

Awareness of COVID-19: What do Pakistanis perceive? A Large Survey of 1200 Residents

Zoya Fatima Rizwan Ladiwala

Dr Ruth KM Pfau Civil Hospital Karachi

Rubaid Azhar Dhillon

Riphah International University Islamic International Medical College

Ibrahim Zahid

Dr Ruth KM Pfau Civil Hospital Karachi

Omar Irfan (✉ omarirfan1@hotmail.com)

Hospital for Sick Children <https://orcid.org/0000-0003-0921-1456>

Muhammad Sharjeel Khan

Altamash Institute of Dental Medicine

Safia Awan

Aga Khan University Hospital

Javaid Ahmad Khan

Aga Khan University Hospital

Research article

Keywords: Coronavirus, Pandemic, Pakistan, Attitude, Perception, Knowledge

Posted Date: October 15th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-55330/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Version of Record: A version of this preprint was published on January 5th, 2021. See the published version at <https://doi.org/10.1186/s12889-020-10083-y>.

Abstract

Background: The Novel Coronavirus Disease (COVID-19) has created havoc globally as countries worldwide struggle to combat this pandemic. Since prevention and social isolation are known to be the only ways to prevent the spread of COVID-19, this has created challenges among the lower-middle income countries (LMIC) including Pakistan, as it battles between an under-resourced healthcare, an economic shutdown, and widespread myths and misconceptions. Therefore, we conducted a study to evaluate the knowledge, attitude and perceptions regarding COVID-19 as public understanding is vital to help facilitate the control of this outbreak.

Methods: A pre-validated online questionnaire was distributed among the general population of Pakistan from 1st to 12th June 2020. Descriptive statistics were analyzed using SPSS v25. Adequate knowledge was assigned as a score of >4 (range: 0-8) and good perception as a score of >3 (range: 0-5). Chi-square test was used to determine the significance of difference in knowledge and perception of COVID-19 among socio-demographics. Logistic regression analysis was run to identify factors associated with adequate knowledge and perception. $P < 0.05$ was considered as significant.

Results: A total of 1200 respondents participated in this study with a wide range of age groups and education. Majority of the respondents had adequate knowledge (93.3%) with a mean score of 6.59 ± 1.35 , and good perception (85.6%) with a mean score of 4.29 ± 0.82 . Significant differences in knowledge and perception were observed among genders, age groups, education and between students and employees in the healthcare and non-healthcare department. A multivariable analysis revealed an advanced degree and a female gender to be significant predictors of adequate knowledge and perception.

Conclusions: Albeit the surge of COVID-19 cases in Pakistan, the participants demonstrated an overall adequate knowledge and good perception towards COVID-19. Perhaps, a potential hint towards noncompliance practices in following preventive protocols requires further educational interventions that target safe health practices and complications of this infection.

Background

The rapidly evolving outbreak of the Novel Coronavirus Disease (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has proven to be a matter of utmost concern amongst global authorities, as countries worldwide struggle to combat this pandemic. COVID-19 is an emerging respiratory illness that was first detected in Wuhan, China on 12th December 2019 [1]. As the world is thoroughly well-connected via trade, business and travel, the virus has since then managed to affect 212 countries and territories worldwide. This eventually led to the World Health Organization (WHO) declaring COVID-19 a public health emergency of international concern on 30th January 2020 and subsequently a global pandemic on 11th March 2020 [2].

The two concerning features of this virus are low pathogenicity and high transmissibility, which has led to an exceedingly high prevalence and fatalities caused by it, as compared to its predecessors [3]. The WHO

report revealed a global mortality rate of COVID-19 to be 3.4% [4]. Currently, no specific treatment of COVID-19 exists and prevention and social isolation have been the only recognized ways to control the spread. Some evidence has emerged regarding the efficacy of Dexamethasone in critical cases of COVID-19, as reported from a recovery trial in the United Kingdom [5]. Nonetheless, high prevalence and no definite treatment has indeed created unimaginable challenges in the lower middle income countries (LMIC) where extended periods of lockdowns along with the lack of infrastructure, under- resourced healthcare and weak financial governance has led to crippling economies, escalating unemployment rates and an ever increasing burden on healthcare.

Pakistan, with a limited allotted health care budget lacks sufficient medical equipment such as ventilators, hospital gowns and personal protective equipment to combat the ongoing pandemic [6]. Despite strict measures enforced by the government, up until July 17, 2020, a grim total of 260,000 cases with over 5000 deaths have been reported nationally. The provincial governments enforced a nationwide lockdown during early March which was unfortunately partly opposed by hard-line clerics and religious activists who insisted citizens to continue routine congregational prayers at mosques [7]. During the course of this pandemic, several incidents of mass gatherings have been observed nationally, demonstrating poor knowledge of the outbreak.

