

# PUBLIC KNOWLEDGE, ATTITUDES, AND PRACTICES TOWARDS COVID-19 PANDEMIC AMONG EGYPTIAN CITIZENS: A DESCRIPTIVE STUDY

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**ABBREVIATIONS:** ARDS: Acute Respiratory Distress Syndrome; CDC: Center for Disease Control and Prevention; COVID-19: Coronavirus disease 2019; KAP: Knowledge, Attitudes, Practice; MOH: Ministry Of Health; SARS-CoV-2: Severe Acute Respiratory Distress Coronavirus-2; WHO: World Health Organization

## ABSTRACT

**Background:** Coronavirus disease 2019 (COVID-19) pandemic has been transmitted rapidly worldwide and is recognized as a main threat to human health in 2020. The best methods to prevent its spread are to know about it and act accordingly.

**Aim:** This study aimed to assess the knowledge, attitudes, and practices to respond to COVID-19 among a sample of Egyptian citizens.

**Methods:** A community-based cross-sectional online survey was conducted on 501 Egyptian citizens during the early phase of the epidemic.

**Results:** The study included 501 participants. Females account for 49.9% (n=250). Most of the participants (n=380, 75.8%) were between 21- 40 years old. of Transmission modes were recognized

by 96% (n=481). The signs and symptoms were identified by 90.8% (n=455). About 91% (n=453) knew that all ages were liable to get infected with COVID-19 and 96% (n=481) knew that the elderly were more prone to develop severe disease. Almost all of the participants (99%, n=494) claimed that they kept hand washing, while only 56.7% mentioned regular use of hand antiseptics. Avoiding contact with symptomatic persons was reported by 97.6% (n=490) and 91.6% (n=459) said they were putting on face masks in crowded places. The concept of remote work was accepted by 89.4% (n=448) and 97.6% (n=489) believed that preventive measures could reduce the risk of catching the infection. Almost all the participants (98.4%, n= 493) would like to know more about the disease.

**Conclusion:** Most of the studied sample of Egyptian citizens were knowledgeable about COVID-19, positive in their attitudes, and have appropriate practices regarding COVID-19 pandemic. However, these observations should be generalized with caution due to the limited size of the sample, and the representativeness of low socioeconomic citizens.

**Recommendations:** Health education programs should be implemented among Egyptian citizens to maintain appropriate and updated knowledge and practices and keep positive attitudes towards COVID-19.

**Keywords:** SARS-CoV-2, Egypt, Pandemic, COVID-19, Survey

## INTRODUCTION

An outbreak of pneumonia of unknown etiology commenced in December, 2019 in Wuhan city of central Hubei province of China. Chinese authorities along with World Health Organization (WHO) began working collectively, the etiological agent was established to be a new virus and was named Novel Corona Virus (2019-nCoV) (1). WHO declared COVID-19 as a pandemic disease on March 11, 2020 and by the beginning of April, 2020 COVID-19 cases were reported in 203 countries around the world (2).

Fever is the most common clinical presentation of COVID-19. Other symptoms include cough, malaise, fatigue, shortness of breath, acute respiratory distress syndrome (ARDS) and cytokine storm. Worldwide concerns about the virus have risen due to its high

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transmissibility. The elderly and patients with chronic medical conditions are more prone to develop severe disease (3). To date, there is no approved specific treatment or vaccination against COVID-19. Strict infection control measures are the primary intervention to minimize the spread of the virus (4). Community awareness of how to deal with this highly infectious respiratory disease plays a critical role in controlling the pandemic. Egypt is one of the largest countries in the Arab region, Africa and the Middle East with more than 100 million citizens. Governmental efforts have been exerted to prevent the spread of the virus (5).

The Egyptian Ministry of Health (MOH) launched a COVID-19 Taskforce to steer the country's prevention, containment and mitigation measures. The Egyptian government cancelled international flights, closed schools and banned large social gatherings including certain cultural and faith practices such as mass praying, large weddings and funerals. Health authorities need timely, accurate, and actionable data to design policies and interventions in order to make evidence-based adjustments as the outbreak evolves (6).

