made this disease critical for health authorities to execute pertinent strategies and supervise the public opinion and practice (16). The present study found variation in opinion and beliefs of the respondents regarding COVID-19. The assessment of knowledge, attitudes and practices (KAP)

towards COVID-19 was made by collecting data from the respondents of twin cities (Islamabad and Rawalpindi) in Pakistan.

Mostly young adults responded to this online KAP survey because the use of social media platforms and mobile phones is more common in the younger generation (17). We observed more response from the urban area of the twin cities where the respondents could easily access the internet services. It was found that the rate of correct responses of the COVID-19 knowledge questionnaire was high enough to indicate that most study participants had sufficient basic knowledge about COVID-19. Similar findings were observed in a study conducted by Al-Hanawi in KSA demonstrated correct answer rate 81.64% (18).

Among the participants, 95% were aware of the clinical symptoms and 90% knew that, with early detection and supportive treatment, patients can recover from the infection. The reason behind this is that most of the participants in our survey were educated i.e., they were holding a bachelor's degree or above, and media played an important role in spreading information and creating awareness regarding COVID-19 (19). This reasoning is supported by another study which describes that more educated respondents are more knowledgeable about emerging communicable diseases (20).

As the questionnaire was being distributed amid the COVID-19 outbreak in the country, at that time people may have got awareness and knowledge about the disease and its spread, via print and electronic media (21). Moreover, public awareness campaigns launched by the Government of Pakistan along with the NIH also helped to improve the understanding of the general public regarding COVID-19 (22). Studies conducted in China (23) and Pakistan (24) also found similar results. Almost all the participants were aware of the fact that hand washing, social distancing and staying home are effective measures and help to prevent the spread of COVID-19. The WHO has already advised the same preventive measures to limit the spread of COVID-19 (25).

With reference to attitude, an optimistic approach was shown by participants toward COVID-19, many of the participants believed that COVID-19 will finally be successfully controlled. This positive attitude may be developed with some measures like imposing partial lockdown (14), suspended flight operation for specific time periods (26), closure of all educational institutes (27) and all non-essential markets (28) and launch of awareness campaigns using print and electronic media. Moreover, the knowledge of study participants about COVID-19 was higher, which also supports this belief. This finding agrees with another study held in China relevant to higher level of knowledge, trust and reasonable attitude towards interventions taken by the government during health emergencies (29).

Our results demonstrated that a majority of the participants took appropriate preventive measures against COVID-19 by avoiding going to crowded and

religious places. The percentage of males (31%) visiting crowded places was higher than that of females (19.3%). In the local setting, the male population is involved in repeated outside movements for household, financial, trading and transportation purposes. Risk of exposure among males may be higher than among females in Pakistan. Females are more likely to self-quarantine when sick with fever or cough, as compared with males who feel cough or fever.

Association between educational level and reduction of outdoor activities for prevention and safety was assessed. Negative association ($p=0.001$) was found between education level and reduction of outdoor activities. As with increased education level, the tendency of going out seems to be reduced.

Conclusion

This study provided detailed information about the knowledge, attitude and practice regarding COVID-19. The study findings suggest that residents of Islamabad and Rawalpindi have reasonable level of knowledge on COVID-19. However, it is necessary to launch enormous health education and awareness campaigns to improve the knowledge and practices about COVID-19, to control its transmission.

Limitations

Due to the lockdown, we were not able to approach more groups of people with low levels of education, elderly, and general public in the communities which would have generated diverse findings.

The data collection process was based on internet applications like WhatsApp and Facebook accounts. Social media is less likely used among individuals with old age and those who are uneducated for the research purposes. So, the study covers response mostly from young adults who were familiar with use of internet and smartphone technology.

Table 3. Regression analysis

Characteristics	Coefficient	<i>p value</i>
Gender (male vs. female)	-0.191	0.001***
Age-group (16-30 vs. 31-45) years	0.050	0.625
(46+ vs. 31-45) years	-0.313	0.011*
Marital status (married vs. unmarried)	0.113	0.267
(others vs. unmarried)	0.368	0.188
Education (Intermediate and below vs. higher)	-0.302	0.011*
(Graduate degree vs. higher)	0.006	0.935
Occupation (employment vs. unemployment)	0.006	0.958
(Student vs. unemployment)	-0.014	0.918
Area of Residence (urban vs. rural)	-0.029	0.021*

