

# How are Young Adults in Pakistan dealing with COVID-19: An Online Survey Assessing the Impact of Demographic Characteristics and Sources of Information on Awareness and Behaviors

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## Research article

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# Abstract

## Background:

The ongoing COVID-19 pandemic has impacted a large majority of Pakistan's population, with one particular demographic of stakeholders being the country's young adult population. Our study looks to understand levels COVID-19-related awareness, perceptions, and behaviors, and sources of COVID-19-related knowledge, amongst Pakistan's young adult population.

## Methods:

This survey was conducted by the Aga Khan University over July-October 2020, via a Google Form disseminated on multiple social media platforms. All respondents aged between 18-35 years and currently residing in Pakistan were included.

## Results:

The questionnaire received a total of 406 responses with the respondents having a mean age of  $25.15 \pm 5.80$  years. 52.5% of the respondents were currently students. The vast majority relied on social media (83.7%), internet blogs/websites (83.3%) and newspapers/television (70.7%) as major sources of information regarding COVID-19. The highest percentage of individuals believed spread was possible through contaminated surfaces (95.3%), while 86.4% believed spread was possible via inhalation of droplets, and 52.0% via close contact with asymptomatic individuals. Alarming, 21.9% believed that transmission was possible through contact with packages shipped from China, and 16% believed COVID-19 could be contracted by eating food in Chinese restaurants. Moreover, 24.1% believed COVID-19 to be a biological weapon designed in a laboratory, while 23.9% were unsure.

## Conclusions:

Our survey revealed some deficiencies in the understanding of transmission of SARS-CoV-2, along with racial biases and the prevalence of misinformation. Since young adults play an important role in the global response to the pandemic, our study suggests interventions that target the young adults in Pakistan in an attempt to increase their awareness about the pandemic and help them cope with its effects.

# Background

Since being declared a pandemic by the World Health Organization (WHO) in March 2020 <sup>(1)</sup>, COVID-19 (coronavirus disease 2019) has posed a hitherto unprecedented challenge to health systems worldwide. However, a major threat to the global response to COVID-19 remains the prevalence of misinformation amongst the general public, which is fuelled oftentimes by the media <sup>(2)</sup>.

The young adults within a population comprises a special demographic of stakeholders in the COVID-19 pandemic. People in this age group are most likely to have active social lives <sup>(3)</sup> and spend more time doing activities that require social interaction <sup>(4)</sup>. Moreover, young adults routinely use networking sites for online communication <sup>(5)</sup>, with individuals aged between 18–29 being the most likely demographic to be on social media <sup>(6)</sup>. Social media often facilitates the spread of vaccine misinformation <sup>(7)</sup>, and those who rely on social media are more likely to remain misinformed about vaccinations <sup>(8)</sup>. For example, in America, 1 in 5 adults aged 18–29 years believe that early childhood vaccinations can cause autism <sup>(9)</sup>. Vaccine hesitancy threatens to be a challenge to mass immunizations if and when a COVID-19 vaccine is available <sup>(10,11)</sup>, and it is possible that young adults may form the bulk of this resistance as seen with the influenza vaccine. With physical social interactions unfeasible during this pandemic, and the thriving existence of COVID-19-related misinformation on social media <sup>(12,13)</sup>, young adults may be uniquely affected by the COVID-19 pandemic.

Pakistan's young adult population (aged 18–40) comprises around 30% of the country's total population <sup>(14)</sup>. Given the impending second wave of COVID-19 cases in Pakistan <sup>(15)</sup>, with cases already exceeding 372,000 and deaths exceeding 7,600

as of November 21st, 2020 <sup>(16)</sup>, it is imperative to understand the COVID-19-related awareness and perceptions amongst the country's young adult population. Though surveys assessing COVID-19-related awareness have been conducted in the general population of various countries <sup>(17–19)</sup>, including Pakistan <sup>(20)</sup>, these did not specifically highlight the perspectives of young adults. Thus, this study aimed to assess the COVID-19-related knowledge, perceptions, and behaviour, as compare these across demographics and sources of information, amongst young adults in Pakistan.

## Methods

A cross-sectional survey was conducted amongst the adult general population in Pakistan after obtaining ethical approval from the Institutional Review Board at the Aga Khan University (AKU). A minimum sample size of 384 was calculated using OpenEpi with 95% confidence interval and 5% confidence limits. The survey, which was self-designed and pre-tested by the research team, was disseminated as a Google Form on multiple social media platforms (WhatsApp, Twitter, Facebook, Instagram).