The fragmented healthcare system of Pakistan coupled with the uncooperative attitude of the local population and the religious protestors to social distancing measures alongside the overall poor health literacy calls for an urgent strategic plan. Therefore, we conducted this study to assess the knowledge, attitude and perception of the Pakistani population towards COVID-19, and to identify factors affecting the knowledge and perception scores among the residents. Through our study, we aim to help raise awareness and clear misconceptions regarding COVID-19, in this way preventing the already -stretched healthcare system of Pakistan from being overwhelmed.

Methods

A national adaptive cross-sectional study was conducted among the general population of Pakistan from 1st to 12th June 2020 to assess their knowledge, attitude and perceptions regarding COVID-19. The Ethical Review Committee of Islamic International Medical College, Rawalpindi, Pakistan approved our study protocol before we initiated the formal survey.

Due to the mode of transmission through human interaction of SARS-CoV-2, we opted for an online medium to collect responses. The questionnaire was originally produced in the English language but was also translated to Urdu by the research investigators in order to interview participants orally who were non-fluent in English. This was then back-translated to ensure validity. The targeted population, selected on the basis of non-probability convenience sampling, consisted of participants aged 15 years and above who were permanent residents of Pakistan and wished to voluntarily take part in the study. A written parental consent was obtained on behalf of participants below the age of 16. The Ethical Review Committee approved the use of implied consent to participate upon completion of the questionnaire. The

aim of the study with an acknowledgment of consent was appended within the survey; those who were not willing to participate were excluded.

A self-administered questionnaire, designed after going through previously validated questionnaires from similar published studies [8, 9] and online published surveys was formulated as a tool for data collection. A pilot study among ten health care professionals was conducted to ensure clarity, relevance and compliance, following which necessary changes were made accordingly. These responses were excluded from the final results. The survey comprised of 34 questions which was divided into three sections: 1) Socio-demographic characteristics, 2) Knowledge and perceptions of COVID-19 and 3) Attitude towards COVID-19. Participants were also provided with an opportunity to view the correct answers at the end of the survey through which we accomplished our goal of educating and raising awareness of the disease. Through extensive and widespread sharing, we aimed to collect forms from all provinces of Pakistan to arrive at a general consensus.

The sample size was estimated using the software Epi-Info for the survey with 50% expected to lack knowledge on the subject. With an error bound of 0.03 (3%) and 95% confidence interval (CI), the maximum sample size was calculated as 683. This was further increased by 76% to a total of 1200 participants to ensure maximal representation of the population. Descriptive analysis was performed to calculate frequencies and percentages for the socio-demographic characteristics, knowledge, attitude and perceptions towards COVID-19 using Statistical Package for the Social Sciences (SPSS) version 25. Results were reported as mean \pm standard deviation for quantitative variables and frequencies (proportions) for qualitative variables. The responses to questions regarding knowledge and perception were scored as '1' (correct) and '0' (wrong), with scores ranging from 0 to 8 and 0 to 5 respectively. A cutoff level of ≤ 4 was considered as poor knowledge whereas > 4 as adequate knowledge. Likewise, perception was classified as good (score > 3) or poor (score ≤ 3). The comparison of adequate knowledge and perception among groups within the socio-demographics was assessed by using the Chi-square test or Fisher Exact test where appropriate. Finally, univariate and multivariate analyses was done to compare the knowledge and perception scores with each variable of interest. All *p*-values were two sided and considered as statistically significant if < 0.05 .

Results

A total of 1200 participants completed the online questionnaire. As shown in Table 1, most of the population was aged between 20–29 years (44.6%, *n* = 535). Majority of the respondents were unmarried (56.9%, *n* = 683) and were residents of Sindh province (77.8%, *n* = 934). More than half (58.5%, *n* = 702) of our sample had completed a bachelor's degree. On the other hand, 38.1% (*n* = 457) of the participants were students, out of which the majority (57.5%, *n* = 263) were enrolled in a health care related field. Roughly, one quarter (22.7%, *n* = 273) of the population were either smokers or had quit smoking. A greater part of the sample (86.3%, *n* = 1036) had not contracted the COVID-19 virus.

Table 1
Demographic characteristics and comparison of adequate knowledge and perceptions ($n = 1200$)

	n (%)	Adequate knowledge;	<i>p</i> value	Good perception;	<i>p</i> value
		n (%)		n (%)	
Age	123(10.3)	113(91.9)	0.001*	103(83.7)	0.001*
15–19	535(44.6)	517(96.6)		483(90.3)	
20–29	202(16.8)	182(90.1)		165(81.7)	
30–39	136(11.3)	127(93.4)		114(83.8)	
40–49	116(9.7)	103(88.8)		94(81.0)	
50–59	88(7.3)	78(88.6)		68(77.3)	
60+					
Gender	459(38.3)	404(88.0)	< 0.001*	366(79.7)	< 0.001*
Male	741(61.8)	716(96.6)		661(89.2)	
Female					
Marital status	517(43.1)	468(41.8)	0.001*	420(81.2)	< 0.001*
Married	683(56.9)	652(58.2)		607(88.9)	
Single					
Education	26(2.2)	19(73.1)	< 0.001*	12(46.2)	< 0.001*
No education	30(2.5)	19(63.3)		14(46.7)	
Primary school	201(16.8)	181(90.0)		164(81.6)	
Secondary school	702(58.5)	672(95.7)		624(88.9)	
Bachelor degree	241(20.1)	229(95.0)		213(88.4)	
Advanced degree					
Student	457(38.1)	441(96.5)	0.001*	409(89.5)	0.002*
Yes	743(61.9)	679(91.4)		618(83.2)	
No					