Table 4. Attitudes towards COVID-19 by demographic variables

Characteristics		Attitudes, n (%)			p-value	A2: Confidence of winning battle against COVID-19			p-value
		A1: Success in controlling COVID-19				Agree	Disagree	Don't know	
		Agree	Disagree	Don't know		Agree	Disagree	Don't know	
Gender	Male	326 (48)	248 (37)	106 (15)	0.001***	434 (64)	142 (21)	104 (15)	0.001***
	Female	198(33)	270(45)	134 (22)		320 (53)	148 (25)	134 (22)	
Age-group (years)	(16-30)	308 (40)	316 (41)	140 (18)	0.766	484 (63)	38 (29)	30 (23)	0.001***
	(31-45)	160 (41)	156 (40)	72 (19)		208 (53)	106 (27)	74 (19)	
	(46+)	56 (43)	46 (35)	28 (22)		62 (48)	10 (46)	4 (18)	
Marital status	Married	256 (42)	234 (39)	116 (19)	0.002***	324 (54)	150 (25)	132 (22)	0.001***
	Unmarried	266 (41)	266(41)	122 (19)		422 (65)	132 (20)	100 (15)	
	Others^	2 (9)	18 (82)	2 (9)		8 (36.4)	8 (36.4)	6 (27.3)	
Education	Intermediate and below	88 (47)	62 (33)	36 (19)	0.083	132 (71)	281 (15)	26 (14)	0.001***
	Graduate	236 (42)	226 (41)	96 (17)		342 (61)	128 (23)	88 (16)	
	Higher (masters & above)	200 (37)	230 (43)	108 (52)		80 (52)	134 (25)	124 (23)	
Occupation	Employment	234 (37)	278 (44)	122 (18)	0.015**	326 (51)	162 (26)	146 (23)	0.001***
	Unemployment	112 (41)	108 (39)	56 (20)		164 (59)	56 (20)	56 (20)	
	Student	178 (48)	132 (36)	62 (17)		264 (71)	72 (19)	36 (10)	
Area of Residence	Urban	404 (39)	440 (42)	206 (20)	0.001***	162 (70)	44 (19)	26 (11)	0.001***
	Rural	120 (52)	78 (34)	34 (15)		592 (56)	246 (23)	212 (20)	

^“Others” included separated, widowed and divorced

*P<0.05, **P<.01, ***P<0.001.

Table 5. Practices towards COVID-19 by demographic variables

Characteristics		Practices, n (%)								
		P1: Going to a crowded place		p-value	P2: With fever/cough quarantine yourself		p-value	P3: Reduce the outdoor activities		p-value
Yes	No	Yes	No		Yes	No				
Gender	Male	210 (31)	470 (69)	0.001***	568 (84)	112 (16)	0.001***	630 (93)	50 (7)	0.001***
	Female	116 (19.3)	486 (81)		540 (90)	62 (10)		584 (97)	18 (3)	
Age-group (years)	(16-30)	196 (26)	568 (74)	0.809	656 (84)	30 (16)	0.212	720 (94)	44 (6)	0.454
	(31-45)	100 (26)	288 (74)		344 (89)	84 (15)		372 (96)	16 (4)	
	(46+)	30 (23)	100 (77)		108 (89)	60 (11)		122 (94)	8 (6)	
Marital status	Married	148 (24)	458 (76)	0.732	526 (87)	80 (13)	0.783	580 (96)	26 (4)	0.012*
	Unmarried	172 (26)	482 (74)		564 (86)	90 (14)		616 (94)	38 (6)	
	Others^	6 (27)	16 (73)		18 (82)	22 (17)		181 (82)	4 (18)	
Education	Intermediate and below	136 (24)	422 (76)	0.069	156 (84)	30 (16)	0.092	164(88)	22 (12)	0.001***
	Graduate	60 (32)	126 (68)		474 (85)	84 (15)		528 (95)	30 (5)	
	Higher (masters & above)	130 (24)	408 (76)		478 (89)	60 (11)		522 (97)	16 (3)	
Occupation	Employed	158 (25)	476 (75)	0.661	548 (86)	86 (14)	0.722	598 (94)	36 (6)	0.833
	Unemployment	92 (25)	280 (75)		242 (88)	34 (12)		262 (95)	14 (5)	
	Student	76 (28)	200 (73)		318 (86)	54 (14)		354 (95)	18 (5)	
Area of Residence	Urban	68 (29)	164 (71)	0.134	920 (88)	130 (12)	0.007**	996 (95)	54 (5)	0.34
	Rural	258 (25)	792 (75)		188 (81)	44 (19)		218 (94)	14 (6)	
^“Others” included separated, widowed and divorced.										
*P<0.05, **P<.01, ***P<0.001.										