Gathering data on public knowledge, attitudes, and practice (KAP) has long been beneficial in prevention, control, and mitigation measures during outbreaks. For example, during the 2014 Ebola outbreak, KAP surveys yielded vital information on the prevalence of misunderstanding about Ebola transmission and prevention, and the need to prevent stigmatization of Ebola survivors and foster safer case management and burial practices (7). During other recent outbreaks, such as SARS-CoV-1 or Zika virus, KAP surveys were used to evaluate how providers could better triage patient calls to fever hotlines and measure how the public responded to mitigation efforts (8&9). Hence, it is essential to study these domains among the Egyptian citizens during the current pandemic.

Taking into consideration the massive time needed to conduct a national household survey and the commonly low response rate of phone surveys, online surveys are a promising tool to analyze and track KAP among the public during fast-moving infectious disease outbreaks within a short time-frame.

## **SUBJECTS AND METHODS**

### **Study design and population**

This study was designed as a cross-sectional survey and was carried out between March and May 2020 in

Egypt using a snowball sampling technique. As there have been no similar published studies, the sample size calculations were based on the assumption that the likelihood of having public good knowledge and positive attitude towards preventive measures against COVID-19 was 50.0% (10). At 95% confidence interval; margin of error 5%, with a design effect of 1.0, the calculated sample size was 501 participants.

## **QUESTIONNAIRE DEVELOPMENT AND VALIDATION**

The survey was developed by the principle author using the frequently asked questions for public posted on WHO website and translated in Arabic, the native language in Egypt. The final questionnaire was reviewed for validity with the aid of biostatistics expert and was pilot examined on 20 subjects from the target population who were not included in the study. Cronbach's alpha was calculated to be 0.7.

The survey consisted of the following parts: (1) Basic demographic data of the participants including age, gender, and education level (2) Nine multiple-choice close-ended knowledge questions tested the following aspects in relation to SARS-CoV-2 infection: methods of transmission, symptoms, vulnerable and high risk groups (3) Ten close-ended practices questions (4) Three questions to check the public attitude (5) one question about the essential source of information.

## **ETHICAL APPROVAL & DATA COLLECTION**

Ethical approval was received from Zagazig University - Faculty of Human Medicine Institutional Review Board (IRB). The survey was carried out during March and May, 2020 when a strict lockdown was imposed by the Egyptian government to implement the social distancing policy. Thus, the online survey was selected for this study since a population-based survey was not feasible under that critical condition. Respondents were pulled across all the Egyptian governments. The questionnaire was electronically sent to the participants through e-mails, WhatsApp, and social networks. Only a single set of responses to the questionnaire was permitted for each person. Consent was implied by the completion of the questionnaire.

## **STATISTICAL ANALYSIS**

Data management and analysis were performed using the Statistical Product and Service Solution (SPSS) version 25 (IBM SPSS Statistics, New York,

United States). Descriptive statistics were performed by reporting the number and percentages for the different categorical variables. Percentages of responses were calculated according to the number of respondents per response with respect to the number of total responses of a question. Continuous variables were expressed as mean and standard deviation (SD). Chi-square test was used for comparison of the categorical variables. All tests were two-tailed,  $p$  value  $\leq 0.05$  was considered statistically significant.

## RESULTS

Five hundred and one participants from 23 governorates completed the survey. Demographic traits of the studied participants are shown in Table (1). Nearly half of the respondents were females ( $n=250$ , 49.9%). Most of the respondents ( $n=380$ , 75.8%) were between 21-40 years old. Approximately 69% of the participants were university graduates, 11.6% had completed postgraduate studies, and 19.6% had a high school education or less.

Results of knowledge questions are shown in Table (2). Ninety six percent of the respondents recognized the means of spread, 87% knew that the use of public toilets at work, restaurants, or malls could also transmit infection from others. About 65% were knowledgeable that avoiding uncooked animal product, unboiled or unpasteurized milk might help limiting the transmission of coronavirus. Ninety eight percent were aware that they should clean surfaces and office supplies with disinfectants and avoid public transportation or any crowded areas to limit the spread of the new coronavirus. Almost 91% could identify the signs and symptoms of the disease. About 64% percent knew that diarrhea was likely a clinical symptom of the disease. Most of the respondents ( $n= 453$ , 90.4%) recognized that any age may be infected and 96% ( $n=481$ ) knew that elderly or people with chronic medical conditions ought to develop severe disease.