* $p < 0.05$ is considered significant

	n (%)	Adequate knowledge;	p value	Good perception;	p value
	n (%)			n (%)	
Student in healthcare	263(21.9)	257(97.7)	0.001*	248(94.3)	< 0.001*
Yes	194(16.2)	184(94.8)		161(83.0)	
No	743(61.9)	679(91.4)		618(83.2)	
N/A					
Type of job	171(14.3)	167(97.7)	< 0.001*	163(95.3)	< 0.001*
Healthcare	475(39.6)	423(89.1)		383(80.6)	
Non-healthcare	554(46.2)	530(95.7)		481(86.8)	
N/A					
Lost job due to COVID-19	95(7.9)	86(90.5)	0.49	81(85.3)	0.98
Yes	765(63.8)	717(93.7)		654(85.5)	
No	340(28.3)	317(93.2)		292(85.9)	
N/A					
Province of residence	934(77.8)	864(92.5)	0.20	784(83.9)	0.009*
Sindh	183(15.3)	178(97.3)		170(92.9)	
Punjab	27(2.3)	26(96.3)		26(96.3)	
Balochistan	43(3.6)	40(93.0)		35(81.4)	
KPK	13(1.1)	12(92.3)		12(92.3)	
Gilgit and Baltistan					
Smoking status	149(12.4)	135(90.6)	0.04*	124(83.2)	0.08
Smoker	927(77.3)	874(94.3)		804(86.7)	
Never smoker	124(10.3)	111(89.5)		99(79.8)	
Quit smoking					

* $p < 0.05$ is considered significant

Table 2 depicts the knowledge related to COVID-19. The majority (70.5%, n = 846) of the respondents answered correctly that COVID-19 is transmitted through air droplets and contact. A considerable (89.6%, n = 1075) part of the survey acknowledged that COVID-19 can lead to pneumonia and respiratory failure and more than three fourths (79.2%, n = 950) agreed that supportive care is the current treatment. Moreover, almost the entire population (97.8%, n = 1173) were aware of preventive measures. Overall,

93.3% ($n = 1120$) of our sample exhibited adequate knowledge of COVID-19 with a mean score of 6.59 ± 1.35 (range: 0–8).

Table 2
Knowledge and perceptions of COVID-19

	Yes	No	I do not know
KNOWLEDGE			
COVID-19 is thought to be originated from animals including bats and pangolins?	701(58.4)	168(14)	331(27.6)
COVID-19 is transmitted through air droplets and contact?	846(70.5)	233(19.4)	121(10.1)
Headache, fever, cough, sore throat, and flu are common symptoms of COVID-19?	1114(92.8)	42(3.5)	44(3.7)
The period between exposure to the infection and appearance of symptoms (incubation period) of COVID-19 is 2-14days?	1085(90.4)	27(2.3)	88(7.3)
COVID-19 can lead to pneumonia, and respiratory failure	1075(89.6)	28(2.3)	97(8.1)
Supportive care is the current treatment for COVID-19?	950(79.2)	70(5.8)	180(15)
Covering nose and mouth while coughing, and avoiding sick contacts and crowded places such as train stations and public transportations can help in the prevention of COVID-19 transmission?	1173(97.8)	10(0.8)	17(1.4)
Ordinary residents can wear general medical masks to prevent the infection by the COVID-19 virus?	957(79.8)	163(13.6)	80(6.7)
Knowledge score; mean \pm SD; range	6.59 \pm 1.35; 0-8		
Adequate knowledge	1120(93.3)	80(6.7)	
PERCEPTION			
Those who are elderly or chronically ill are more likely to be severely affected?	836(69.7)	280(23.3)	84(7.0)
COVID-19 can be fatal?	1059(88.3)	53(4.4)	88(7.3)
Washing hands with soap and water can help in the prevention of COVID-19 transmission?	1181(98.4)	7(0.6)	12(1.0)
Flu vaccination is sufficient for preventing COVID-19?	51(4.3)	905(75.4)	244(20.3)
Sick patients should share their recent travel history with healthcare providers?	1162(96.8)	16(1.3)	22(1.8)
Perception score; mean \pm SD; range	4.29 \pm 0.82; 0-5		
Good perception	1027(85.6)	173(14.4)	

Table 3 shows the overall attitude regarding COVID-19. While 415 (34.6%) participants believed that the COVID-19 virus was developed intentionally, an equal number of interviewees were not entirely sure about the emergence of it. Though, more than half (58.2%, n = 698) of the population was following the quarantine regulations imposed by the government ‘to a great extent’; fairly 36.8% (n = 441) showed just a ‘neutral’ attitude regarding the competency of the government of Pakistan in controlling the pandemic. Fear levels regarding infection of COVID-19 varied as 32.8% (n = 394) were afraid of themselves and their families from getting infected. An optimistic attitude was observed as 67.3% (n = 807) agreed that COVID-19 will be successfully controlled.