A consent form preceding the survey described the scope and nature of the study, and no personal identifiers were recorded in the survey. The survey contained the following six sections: (1) demographics; (2) perceptions of young adults regarding COVID-19; (3) behavior changes of young adults due to COVID-19; (4) perception of young adults regarding the government's efforts to tackle COVID-19; (5) emotional effects of COVID-19 on young adults; (6) other perceptions and behaviors (open-ended questions). All young adult respondents (aged between 18–35 years inclusive) currently residing in Pakistan were included in the final sample.

## Data Analysis

Data was analyzed using IBM SPSS v. 21. Continuous data was represented with means and standard deviation, and compared using independent sample t-tests. Categorical data was represented as frequencies and percentages, and compared using chi-squared tests. A p-value < 0.05 was considered significant throughout. A qualitative thematic analysis was conducted in the open ended sections of the questionnaire (Sect. 6).

## Results

### Demographics

The questionnaire received a total of 406 responses with the respondents having a mean age of  $25.15 \pm 5.80$  years. Females comprised 65% of the respondents. The highest percentage of respondents (38.9%) had a monthly income between PKR 50,000-150,000. 52.5% of the respondents were currently students. The majority of respondents reported their highest level of education as high school or lower (53.0%), while 40.1% had received a bachelor's degree. Only 5.7% of respondents reported that they worked or studied in a health science field. The demographics of the respondents are shown in **Table 1**.

### Knowledge and Perceptions Regarding the COVID-19 Pandemic

The majority of the respondents (80.3%) had not been tested for the virus, out of which 10.3% had experienced symptoms of the virus (such as fever, cough, shortness of breath, loss of taste or smell, and body aches). 73.4% of the individuals rated their general health to be *very good/good*. The vast majority relied on social media (83.7%), internet blogs/websites (83.3%) and newspapers/television (70.7%) as major sources of information regarding COVID-19. Only 47.5% reported using official medical resources such as the World Health Organization (WHO) and the Centers for Disease Control (CDC) as sources of information regarding COVID-19.

The majority of 90.6% of the respondents believed the pandemic to be *extremely serious/serious*. There were mixed responses as to whether the respondents believed they would catch the virus or not: 27.3% believed they were *extremely likely/likely*, 41.1% were *unsure*, and the remaining 31.5% believed it was *extremely unlikely/unlikely*.

With regards to the mode of transmission of the coronavirus, the highest percentage of individuals believed spread was possible through contaminated surfaces (95.3%), while 86.4% believed spread was possible via inhalation of droplets, and 52.0% via close contact with asymptomatic individuals. Moreover, 36.2% believed COVID-19 could be contracted by eating

contaminated food or water, and 3.9% believed COVID-19 could be transmitted via contact with human feces. Alarming, 21.9% believed that transmission was possible through contact with packages shipped from China, and 16% believed COVID-19 could be contracted by eating food in Chinese restaurants. Moreover, 24.1% believed COVID-19 to be a biological weapon designed in a laboratory, while 23.9% were unsure.

### **Behaviour, Emotions and Outlook during the COVID-19 pandemic (Table 3)**

In response to the COVID-19 pandemic, respondents most commonly reported that they had practiced self-isolation (95.3%), washed/sanitized their hands with increased frequency (88.2%), and reduced social interactions (73.4%). However, 11.1% of the respondents reduced eating and ordering food from Chinese restaurants and 49.5% reported stocking up on food and sanitary supplies. Additionally, 65.3% expressed fear of contracting the disease themselves, with same percentage also reporting fear of affecting others with the disease. General stress due to the pandemic situation was reported by 55.4% of the respondents, while overall productivity was reduced in 54.9%. A small percentage (9.4%) remained indifferent to the outbreak situation.

Around half of the respondents believed that it was extremely likely/likely to have a vaccine available by the end of 2020 (51.2%) and that the Government of Pakistan was dealing effectively with the COVID-19 pandemic (52.7%). The majority (72.9%) felt that there would be less than 4000 COVID-19 deaths in Pakistan by the end of 2020.

### **Differences Related to Source of Information**

The differences in COVID-19-related knowledge and behavioural responses to COVID-19, according to source of information, are shown in **Figure 1**.