References

- Hui DS, Azhar E, Madani TA, et al. The continuing 2019-nCoV epidemic threat of novel coronaviruses to global health—The latest 2019 novel coronavirus outbreak in Wuhan, China. *International Journal of Infectious Diseases*. 2020; 91: 264–66.
- Naming the coronavirus disease (COVID-19) and the virus that causes it. [https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-\(covid-2019\)-and-the-virus-that-causes-it](https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-(covid-2019)-and-the-virus-that-causes-it). (Accessed 28 February 2020).
- “CoV2020”. GISAID EpifluDB. <https://web.archive.org/web/20200112130540/https://platform.gisaid.org/epi3/start/CoV2020>
- WHO Director-General’s opening remarks at the media briefing on COVID-19 <https://www.who.int/dg/speeches/detail/who-director-general-s-openingremarks-at-the-media-briefing-on-covid-19---11-march-2020>. (Accessed 11 March 2020).
- Worldometer. Coronavirus cases. <https://www.worldometers.info/coronavirus/>. (Accessed 18 August 2021).
- Government of Pakistan. : <https://covid.gov.pk/stats/pakistan>. (Accessed 10 June 2021)
- WHO. Coronavirus. https://www.who.int/health-topics/coronavirus#tab=tab_1. (Accessed 11 April 2020).
- CDC. "Coronavirus Disease 2019 (COVID-19) Symptoms". [cited 2020 March 27]. <https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>. (Accessed 27 March 2020).
- Hopkins C. "Loss of sense of smell as marker of COVID-19 infection". Ear, Nose and Throat surgery body of United Kingdom. (Accessed 8 March 2020).
- Muhmmad S, Ali A, Aqsa G, et al. Public’s Knowledge and Practices regarding COVID-19: A cross-sectional survey from Pakistan. 2020. <https://www.medrxiv.org/content/10.1101/2020.06.01.20119404v1.full.pdf>
- WHO. Coronavirus. Available from: https://www.who.int/health-topics/coronavirus#tab=tab_1 (Accessed 20 May 2020).
- World Health Organization (WHO). Q&A on coronaviruses. <https://www.who.int/news-room/q-a-detail/q-a-coronaviruses>
- Government UK. Guidance on social distancing for everyone in the UK <https://www.gov.uk/government/publications/covid-19-guidance-on-social-distancing-and-for-vulnerable-people/guidance-on-social-distancing-for-everyone-in-the-uk-and-protecting-older-people-and-vulnerable-adults>. Retrieved 25 March 2020. (Accessed 25 March 2020).
- Huaxia. Pakistan announces lockdown of major provinces to curb COVID-19 spread. Xinhuanet 2020. http://www.xinhuanet.com/english/2020-03/24/c_138910694.htm
- Al-Mohrej OA, Al-Shirian SD, Al-Otaibi SK, et al. Is the Saudi public aware of Middle East respiratory syndrome? *J Infect Public Health* 2016; 9:259–66. doi: 10.1016/j.jiph.2015.10.003
- Robin W. Battling the pandemic of misinformation, *The Harvard Gazette*, 2020. <https://news.harvard.edu/gazette/story/2020/05/social-media-used-to-spread-create-covid-19-falsehoods/>
- Pakistan Telecommunication Authority. Paradigm Technologies Broadband Subscribers Survey. 2020. http://www.pta.gov.pk/media/bb_sub_sur_report_10.pdf
- Al-Hanawi. Knowledge, Attitude and Practice Toward COVID-19 Among the Public in the Kingdom of Saudi Arabia: A Cross-Sectional Study. *Frontiers in Public Health*. <https://doi.org/10.3389/fpubh.2020.00217> (Accessed 27 May 2020).
- Hussain W. Role of Social Media in COVID-19 Pandemic. *The International Journal of Frontier Sciences* 2020; 4. 10.37978/tjfs.v4i2.144. https://www.researchgate.net/publication/340772623_Role_of_Social_Media_in_COVID-19_Pandemic
- Al-Mohrej OA, Al-Shirian SD, Al-Otaibi SK, et al. Is the Saudi public aware of Middle East respiratory syndrome? *J Infect Public Health* 2016; 9:259–66. doi: 10.1016/j.jiph.2015.10.003
- The public service message by Dettol Pakistan and Ministry of National Health Services, Regulations & Coordination Islamabad, 2020, Hoga Saaf Pakistan Mahira Khan. <https://www.facebook.com/1455233781383220/posts/2554697634770157/?vh=e>
- National Institute of Health, Pakistan. COVID-19. 2020. www.nih.org.pk
- Zhong BL.; Luo W, Li HM, 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, 1745.
- <file:///C:/Users/Hp/Downloads/ijerph-17-03347-v2.pdf>
- WHO. Coronavirus Disease (COVID-19) Advice for the Public. 2020. (cited 2020 April 20). Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public>

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