Table 3
Attitude towards COVID-19

	n (%)
How do you think COVID-19 came about?	415(34.6)
Came about naturally	322(26.8)
Developed intentionally in a lab	48(4.0)
Made accidentally in a lab	415(34.6)
Not sure	
How soon will the vaccine for COVID-19 develop?	504(42)
In a year or more	377(31.4)
In the next few months	21(1.8)
Now	16(1.3)
Not possible to create a vaccine	282(23.5)
Not sure	
According to you, how much of the news and information about COVID-19 is made-up?	435(36.3)
A lot	577(48.1)
Some	148(12.3)
Not much	40(3.3)
Not at all	
Do you agree that 'God has control over the spread of COVID-19'; therefore congregational prayers in the country cannot be a source of infection?	245(20.4)
Agree	773(64.4)
Disagree	182(15.2)
I don't know	
To what extent are you following the quarantine regulations imposed by the government?	27(2.3)
Not at all	154(12.8)
To some extent	321(26.8)
To a moderate extent	698(58.2)
To a great extent	

	n (%)
To what extent do you agree/disagree that the Government of Pakistan is controlling the COVID-19 situation very well?	80(6.7)
Strongly disagree	170(14.2)
Disagree	441(36.8)
Neutral	431(35.9)
Agree	78(6.5)
Strongly agree	
In recent days, have you worn a mask when leaving home?	1020(85)
Yes	93(7.8)
No	87(7.2)
Never left home	
To what extent do you agree or disagree with the following statement 'I am afraid that I & someone in my household will be infected by COVID-19'?	76(6.3)
Strongly disagree	138(11.5)
Disagree	373(31.1)
Neutral	394(32.8)
Agree	219(18.3)
Strongly agree	
Do you agree that COVID-19 will be successfully controlled?	807(67.3)
Agree	78(6.5)
Disagree	315(26.3)
I don't know	

Majority (85.6%, n = 1027) of the Pakistani residents showed good perception of COVID-19 with a mean score of 4.29 ± 0.82 (range: 0–5). As indicated by Table 2, almost all participants knew that washing hands with soap and water can help in the prevention of COVID-19 transmission (98.4%, n = 1181) and that sick patients should share their recent travel history with health care (96.8%, n = 1162). However, roughly one third (30.3%, n = 364) of the sample was not aware that elderly and chronically ill patients were more likely to be severely affected and nearly a quarter (24.6%, n = 295) of the respondents did not know that flu vaccination is not sufficient for preventing COVID-19.

Significant differences ($p < 0.05$) in knowledge and perception across both genders as well as among all age groups, education groups and between students and employees in the healthcare and non-healthcare

department were noted (Table 1). Across province of residence, there was a significant difference in perception ($p < 0.05$). Likewise, a significant difference in knowledge ($p < 0.05$) between smokers and non-smokers existed.

On multivariable analysis for knowledge, age groups of 30–39 and 50–59 years had significantly lower knowledge. Female gender and an education level of minimum bachelors were significantly associated with adequate knowledge (Table 4). Likewise, female gender, a minimum education level of bachelor's and being employed in the healthcare system was significantly associated with good perception (Table 5).

Table 4
Univariate and Multivariable logistic regression for knowledge

	Odds ratio (95% CI)	p value
UNIVARIATE ANALYSIS		
Age	1.0	0.02*
15–19	2.54(1.14–5.65)	0.59
20–29	0.80(0.36–1.78)	0.64
30–39	1.24(0.49–3.18)	0.42
40–49	0.70(0.29–1.66)	0.43
50–59	0.69(0.27–1.73)	
60+		
Gender	1.0	< 0.001*
Female	0.25(0.15–0.41)	
Male		
Marital status	1.0	0.001*
Married	2.20(1.38–3.50)	
Single		
Education	1.0	0.43
No education	0.63(0.20–1.99)	0.01*
Primary school	3.33(1.24–8.90)	< 0.001*
Secondary school	8.25(3.22–21.13)	< 0.001*
Bachelor degree	7.03(2.47–19.95)	
Advanced degree		
Student	1.0	0.001*
No	2.59(1.48–4.55)	
Yes		