Results of practice and attitude questions are shown in Table (3). About 99% of the respondents said they kept hand washing. However, solely half of the respondents ( $n= 284$ , 56.7%) used hand antiseptics. Ninety seven percent said they used tissues when coughing or sneezing and about 98% said they practiced secure disposal of used wipes in a closed waste bin. Ninety four percent stated they used bent elbow for coughing or sneezing when tissues were

not available. Ninety four percent of the respondents claimed they avoided hand contact with mouth, nose, or eyes. About 98% stated they kept away from contact with infected people. Approximately, 92% stated they put on masks in crowded spaces. About 67% of the participants said they kept away from gathering spaces, 23% said they avoided hand shaking, 7% and 3% of the respondents stated they practice balanced food regimen and sufficient sleep as preventive measures against COVID-19 infection, respectively. About 93% said they dedicated to staying at home to stop spread of the infection.

Regarding the attitude of the participants, about 89% said they agreed to work remotely in order to preserve the workflow and employee's safety at the same time. Approximately 98% accepted the statement that using preventive measures reduces the hazard of developing the disease. Almost all the individuals ( $n= 493$ , 98.4%) stated they make sure to recognize more about the disease to stop it.

Based on age, the 15-20 years old respondents had the highest correct answer rate concerning the identification of the emerging coronavirus symptoms ( $n=55/63$ , 87.3%) compared to other groups ( $p = 0.01$ ) as shown in Fig. (1). Regarding the practices and attitudes, all participants (100%) aged between 15 - 20 years ( $n=63$ ), 41-50 years ( $n= 42$ ), and over 60 years ( $n=2$ ) claimed they were committed to staying at as home compared to 91.6% ( $n=175/191$ ) of the participants aged 21-30 years, 89.9% ( $n=170/189$ ) of those aged 31-40 years, and 92.9% ( $n=13/14$ ) of those aged 51-60 years ( $p = 0.05$ ) as shown in Fig. (2). No statistically significant differences between participants' attitude based on their age group were detected.

Based on sex, there were no statistical differences between males and females regarding knowledge questions. Yet, certain practices were statistically distinct between male and female participants as shown in Figure (3). One hundred and seventy eight females (178/250, 71.2%) claimed to avoid congested places in contrast to 156 male participants (156/251, 62%),  $p = 0.03$ . Twelve male individuals (12/ 251, 4.8%) stated they practiced adequate sleep as preventive measure against COVID-19 in contrast to two females (2/250, 0.8%),  $p = 0.006$ . Female participants were more committed to staying at home (240/250) in distinction to male participants (225/251),  $p=0.005$ . Regarding attitude, 234 males (234/251, 93.2%) said they agreed to work remotely

to keep workflow and employee's safety in contrast to 214 female (214/250, 85.6%),  $p=0.005$ .

Based on education level, both university graduates and individuals with post-graduate studies were more informed about the modes of transmission of emerging coronavirus when compared to individuals with secondary school education or less ( $p = 0.02$ ). They were also more knowledgeable that avoiding public transportation and crowded places helped limit the spread of the new disease ( $p = 0.05$ ). University graduates were the most expertised about COVID-19 symptoms. About 85% of the university graduates (293/345) identified correctly the symptoms of COVID-19 in comparison to 69% (40/58) and 78% (77/98) of the individuals with postgraduate or secondary school education, respectively ( $p = 0.05$ ). Additionally, university graduates and individuals

with post-graduate studies were the best informed that all ages could be infected with the emerging coronavirus ( $p = 0.0001$ ) and that elderly people and people with chronic medical conditions were more susceptible to severe disease when compared to individuals with secondary school education or less ( $p = 0.001$ ). There were no statistically significant differences between participants' practices or attitude based on their level of education.

The main source of participants' information is shown in Figure (4). Most of the participants ( $n=372$ , 74.3%) reported social media as their major source of information, whereas 66 participants (13.2%) mentioned TV and radio, unfortunately, only 55 (11%) and 8 (1.6%) participants mentioned physicians and training courses or lectures as their source of information, respectively.