### **Differences Related to Average Monthly Income**

Average monthly income was significantly associated with reporting community/friends/colleagues as a major source of COVID-19-related information (< PKR 50,000: 29.2% vs. PKR 50-150,000: 46.2% vs. PKR 150 -300,000: 49.6% vs. > PKR 300,000: 57.6%;  $p = 0.009$ ). Monthly family income was also associated with belief that one was extremely likely/likely to contract COVID-19 themselves (< PKR 50,000: 13.8% vs. PKR 50-150,000: 24.7% vs. PKR 150 -300,000: 35.9% vs. > PKR 300,000: 31.8%;  $p = 0.024$ ). Average monthly income was also significantly associated with the belief that COVID-19 could be contracted through contact with infected surfaces (< PKR 50,000: 18.5% vs. PKR 50-150,000: 28.5% vs. PKR 150 -300,000: 35% vs. > PKR 300,000: 42.4%;  $p = 0.017$ ). Moreover, monthly income was found to be significantly associated with the belief that COVID-19 could be contracted through close contact with an asymptomatic individual (< PKR 50,000: 29.2% vs. PKR 50-150,000: 50.6% vs. PKR 150 -300,000: 65.8% vs. > PKR 300,000: 53%;  $p = 0.017$ ). It was also associated with the fear of contracting COVID-19 oneself (< PKR 50,000: 53.8% vs. PKR 50-150,000: 62.7% vs. PKR 150 -300,000: 69.2% vs. > PKR 300,000: 75.8%;  $p = 0.041$ ).

### **Differences Related to Employment Status**

Employment status was found to be associated with perceived seriousness of the COVID-19 pandemic, with 92.4% of students believing it was extremely serious/serious, as compared to 83.9% of those currently working and 78.6% of those unemployed ( $p = 0.049$ ). Employment status was associated with belief of COVID-19 to be a bioweapon, with 35.5% of those working strongly agreeing/agreeing, as compared to 21.4% of those unemployed and 22.1% of students ( $p = 0.002$ ). Surprisingly, respondents currently working as healthcare providers/studying health sciences were more likely to strongly agree/agree that COVID-19 was a bioweapon (37% vs. 23.2%;  $p = 0.020$ ). Employment status was also associated with the belief that one was extremely unlikely/unlikely to contract COVID-19 themselves (students: 33% vs. working: 25.8% vs. unemployed: 21.4%;  $p < 0.001$ ), as well as with the belief that COVID-19 could be contracted through contact with infected surfaces (students: 34.2% vs. working: 14.5% vs. unemployed: 28.6%;  $p = 0.005$ ). The experience of financial stress during the pandemic was reported by a greater percentage of unemployed respondents (71.4%), as compared to students (36.4%) and those employed (41.9%;  $p = 0.025$ ).

Respondents currently working as healthcare providers/studying health sciences were less likely to have practiced self-isolation/kept away from crowded places whenever possible (85.2% vs. 96%;  $p = 0.030$ ). They were also less likely to have

minimized attendance at educational/work institutions (40.7% vs. 78.9%;  $p = 0.030$ ), to have reduced work/study due to the pandemic (29.6% vs. 51.7%;  $p = 0.027$ ), as well as to have reduced social activity/interactions due to the pandemic (55.6% vs. 74.7%;  $p = 0.030$ ). Respondents currently working as healthcare providers/studying health sciences were found to be less likely to stock up on supplies (29.6% vs. 50.9%;  $p = 0.033$ ), and were less likely to report experiencing general stress due to the pandemic (33.3% vs. 57%;  $p = 0.017$ ).

### Differences Related to Highest Level Education

Highest education was significantly associated with reporting internet blogs/websites as a major source of COVID-19-related information (high-school or lower: 86.5% vs. bachelor's degree: 78.3% vs. postgraduate degree: 68.4%;  $p = 0.037$ ). Highest level education was also associated with the belief that COVID-19 could be contracted through contact with infected surfaces (high-school or lower: 40.4% vs. bachelor's degree: 13.3% vs. postgraduate degree: 10.5%;  $p < 0.001$ ). Interestingly, highest level education was found to also be significantly associated with the belief that a COVID-19 vaccine would be available before the end of 2020 (high-school or lower: 43.1% vs. bachelor's degree: 65% vs. postgraduate degree: 78.9%;  $p = 0.037$ ), as well as with the belief (strongly agreeing/agree) that the government was effectively dealing with the outbreak (high-school or lower: 46.4% vs. bachelor's degree: 63.3% vs. postgraduate degree: 73.7%;  $p = 0.008$ ).