* $p < 0.05$ is considered significant

CI: Confidence Interval

	Odds ratio (95% CI)	p value
Type of job; n = 646	1.0	0.002*
Non-healthcare	5.13(1.82–14.41)	
Healthcare		
Lost job due to COVID-19	1.0	0.24
No	0.64(0.30–1.34)	
Yes		
Province of residence	1.0	0.02*
Sindh	2.88(14-7.24)	0.46
Punjab	2.10(0.28–15.75)	0.90
Balochistan	1.08(0.32–3.58)	0.97
KPK	0.97(0.12–7.58)	
Gilgit and Baltistan		
Smoking status	1.0	0.08
Smoker	1.71(0.92–3.16)	0.76
Never smoker	0.88(0.40–1.96)	
Quit smoking		
	Adjusted Odds ratio (95% CI)	p value
MULTIVARIATE ANALYSIS		
Age	1.0	0.89
15–19	1.06(0.43–2.58)	0.03*
20–29	0.37(0.14–0.94)	0.38
30–39	0.63(0.22–1.78)	0.02*
40–49	0.32(0.12–0.87)	0.06
50–59	0.37(0.13–1.04)	
60+		

* $p < 0.05$ is considered significant

CI: Confidence Interval

	Odds ratio (95% CI)	<i>p</i> value
Gender	1.0	< 0.001*
Female	0.33(0.20–0.57)	
Male		
Education	1.0	0.58
No education	0.71(0.21–2.35)	0.30
Primary school	1.73(0.60–4.97)	0.001*
Secondary school	5.37(2.01–14.36)	0.001*
Bachelor degree	6.47(2.21–18.98)	
Advanced degree		
<i>*p</i> <0.05 is considered significant		
CI: Confidence Interval		

Table 5
Univariate and Multivariable logistic regression for perception

	Odds ratio (95% CI)	p value
UNIVARIATE ANALYSIS		
Age	1.0	0.03*
15–19	1.80(1.03–3.15)	0.63
20–29	0.86(0.47–1.57)	0.98
30–39	1.006(0.51–1.95)	0.58
40–49	0.83(0.42–1.61)	0.23
50–59	0.66(0.33–1.31)	
60+		
Gender	1.0	< 0.001*
Male	2.09(1.51–2.90)	
Female		
Marital status	1.0	< 0.001*
Married	1.84(1.33–2.55)	
Single		
Education	1.0	0.96
No education	1.02(0.35–2.92)	< 0.001*
Primary school	5.17(2.21–12.09)	< 0.001*
Secondary school	9.33(4.16–20.90)	< 0.001*
Bachelor degree	8.87(3.73–21.09)	
Advanced degree		
Student	1.0	0.003*
No	1.72(1.20–2.45)	
Yes		

* $p < 0.05$ is considered significant

CI: Confidence Interval

	Odds ratio (95% CI)	p value
Type of job n = 646	1.0	< 0.001*
Non-healthcare	4.89(2.32–10.31)	
Healthcare		
Lost job due to COVID-19	1.0	0.95
No	0.98(0.53–1.79)	
Yes		
Province of residence	1.0	0.002*
Sindh	2.50(1.38–4.51)	0.11
Punjab	4.97(0.67–36.93)	0.65
Balochistan	0.83(0.38–1.84)	0.42
KPK	2.29(0.29–17.78)	
Gilgit and Baltistan		
Smoking status	1.0	0.24
Smoker	1.31(0.82–2.10)	0.47
Never smoker	0.79(0.43–1.47)	
Quit smoking		
	Adjusted Odds ratio (95% CI)	p value
MULTIVARIATE ANALYSIS		
Gender	1.0	0.004*
Male	2.07(1.25–3.44)	
Female		

* $p < 0.05$ is considered significant

CI: Confidence Interval

	Odds ratio (95% CI)	<i>p</i> value
Education	1.0	0.53
No education	1.42(0.46–4.41)	0.03*
Primary school	3.51(1.06–11.52)	< 0.001*
Secondary school	5.53(2.29–13.35)	< 0.001*
Bachelor degree	7.74(3.003–19.99)	
Advanced degree		
Type of job	1.0	0.008*
Non-healthcare	2.90(1.32–6.39)	
Healthcare		
<i>*p</i> <0.05 is considered significant		
CI: Confidence Interval		

Discussion

Epidemics and pandemics are occasional circumstances, and they bring multiple challenges for the affected population. Paucity of knowledge may lead to nonchalant behavior making it difficult to curb the disease. Pakistan, with its poor infrastructure, lack of emergency preparedness mechanisms and substandard testing rates struggles to combat the coronavirus. The number of recorded cases has grown exponentially, especially after the lockdown imposed in March 2020 was eased in May 2020 due to religious festivities; with a daily rise of approximately 1000 cases per million population. Punjab and southern Sindh provinces which make up 75% of the total cases in Pakistan, have slightly over only 14,000 beds for COVID-19 patients at state-run and private hospitals [10], causing most of the patients with milder symptoms to be managed at home instead. Moreover, the total number of functional ventilators in the country is just 1650 with varying numbers among provinces [11]. As a result, in an attempt to reform the health sector, Pakistan has inaugurated its first ever local production of ventilators, with an average manufacturing capacity of 250–300 units per month [12].