**Table 1.** Demographic characteristics of the study participants

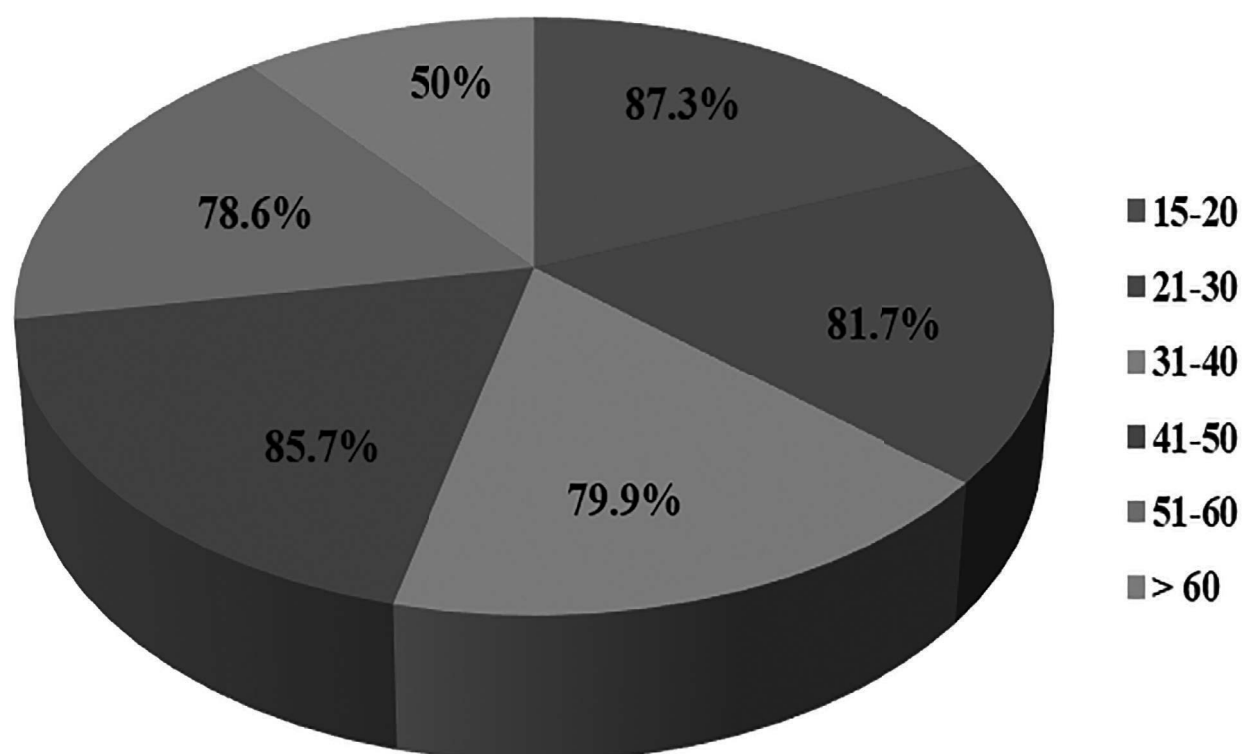
Variable	No.	Percent (%)
<b>Age (years)</b>		
15-20 years	63	12.6%
21-30 years	191	38.1%
31-40 years	189	37.7%
41-50 years	42	8.4%
51-60 years	14	2.8%
> 60 years	2	0.4%
<b>Sex</b>		
Male	251	50.1%
Female	250	49.9%
<b>Education</b>		
Secondary or less	98	19.6%
University graduate	345	68.9%
Postgraduate	58	11.6%