### Differences Related to Self-reported Health Status

Self-reported health status was found to be significantly associated with perceived seriousness of the COVID-19 pandemic, with 4.7% of those with average health and 4.4% of those with very good/good health believing the pandemic to be extremely exaggerated/exaggerated, as compared to none of those with very poor/poor health ( $p = 0.039$ ). Self-reported health was also associated with the practice of regularly cleaning of surfaces, with 68.8% of those with good/good health reporting doing so, as compared 43.5% of those with very poor/poor health ( $p = 0.021$ ), as well as with the practice of actively avoiding touching one's face, with 60.4% of those with good/good health reporting doing so, as compared to 34.8% of those with very poor/poor health ( $p = 0.006$ ). Self-reported health was also associated with the fear of contracting COVID-19 oneself, with 63.4% of those with good/good health reporting doing so, as compared 43.5% of those with very poor/poor health ( $p = 0.004$ ). Self-reported health was also found to be associated with the experience of general stress during the pandemic, with 60.9% of those with very poor/poor health reporting doing so, as compared to 51.3% of those with very good/good health ( $p = 0.004$ ).

### Differences Related to Gender

It was found that females were more likely to have practiced regular cleaning of surfaces than males (68.4% vs. 58.1%;  $p = 0.043$ ). Females were also more likely than males to have convinced others to self-quarantine (79.4% vs. 59.7%;  $p < 0.001$ ), as well as having reported experiencing general stress due to the pandemic (59.9% vs. 45.2%;  $p = 0.006$ ).

### Thematic Analysis of Open-Ended Section

A total of 141 individuals responded to the open-ended section. On analysis of their responses, major themes identified were *the need to spread awareness and curb misinformation*, *the need for additional government intervention*, and *the need for health research* (Table 4).

## Discussion

Young adults play an important role in the global response to the pandemic. The results of our survey revealed that the young adult population in Pakistan relies majorly on social media as the major source of COVID-19-related information (83.7%), followed by internet blogs/websites (83.3%) and newspapers/television (70.7%). Several misconceptions were also identified amongst respondents, with regards to the transmission of the virus, immunity against the disease, and the severity of the ongoing pandemic. Additionally, a large majority of the young adult population reported experiencing general stress (55.4%), and reduced overall productivity (54.9%). It is imperative that interventions targeting these misconceptions and the effects of

the pandemic on mental health are designed, in order to initiate a better response towards COVID-19 amongst the young adult population, and an overall better global response.

Similar to our study, a recently published study in Pakistan also concluded that the internet and social media was found to be the resource used by a majority of respondents <sup>(21)</sup>. In another study conducted on the knowledge and awareness of the young adult population in Karachi only, social media was yet again highlighted as the primary resource for COVID-19-related information in almost two-thirds of respondents <sup>(22)</sup>. However, this study concluded that there existed several misconceptions about COVID-19 amongst the general young adult population in Karachi <sup>(22)</sup>. Though the potential of social media for the effective dissemination of COVID-19 related information is high <sup>(23)</sup>, social media can be a popular platform for the circulation of health-related misinformation <sup>(24)</sup>. In fact, the dissemination of such misinformation during a health crisis via social media is not uncommon. According to the Director for Policies and Strategies regarding Communication and Information at UNESCO, “there seems to be barely an area left untouched by disinformation in relation to the COVID-19 crisis” <sup>(25)</sup>. The impact of true, factual based information is thereby negated by the repetition and amplification of such disinformation. In Pakistan itself, a study on the role of electronic media to mitigate the psychological impacts of COVID-19 claimed that coverage of the pandemic by Pakistan’s electronic media creates panic and depression due to lack of authentic information <sup>(26)</sup>. Furthermore, a study found that more than 25% of the most viewed YouTube videos on COVID-19 contained misinformation, which was consequently reaching millions of viewers around the world <sup>(27)</sup>. Misconceptions amongst the young adults in our study indicated exposure to such misinformation, most likely via social media platforms, as social media was reported as a source of COVID-19-related information by the majority of respondents. This includes 36.2% of respondents believing that COVID-19 could be contracted by eating contaminated food or water, and 3.9% believing the virus could be transmitted via contact with human feces. Additionally, the majority (72.9%) felt that there would be less than 4000 COVID-19 deaths in Pakistan by the end of 2020. With the number of COVID-19-related deaths in Pakistan surpassing 7600 as of November 21st, 2020, this indicates a misperception regarding the severity of the pandemic amongst the young adult population. Moreover, 44.3% of respondents believed that immunity against the disease was permanent. This could potentially mean that individuals recovering from COVID-19 may end adherence to preventative measures, and thus re-contract and transmit the disease, as evidence of re-infection grows <sup>(28, 29)</sup>. Since young adults are most likely to lead active social lives, their behavior in regard to following standard operating procedures (SOPs), could be a key determinant in the spread of the disease. There is therefore the need for governments to ensure strict following of all SOPs in all settings.