Research has proven good knowledge to be a significant predictor of correct practices in infection control [13, 14], while highlighting how a knowledge deficit can lead to an inadequacy [8]. The overall adequate knowledge of COVID-19 reported in our survey was 93.3%, which is higher than that in previous studies from Pakistan [15, 16]. This is parallel to a survey conducted in Tanzania where 84.4% had good knowledge [17]. Such figures did not come out as a surprise as the government of Pakistan has taken all the appropriate actions of updating their webpage, providing information regarding prevention and guidelines for the public. Informative television channels, numerous awareness campaigns by local nongovernmental organizations alongside the launch of healthcare related applications over mobile

platforms have played a remarkable role in educating the citizens about the nature of the disease. Additionally, about 80% of the study population had a minimum education level of bachelor's which may account for their high level of knowledge; this is further confirmed by the significant association of education level with adequate knowledge-similar to a study conducted in China [8]. It is interesting to note that the mean knowledge score for our sample was about 82% (6.59/8) which was quite comparable to the more developed parts of the world such as the United States [18] and China [8] with around 80% and 90% mean scores respectively.

In particular, the knowledge regarding symptoms of COVID-19 was good where about 93% were well-aware and around 79% knew that there is only supportive treatment available for the virus; both these findings were in accordance with a study from Jordan [19]. On the other hand, only 70.5% of the sample agreed that the virus spreads through air droplets and contact, whereas a similar study from Egypt [20] showed a wholesome 95% of the population to be aware of the same. About 14% of the sample believed that wearing medical masks does not protect against infection, which is noteworthy, as a report on health care workers reported about 17% to believe the same [21]. On the other hand, where almost 80% from our study agreed that wearing a mask offers protection, only 35% from a study in Egypt had parallel views [20]. These positive findings explain how the seriousness of the disease has been highlighted by multiple media and health platforms during the pandemic, successfully reaching the masses in the country. A study on health care workers from Uganda [21] reported a poor attitude towards COVID-19. However, a study among Malaysian [22], Chinese [8] and Vietnamese [23] citizens showed positive attitudes towards overcoming the COVID-19 crisis.

Despite much less faith in the government of Pakistan, 67.3% were optimistic that COVID-19 would be successfully controlled; though this was relatively low as compared to that in China [8] and Malaysia [22]. The government of Pakistan has taken several actions to limit the dispersion of the virus. Some important measures include suspension of all incoming flights at airports, closure of educational institutions and import of 1000 ventilators until the end of June 2020 [24]. However, despite these extensive preventative measures, 36.8% of the participants showed just a 'neutral' attitude regarding the competency of the government of Pakistan in controlling the pandemic. This wasn't surprising as lockdown restrictions were soon eased and businesses were allowed to operate even though cases were on a rise, leading to the selling of medicines and personal protective items at higher than standard rates illegally [25]. Additionally, the aggressive media and the constant protests by political and religious leaders towards the government's shortfall in controlling the pandemic played an important role in orchestrating the pessimism among citizens [26].

Nonetheless, Pakistan being a LMIC needed to take into account the consequences of an economic downfall due to a complete lockdown and so had little choice but to ease it, since most of the population survives on daily or monthly wages. However, as part of its continued anti-corona strategy, Pakistan's implementation of a limited locality based lockdown ('smart lockdown') instead fairly proved to be successful as the number of cases and mortality rates related to COVID-19 relatively decreased in July 2020 [27]. Even so, the United Nations estimates that developing countries will need \$2.5 trillion in rescue

funding to avoid an economic and health catastrophe [28]. A significant burden on LMIC including Pakistan exists, as it struggles to overcome the constraints associated with improving healthcare reforms along with constantly striving to revive the weakening economy.

A study on Iranian medical students indicated that their women were more aware of the significance of the virus [29], in line with the multivariable analysis from our synthesis. Older participants (of age groups 50 to 59 years) had significantly lower knowledge scores, similar to a study from Egypt [20]. To the contrary, Malaysian citizens above the age of 50 years displayed higher knowledge [30] while another one in Vietnam among health care professionals did not show a relation between age and knowledge [23]. Discrepancies in knowledge across the demographics may have also prevented systemized attempts in decreasing the spread of the virus in Pakistan. For future purposes, it is important for policy makers to design strategies regarding provision of health care awareness resources and guidelines to help fix the gap in knowledge scores among the vulnerable demographics.

Our survey also indicated a significant difference in knowledge between smokers and non-smokers. According to a recent survey conducted by Pakistan Alliance for Nicotine and Tobacco Harm Reduction, 66.7% of smokers were not willing to change their smoking habits during the pandemic and only 41.7% of them believed that smoking increased the risk of getting COVID-19 [31]. This emphasizes the need to raise further awareness in the Pakistani population regarding the severity of COVID-19 symptoms among smokers as many studies in the literature have revealed the same. In a report on COVID-19 infected individuals from China, 12.4% of current smokers and 23.8% of past smokers developed critical disease as compared to only 4.7% of those who had never smoked [32].