**Table 2.** Answers to knowledge questions

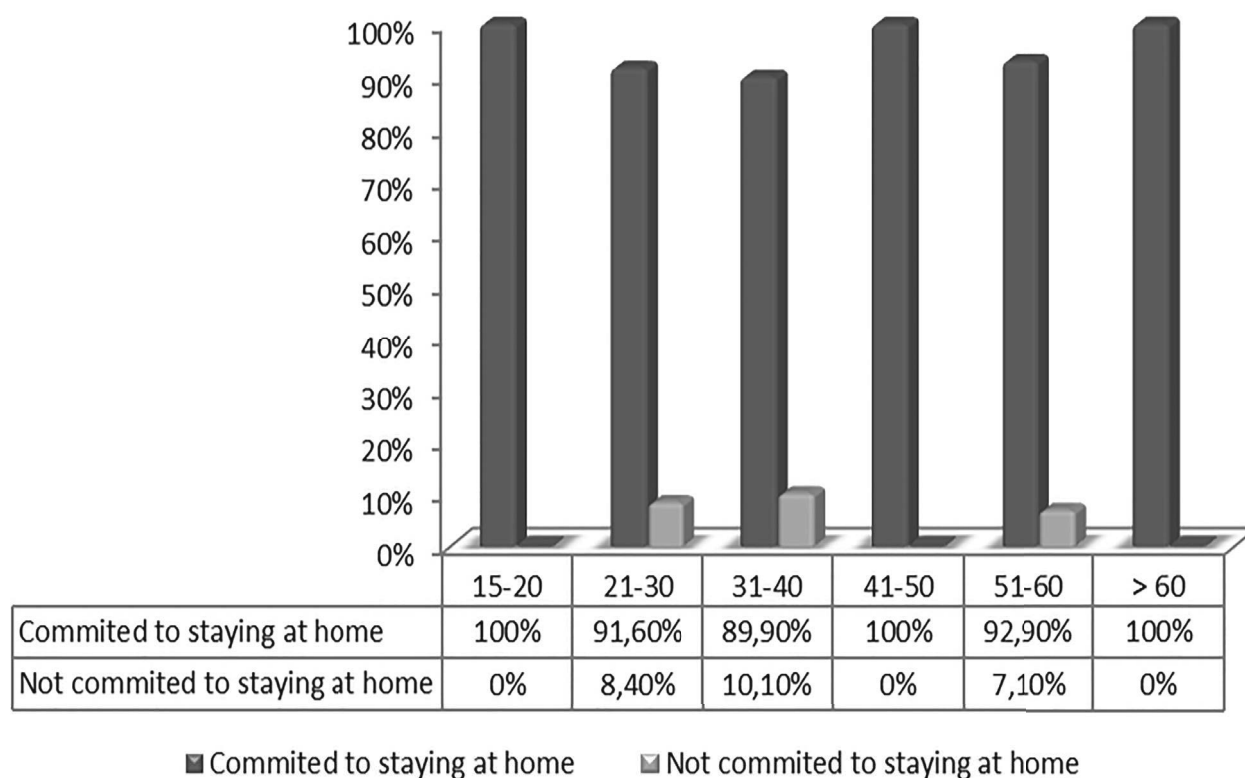
Knowledge Questions	No.	%
<b>What are the modes of infection for the emerging coronavirus?</b>		
Droplets from the patient while coughing and sneezing	10	2%
Direct contact with the patients	4	0.8%
Touching contaminated surfaces and tools	0	0%
All of the above	481	96%
Don't know	6	1.2%
<b>Using public toilets at work, restaurants, or malls may transmit infection from others?</b>		
Yes	438	87.4%
No	26	5.2%
Don't know	37	7.4%
<b>Avoiding uncooked animal product, un-boiled or unpasteurized milk helps limit the transmission of the Coronavirus?</b>		
Yes	325	64.7%
No	53	10.6%
Don't know	123	24.5%
<b>Should you keep surfaces clean (such as desks and tables) and office supplies (such as phones and keyboards) with a disinfectant?</b>		
Yes	491	98%
No	8	1.6%
Don't know	2	0.4%
<b>Avoiding public transportation and crowded places helps limit the spread of the new coronavirus?</b>		
Yes	491	98%
No	6	1.2%
Don't know	4	0.8%
<b>What are the symptoms of the emerging coronavirus?</b>		
Cough	1	0.2%
Fever	24	4.8%
Dyspnea	14	2.8%
All of the above	455	90.8%
Don't know	7	1.4%
<b>Diarrhea may be a symptom of the emerging coronavirus?</b>		
Yes	322	64.3%
No	114	22.7%
Don't know	65	13%
<b>Can all ages be infected with the emerging coronavirus?</b>		
Yes	453	90.4%
No	27	5.4%
Don't know	21	4.2%
<b>The elderly and people with previous medical conditions are more likely to develop severe disease in the case of infection with the virus?</b>		
Yes	481	96%
No	6	1.2%
Don't know	14	2.8%