Furthermore, our study also found racially discriminatory misconceptions in responses, as 15.3% of respondents believed packages shipped from China to be contagious, 7.2% believed eating food at Chinese restaurants to be method of transmission, and 14.7% prevented eating food at Chinese restaurants to reduce the risk of infection. A study conducted amongst the general population in the USA and UK, found similar racially discriminatory results in their survey <sup>(17)</sup>. Our study is the first to highlight the existence of discrimination on a racial basis amongst the young adult population in Pakistan. This may be attributed to the lack of awareness among a number of young adults regarding the methods of transmission of the disease.

Interestingly, our study showed that 55.4% of respondents reported general stress, while 54.9% reported reduced overall productivity. Financial stress during the pandemic was reported by a greater percentage of unemployed respondents (71.4%). Reports of such stress is common to the response of the global population, with the COVID-19 pandemic impacting not only the physical but also the mental health of populations individuals <sup>(30)</sup>. Moreover, a study on student mental health during COVID-19 in Hong Kong reported around 33% of secondary school students as experiencing mental distress, a large number when compared to the 2.2% and 2.6% prevalence rates of depression and anxiety respectively in adolescents in pre-pandemic times <sup>(31)</sup>. This study concluded that with the sense of security offered by online platforms, young people may be more willing to use online counselling services, an intervention that should be considered by institutions in Pakistan as well.

With the second wave of the COVID-19 pandemic gaining momentum in Pakistan, it is imperative that interventions are designed to tackle the existing problems that have stemmed from widespread misinformation and stress experienced by the country’s young adult population. These interventions could be implemented by other low-to-middle-income countries as well. One such intervention is to feature health experts in the media, including television and social media, to update and inform the

public about the virus, similar to how the Aga Khan University has created a media presence to educate the public on COVID-19<sup>(32)</sup>. A recently published study on the use of social media to manage the COVID-19 pandemic stated how clinicians and researchers have been using social media platform to share COVID-19 related information, and explain decisions being made during this time<sup>(33)</sup>. However, these media sources must also highlight not only the limitations of research and development of a functional vaccine, but also the regular update of COVID-19 deaths and cases in the country. This would serve to underscore the reality of the pandemic's severity and persuade young adults on the need to acknowledge the need to stop its spread. Also, to target the student population amongst the young adult population, brief explanatory online courses on the novel coronavirus can be conducted by reputable health/medical institutions. Such online courses will remove limits of physical distancing while reaching out to a wide percentage of the young adult population in both urban and rural areas. Additionally, an intervention to target the stress experienced by the young adult population is to provide online counselling resources, similar to those provided to students in Hong Kong<sup>(31)</sup>. A paper assessing the mental health of healthcare workers in Pakistan during the pandemic suggested the intervention of a medical team to provide online courses to guide medical workers, as well as an assistance hotline to support their psychological needs<sup>(34)</sup>. It also suggested the urgent implementation of a Psychological Crisis Intervention Model (PCIM) through internet technology, that would work to provide psychological support to patients, families, and medical workers<sup>(34)</sup>. The use of such a model could also prove to be useful for the young adult population of the country.

The results of this study are discussed keeping in mind some of the limitations. Firstly, due to the need for social distancing, the survey form had to be shared via online forums. Since not everyone, especially individuals living in rural areas within the country, has access to internet and technology, reaching out to that part of the population was difficult. Secondly, since the survey was not time-dependent, it is possible that some respondents may have looked up the answers to questions in the knowledge-based section, resulting in a higher percentage of accurate answers regarding knowledge of the disease.