Limitations

The study had some limitations. The sample size is acceptably large but might not be enough to be representative of the entire Pakistani population, so the findings should be generalized with caution. The participants were approached through convenience sampling through networks of the data collectors and circulated via multiple social media applications. Additionally, most of the participants are from the younger age group (20–39 years). This might be because the survey was mainly distributed online with 76 million internet users in Pakistan, out of which 63% belong to the ages between 20–25 years, according to a survey by Pakistan Telecommunication Authority [33]. Our survey also mostly included the educated class with most of the respondents bearing a bachelor's degree at minimum and majority (77.4%) of the population residing in an urban metropolitan city like Karachi; this might have led to an overestimation of knowledge and perception of Pakistan's population.

Conclusions

Although our survey shows an overall good knowledge and perception of participants, certain demographics are identifiably less aware than the other with Pakistani residents bearing diversified attitudes towards the pandemic. Moreover, considering the surge in COVID-19 cases in Pakistan, there lies

a possibility of potential noncompliance in practices towards following preventive protocols. This calls for elaborate awareness campaigns that focus on facts laid by WHO and similar bodies to promote uniformity and accuracy in the information delivered.

List Of Abbreviations

COVID-19: Novel Coronavirus Disease

SARS-CoV-2: Severe acute respiratory syndrome coronavirus 2

WHO: World Health Organization

LMIC: Lower middle income countries

CI: Confidence interval

SPSS: Statistical Package for the Social Sciences

OR: Odds ratio

Declarations

Ethics approval and consent to participate:

The Ethical Review Committee of Islamic International Medical College, Rawalpindi, Pakistan approved of our study and an acknowledgement of consent was appended within the online survey for every participant. A written parental consent was obtained on behalf of participants below the age of 16. The Ethical Review Committee approved the use of implied consent to participate upon completion of the questionnaire.

Consent for Publication:

Not applicable.

Availability of data and materials:

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests:

No competing interests to disclose.

Funding:

None.

Authors' contributions:

ZFRL, RAD, OI and JAK were involved in study design. ZFRL, RAD, OI and MSK performed data collection and data interpretation. IZ and SA interpreted and analyzed the data. ZFRL, RAD, IZ, OI and MSK were involved in article writing. JAK was involved in article writing and reviewed the manuscript. All authors have read and approved the final manuscript.

Acknowledgements:

None.

References

1. Zhou P, Yang XL, Wang XG, Hu B, Zhang L, Zhang W, et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin. *Nature*. 2020;579(7798):270-3. doi: [1038/s41586-020-2012-7](https://doi.org/10.1038/s41586-020-2012-7).
2. Rolling Updates on Coronavirus Disease (COVID-19). WHO Available at: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen>
3. Jiang S, Shi Z, Shu Y, Song J, Gao GF, Tan W, et al. A distinct name is needed for the new coronavirus. *Lancet*. 2020;395(10228):949. doi: [1016/S0140-6736\(20\)30419-0](https://doi.org/10.1016/S0140-6736(20)30419-0). [PubMed: [32087125](https://pubmed.ncbi.nlm.nih.gov/32087125/)].
4. World Health Organization. Coronavirus disease (COVID-2019) situation reports. 2020 [internet publication].
5. *New England Journal of Medicine*, 2020. Dexamethasone in Hospitalized Patients with Covid-19 – Preliminary Report. Doi: 1056/NEJMoa2021436
6. com.pk. 2020. *Govt Warns Stern Actions Against Traders Who Raise Face Mask Price: Nausheen Hamid*. [online] Available at: <<https://dailytimes.com.pk/567976/govt-warns-stern-actions-against-traders-who-raise-face-mask-price-nausheen-hamid/>> [Accessed 29 April 2020].
7. com. 2020. *Pakistan'S Coronavirus Lockdown*. [online] Available at: <<https://www.nytimes.com/2020/04/23/world/asia/pakistan-coronavirus-ramadan.html>> [Accessed 5 May 2020].
8. 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;16:1745–1752. pmid:32226294