**Table 3.** Answers to practice and attitudes questions

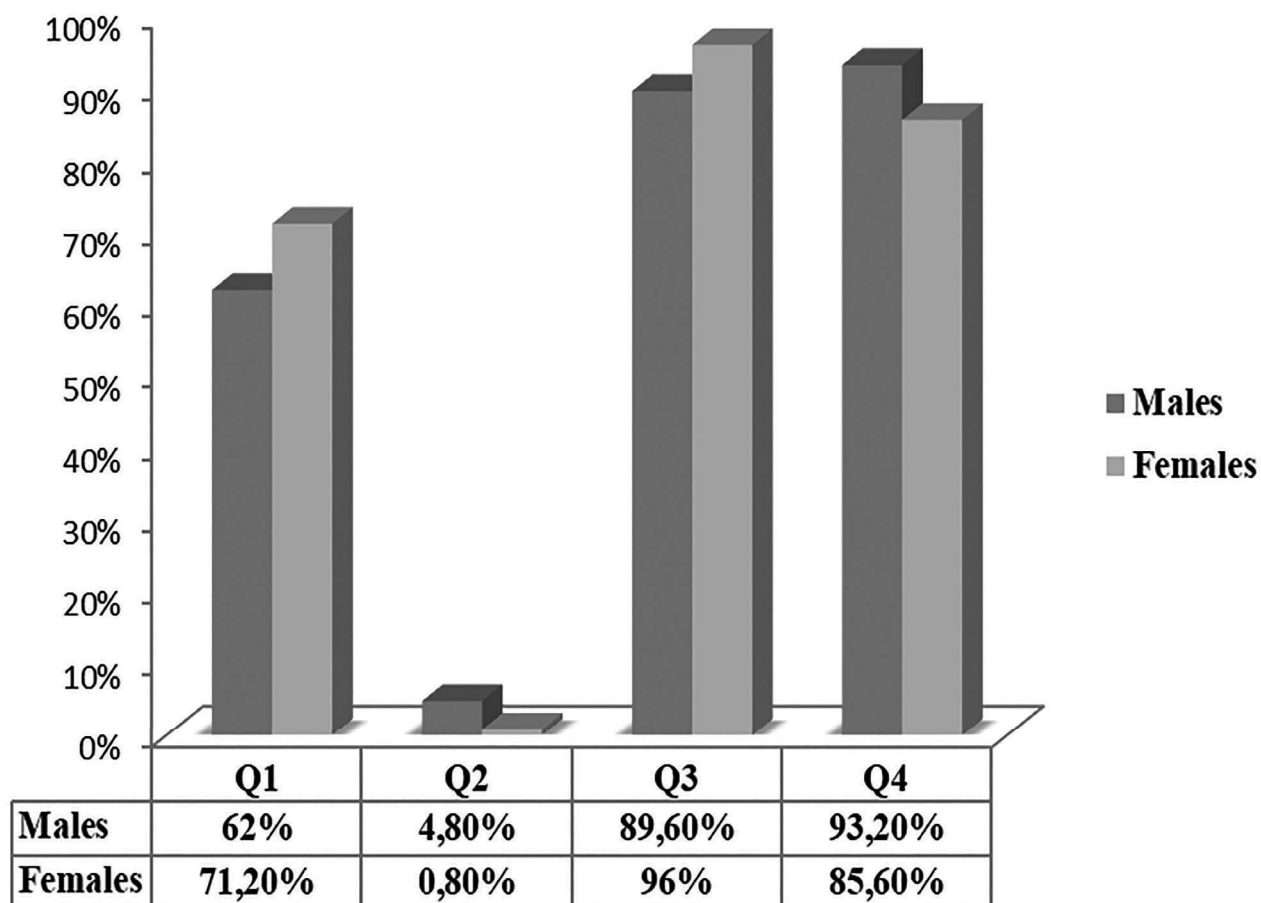
Practice Questions	No.	%
<b>Keeps hand washing?</b>		
Yes	494	98.6%
No	7	1.4%
<b>Do you use antiseptics for hands (Alcohol)?</b>		
Always	284	56.7%
Sometimes	193	38.4%
No	24	4.8%
<b>Using tissues when coughing or sneezing?</b>		
Yes	486	97%
No	15	3%
<b>Safe disposal immediately of used wipes and throw them in a closed waste bin?</b>		
Yes	490	97.8%
No	11	2.2%
<b>Using the upper arm when coughing or sneezing in the absence of a tissue?</b>		
Yes	471	94%
No	22	4.4%
Don't know	8	1.6%
<b>Avoid contact with eyes, nose and mouth by hand?</b>		
Yes	472	94.2%
No	29	5.8%
<b>Avoid direct contact with infected people or people who have symptoms?</b>		
Yes	490	97.6%
No	12	2.4%
<b>Wearing gags in gathering places and congestion?</b>		
Yes	459	91.6%
No	42	8.4%
<b>What other preventive measures did you use to prevent the emerging corona virus?</b>		
Avoid gatherings	334	66.7%
Not shaking hands	117	23.3%
Enough sleep	14	2.8%
Balanced eating	36	7.2%
<b>Are you committed to staying at home to prevent the spread of the Corona virus?</b>		
Yes	465	92.8%
No	36	7.2%
<b>Attitude Questions</b>		
<b>Do you agree to work remotely to maintain workflow and employee's safety at the same time?</b>		
Agree	448	89.4%
Don't agree	40	8%
Not sure	13	2.6%
<b>Using preventive measures reduces my risk of developing the disease?</b>		
Agree	489	97.6%
Don't agree	4	0.8%
Not sure	8	1.6%
<b>Make sure to know more about the disease to prevent it?</b>		
Agree	493	98.4%
Don't agree	8	1.6%
Not sure	0	0%