## Conclusions

This study was conducted to analyze the behaviors and awareness of the young adult population in Pakistan. The findings of this study could be used to create interventions that target the young adult population within the country, to increase knowledge and awareness, and clarify misperceptions about COVID-19. With social media being the most commonly reported source of COVID-19-related information, the suggested interventions of online education on the virus, and online counselling for young adults, are specific to the use of such media/social media platforms. Targeting the young adult population specifically through these interventions, could result in an overall better response to the pandemic in Pakistan.

## Abbreviations

WHO  
World Health Organization  
AKU  
Aga Khan University  
IBM SPSS  
International Business Machines Statistical Package for the Social Sciences  
PKR  
Pakistani Rupee  
CDC  
Centers for Disease Control and Prevention  
COVID-19  
Coronavirus Disease 2019  
UNESCO  
United Nations Educational, Scientific and Cultural Organization  
SOP  
Standard Operating Procedure

USA  
United States of America  
UK  
United Kingdom  
PCIM  
Psychological Crisis Intervention Model  
RSM  
Russell Seth Martins  
RAM  
Ria Angeline Martins  
SMZZ  
Syeda Maryam Zehra Zaidi  
SS  
Scheryar Saqib  
A. Ahmed  
Ainan Ahmed  
ZSC  
Zobiyah Sajid Charolia  
AK  
Alizah Khalid  
AMN  
Aqsa Muhammad Nasir  
AR  
Azkah Rabbani  
R&D  
Research and Development Wing  
SPIE  
Society for Promoting Innovation in Education

## Declarations

### **Ethics approval and consent to participate**

Ethical approval for this study was received from the institutional review board of the Aga Khan University (Reference Number: 2020-4959-10706). Informed consent for participation was obtained from all participants via a preliminary consent form that preceded the online survey. This consent form detailed the nature and scope of the survey, as well as the extent of participants' involvement, and their right to withdraw from the survey at any point. If respondents confirmed their consent to participation in the survey, the online form directed them towards the survey. This study was carried in accordance with all the principles outlined in the 1964 Declaration of Helsinki and its future amendments.

### **Consent for publication**

Not Applicable.

### **Availability of data and material**

The data for this manuscript cannot be shared publicly owing to restrictions in place by the institutional review board of the Aga Khan University. However, the data is available upon reasonable request to the corresponding author i.e. RSM.

### **Competing interests**



None of the authors have any conflicting interests to declare.

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## Authors' contributions

RAM, RSM and A. Arshad were involved in project management. RAM, SMZZ, SS, A. Ahmed, ZSC, AK, AMN, and AR were involved in data collection and synthesis. RSM performed the data analysis for this study. All authors were involved in the writing and critical revision of the manuscript.

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## Tables

Table 1: Respondents' Characteristics

Variable	N (%)/Mean ± SD
Age (Years)	25.15 ± 5.80
Gender	
Male	124 (30.5)
Female	282 (69.5)
Province	
Sindh	367 (90.4)
Punjab	24 (5.9)
Others	15 (3.7)
Average monthly income (PKR)	
< 50,000	65 (16.0)
50,000-150,000	158 (38.9)
150,000-300,000	117 (28.8)
> 300,000	66 (16.3)
Employment status	
Student/Student + Part-time Work	213 (52.5)
Full-Time Employed/Working	154 (37.9)
Unemployed	39 (9.6)
Highest Level of Education	
High School or Lower	215 (53.0)
Bachelor's Degree	163 (40.1)
Postgraduate Degree	28 (6.9)
Do you work as a healthcare provider/study in a health science field?	
Yes	23 (5.7)
No	383 (94.3)
Do you smoke or consume tobacco?	
Yes	67 (16.5)
No	339 (83.5)