9. Bhagavathula, A., Aldhaleei, W., Rahmani, J., Mahabadi, M. and Bandari, D., 2020. *Novel Coronavirus (COVID-19) Knowledge And Perceptions: A Survey Of Healthcare Workers.* doi:10.1101/2020.03.09.20033381
10. Anadolu Agency. 'Pakistan's health system braces for COVID-19 peak' by Aamir Latif. 6th June 2020. Available at: <https://www.aa.com.tr/en/asia-pacific/pakistans-health-system-braces-for-covid-19-peak/1867396>
11. Butt T. Coronavirus: Pakistan much deficient in machines designed to provide mechanical ventilation. 2020;1–6. Available from: <https://www.thenews.com.pk/print/630435-coronavirus-pakistan-much-deficient-in-machines-designed-to-provide-mechanical-ventilation>.
12. Pakistan starts local production of ventilators. *Arab news*; July 06, 2020. Available from: <https://www.arabnews.pk/node/1700796/pakistan>
13. Chen S, Qiu Z, Xu L, Chen J, Lin Y, Yang Y. et al. People groups' responses to SARS in the community. Chinese Rural Health Service Administration. 2003; 23:15–8.
14. Pawlowski B, Atwal R, Dunbar R. Sex Differences in Everyday Risk-Taking Behavior in Humans Evolutionary Psychology. 2008; 6: 29-42.
15. Hayat K, Rosenthal M, Xu S, Arshed M, Li P, Zhai P, Desalegn GK, Fang Y. View of Pakistani Residents toward Coronavirus Disease (COVID-19) during a Rapid Outbreak: A Rapid Online Survey. *International Journal of Environmental Research and Public Health*. 2020; 17(10):3347.
16. Mubeen, S., Kamal, S., Kamal, S. and Balkhi, F., 2020. Knowledge and awareness regarding spread and prevention of COVID-19 among the young adults of Karachi. *Journal of the Pakistan Medical Association*. 2020; 70(5)
17. Rugarabamu, S., Byanaku, A., & Ibrahim, M. (2020). Knowledge, attitudes, and practices (KAP) towards COVID-19: A quick online cross-sectional survey among Tanzanian residents. *BMJ Yale*. doi:10.1101/2020.04.26.20080820
18. Clements JM. Knowledge and Behaviors Toward COVID-19 Among US Residents During the Early Days of the Pandemic: Cross-Sectional Online Questionnaire JMIR Public Health Surveill 2020;6(2):e19161 DOI: 10.2196/19161 PMID: 32369759
19. Hamed Alzoubi, Nedal Alnawaiseh, Asma'a Al-Mnayyis, Mohammad Abu- Lubada, Amin Aqel and Hani Al-Shagahin, COVID-19 - Knowledge, Attitude and Practice among Medical and Non-Medical University Students in Jordan, *J. Pure Appl. Microbiol.*, 2020; 14(1):17-24.
20. Abdelhafiz, A.S., Mohammed, Z., Ibrahim, M.E. et al. Knowledge, Perceptions, and Attitude of Egyptians Towards the Novel Coronavirus Disease (COVID-19). *J Community Health* (2020). doi 10.1007/s10900-020-00827-7
21. Olum R, Chekwech G, Wekha G, Nassozzi DR, Bongomin F. Coronavirus Disease-2019: Knowledge, Attitude, and Practices of Health Care Workers at Makerere University Teaching Hospitals, Uganda. *Front Public Health*. 2020;8:181. Published 2020 Apr 30. doi:10.3389/fpubh.2020.00181
22. Azlan, A., Hamzah, M., Sern, T., Ayub, S. and Mohamad, E., 2020. Public knowledge, attitudes and practices towards COVID-19: A cross-sectional study in Malaysia. *PLOS ONE*, 15(5), p.e0233668.

23. Giao H, Han NTN, 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 Pacific J Trop Med.* 13:3–5. 10.4103/1995-7645.280396
24. Asad Hashim. Smart lockdown' in Pakistan to target 500 coronavirus hotspots. *Al Jazeera*; 23rd Jun 2020. Available at: <https://www.aljazeera.com/news/2020/06/lockdown-pakistan-target-500-coronavirus-hotspots-200623072202544.html>
25. Tufail Ahmad. Profiteering in Karachi: Making the most of the coronavirus panic. *Tribune*; 18th February 2010. Available at: <https://tribune.com.pk/story/2158902/1-making-coronavirus-panic>
26. Umair Jamal. Governing Ineffectively: Has Pakistan's Ruling Party Turned a Health Crisis Into a Political Crisis? *The Diplomat*; 23rd June 2020. Available from: <https://thediplomat.com/2020/06/governing-ineffectively-has-pakistans-ruling-party-turned-a-health-crisis-into-a-political-crisis/>
27. Pakistan Celebrating Victory Against Coronavirus Pandemic As COVID-19 Cases Go Down. *EurAsian Times Desk*, 16th July 2020. Available at: <https://eurasiantimes.com/pakistan-celebrating-victory-against-coronavirus-health-experts-urge-patience/>
28. UN calls for \$2.5 trillion coronavirus crisis package for developing countries [2020] <https://unctad.org/en/pages/newsdetails.aspx?OriginalVersionID=2315>
29. 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):249–254. doi: 10.34172/aim.2020.06.
30. Cao J, Hu X, Cheng W, Yu L, Tu W-J, Liu Q. Letter to the editor: clinical features and short-term outcomes of 18 patients with corona virus disease 2019 in intensive care unit. *Intensive Care Med.* 2020
31. Rapid Assessment of Smoking and Vaping in Pakistan during COVID-19 Lockdown. Accessed from: <http://www.panthr.org/publications/Vaping-and-Smoking-Survey-Report.pdf>
32. Guan W, Ni Z, Hu Y, et al. Clinical characteristics of coronavirus disease 2019 in China. *N Engl J Med* 2020; epub ahead of press.
33. Broadband Subscribers Survey by Pakistan Telecommunication Authority. Accessed from: https://www.pta.gov.pk/media/bb_sub_sur_report_10.pdf

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Questionnaire.docx](#)