**Figure 1.** Correct answer rate for symptoms of the emerging coronavirus by age group.

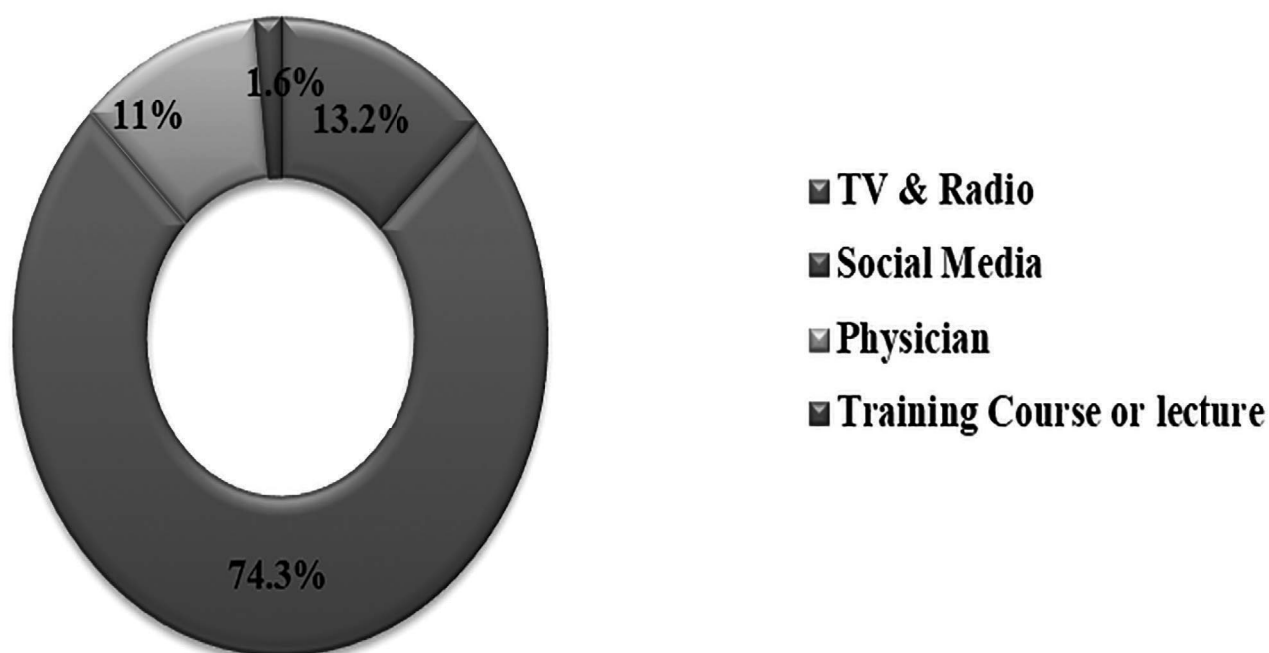


**Figure2.** Commitment to staying at home by age group.



**Figure3.** Response differences based on gender

Q1: Avoiding congested places, Q2: Practicing adequate sleep, Q3: Are you committed to staying at home, Q4: Agreement to remote work



**Figure 4.** Major sources of participants' information



## DISCUSSION

COVID-19 is an emerging disease that has had devastating consequences since it was first detected in December 2019. People in the community face multiple challenges during epidemics and pandemics. Lack of awareness regularly leads to an unconcerned attitude, which may adversely affect the preparedness to meet these challenges (11). Until now, there has been limited published data on population KAP toward COVID-19 in Egypt. Hence, this study aimed to evaluate the KAP towards COVID-19 pandemic in the Egyptian society.