Table 2: Knowledge and Perceptions regarding the COVID-19 Pandemic

Variable	N (%)
<b>Have you been tested for COVID-19 at any time during this pandemic?</b>	
Yes	80 (19.7)
No	326 (80.3)
<b>If you have not been tested, then have you had any symptoms of COVID-19?</b>	<b>N = 326</b>
Yes	33 (10.1)
No	293 (89.9)
<b>How would you rate your health in general?</b>	
Very Good/Good	298 (73.4)
Average	85 (20.9)
Very Poor/Poor	23 (5.7)
<b>What is (/are) your major source(s) of information about COVID-19?</b>	
Social Media	340 (83.7)
Internet Blogs/Websites	338 (83.3)
News (Newspaper, Television)	287 (70.7)
Official Medical Resources (e.g. health authorities such as CDC, WHO or Hospitals)	193 (47.5)
Community/Friends/Colleagues	188 (46.3)
Other	10 (2.5)
<b>How exaggerated or serious do you think this pandemic is?</b>	
Extremely Serious/Serious	368 (90.6)
Unsure	21 (5.2)
Extremely Exaggerated/Exaggerated	17 (4.2)
<b>Do you think COVID-19 is a bioweapon developed by a government/terrorist organization?</b>	
Strongly Agree/Agree	98 (24.1)
Neither Agree nor Agree/Unsure	97 (23.9)
Strongly Disagree/Disagree	211 (52.0)
<b>How likely do you think you are to catch COVID-19?</b>	
Extremely Likely/Likely	111 (27.3)
Neutral/Unsure	167 (41.1)
Extremely Unlikely/ Unlikely	128 (31.5)
<b>What methods of transmission do you think are applicable to the Coronavirus?</b>	
Contact with Contaminated Surfaces	387 (95.3)
Inhalation of Respiratory Droplets	350 (86.2)
Close Contact with People Showing no Symptoms	211 (52.0)
Eating Contaminated Food and Water	147 (36.2)
Close Contact with People Showing Symptoms	126 (31.0)

Contact with Packages Shipped from China	89 (21.9)
Eating Food in Chinese Restaurants	65 (16.0)
Contact with Human Fecal Waste	16 (3.9)
Do you think immunity may be temporary/developing the disease more than once is likely?	
Yes	288 (70.9)
No	118 (29.1)
How effective do you think proper physical distancing is during this pandemic?	
Very Effective/Effective	360 (88.7)
Unsure	26 (6.4)
Very Ineffective/ Ineffective	20 (4.9)

**Table 3: Behaviour, Emotions and Outlook during the COVID-19 pandemic**

Variable	N (%)
<b>Which of the following have you done during the COVID-19 pandemic?</b>	
Practiced self-isolation/kept away from crowded places whenever possible	387 (95.3)
Increased frequency in washing/sanitising your hands	258 (88.2)
Kept away from people showing symptoms	318 (78.3)
Minimised your attendance at educational/work institutes	310 (76.4)
Increased cleaning of surfaces you regularly touch	265 (65.3)
Regularly monitored your temperature	65 (16.0)
Regularly worn masks when in public	304 (74.9)
Convinced others to observe self-quarantine	298 (73.4)
Actively avoided touching your mouth, eyes, and nose as often as before	227 (55.9)
Stayed informed about the outbreak situation in your locality	306 (75.4)
Stocked up on food and sanitary supplies	201 (49.5)
Reduced eating/ordering food from Chinese restaurants	45 (11.1)
<b>Which of the following do you think are applicable to you and your situation?</b>	
Reduced social activity/interactions due to pandemic	298 (73.4)
Experienced fear of contracting the disease yourself	265 (65.3)
Experienced fear of affecting others with the disease	265 (65.3)
Experiencing general stress due to the situation	225 (55.4)
Reduced overall productivity due to pandemic	223 (54.9)
Reduced work/study due to quarantine	204 (50.2)
Experienced stress due to personal economic status during the situation	156 (38.4)
Experienced helplessness in avoiding contraction of the disease	131 (32.3)
Experienced stress due to loved ones having contracted the disease	109 (26.8)
Experienced fear of loved ones contracting the disease	24 (5.9)
Remained indifferent to the outbreak situation	38 (9.4)
<b>Has your educational/work institute allowed you to study/work from home?</b>	
Yes	397 (97.8)
No	9 (2.2)
<b>How likely do you think it is for a COVID-19 vaccine to be available in Pakistan by 2020?</b>	
Extremely Likely/Likely	208 (51.2)
Unsure	121 (29.8)
Extremely Unlikely/ Unlikely	77 (19.0)
<b>The government of Pakistan is dealing very effectively with the outbreak.</b>	

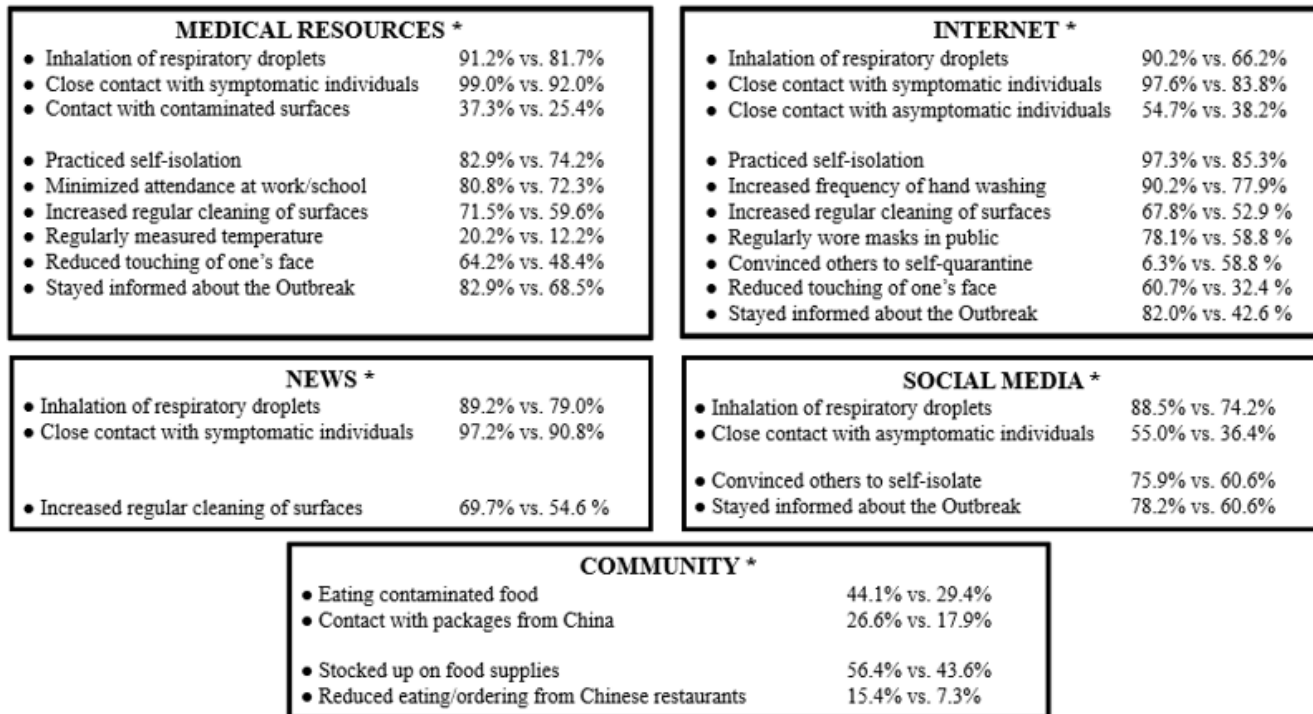
Strongly Agree/Agree	214 (52.7)
Neither Agree nor Agree/Unsure	88 (21.7)
Strongly Disagree/Disagree	104 (25.6)
<b>How many people do you think will have died from COVID-19 in Pakistan by the end of 2020?</b>	
< 1,000	68 (16.7)
1000-2000	82 (20.2)
2000-4000	146 (36.0)
4000-6000	9 (2.2)
6000-8000	14 (3.4)
8000-10000	25 (6.2)
>10000	62 (15.3)

Table 4: Thematic Analysis of Open-Ended Section

Major Themes	Quotes
<b>The Need to Spread Awareness and Curb Misinformation</b>	<ul style="list-style-type: none"> <li>● “Preventing the spread of misinformation is as important as preventing the spread of COVID-19 itself”</li> <li>● “Misinformation on social media sometimes directly contradicts advice and guidance by the WHO”</li> </ul>
<b>The Need for Additional Government intervention</b>	<ul style="list-style-type: none"> <li>● “Media – news channels, talk shows and radio stations – play a huge role in affecting the beliefs of the general public. Authorities should ensure that only scientifically valid information backed by organizations such as the WHO should be shared on such media platforms.”</li> <li>● “The Government should ensure the provision of PPE and sanitation products (such as soaps, hand sanitizers, etc.) to communities in under-developed areas”</li> </ul>
<b>The Need for Health Research</b>	<ul style="list-style-type: none"> <li>● “The Government in Pakistan should invest in COVID-19-related research, particularly with regards to developing and testing a vaccine, as other countries are already doing so.”</li> <li>● “The Government should increase its commitment to science, research and healthcare – COVID-19 is a wake-up call and emphasizes that we need to do better with regards to healthcare and research in the future.”</li> </ul>

## Figures





**Figure 1**

Source of Information and Association with Knowledge of Transmission and Precautionary Measures \* represents a significant difference ( $p < 0.05$ ) in knowledge or behavioural