We found that the vast majority of our respondents held satisfactory knowledge, ultimate practice and optimistic attitude. The high correct answer rate of COVID-19 knowledge in Egyptian citizens was unexpected. We consider that is particularly due to the sample characteristics, 82.4% of the participants holding a university degree or higher.

In agreement with our findings, Abdelhafiz et al. reported the studied sample of Egyptian participants to have a good knowledge about the disease and a positive attitude towards protective measures which was gained mainly through novel media channels (12).

Abdelhafiz et al. studied some demographic criteria and KAP aspects which were not included in our study. Regarding demographic criteria, they mentioned that individuals living in rural areas and with lower monthly income have lower knowledge about COVID-19. This may denote that extra efforts should be exerted to deliver the message to these groups, which might also have technical and/or financial difficulties getting access to the social media platforms.

Concerning knowledge aspects, Abdelhafiz et al. reported that about 34% of the studied Egyptian citizens believed that goods imported from China could be a source of virus transmission. Thirteen and 33% of the studied citizens, respectively, thought that taking antibiotics or eating garlic could prevent the spread of the disease. Additionally, about 27% (n=150/559) believed that the virus was initially designed as a biological weapon.

As regards perception and attitude, Abdelhafiz et al. reported that about 73% (n= 410/559) and about 60% (n= 335/559) of their respondents, respectively, strongly agreed to home or hospital isolation in case of contact with an infected person. This surprising

observation may point out that the Egyptian citizens do not experience a stigma of being infected with the virus, and this finding can be explained by the fact that the study participants represented educated groups using the internet. This analysis is confirmed by another question from the same study whether or not the infection with the virus was related to stigmata or feeling ashamed. Seventy one percent (n=397/559) denied feeling stigma or shame associated with COVID-19 infection. Abdelhafiz et al. also studied the economic burden of COVID-19. About 68% (n=383/559) strongly believed that they should continue receiving a salary during the period of isolation.

According to Abdelhafiz et al. about 63% (n=351/559) and 73% (408/559) of their studied sample mentioned, respectively, they were strongly willing to do the lab test or take the vaccine once available. However, we are questioning the numbers stated to accept the vaccine. We consider this observation is not identical to the current situation. Presently, as vaccination is now available for testing, and there are calls for citizens to try the vaccine, there is fear, questions about the safety of the vaccine, and lack of interest from citizens.

In agreement with our findings, Abdelhafiz et al. reported the social media channels as the major source of participants' knowledge. Most of our study participants were aged between twenty one and forty years (n=380/501,75.8%). Interestingly, Abdelhafiz et al. also reported about 75% of their participants in the age group between eighteen and forty years, which represent more than 75% of Facebook users in Egypt. Abdelhafiz et al. reported the negative assumptions that media were exaggerating the risk. According to their findings, only 16.8% thought that media outlets exaggerate the danger of the disease. Our observations also coincide with that of Zhong et al. who reported high level of knowledge about COVID-19 among Chinese residents. This may be explained by their previous experience with the severe acute respiratory syndrome outbreak in the early 2000s and also the observation that their sample was relatively affluent and highly educated (13).

In the current study, most respondents reported taking preventive precautions by practicing hand hygiene, using tissues when coughing or sneezing with safe disposal immediately in a closed bin, or

using the upper arms when tissues are unavailable, avoiding hands contact with eyes, mouth or nose and avoiding direct contact with symptomatic people, wearing masks when going outside, and commitment to staying at home. This indicates a public willingness for behavioral changes in the face of the COVID-19 pandemic. Second, these precautions might be the result of the respondents' good information related to modes of infectivity with SARS-CoV-2. However, unfortunately only 66.6% (n=334/501) of the respondents reported no longer going to crowded locations.

Certain discrepancies between public responses in Egypt in contrast to China and American citizens were noted. The practice of Chinese residents was much cautious than reported in our study. Zhong et al. reported that nearly all his participants avoided crowded places (96.4%) and wore masks when leaving the home (98.0%) compared to (66.6% & 91.6%) reported in our study respectively (13).

However, American citizens showed the same behavior as we observed in our study. Clements et al. mentioned nearly 30% of their respondents attending gatherings or going to places with more than 50 people, opposite to advices from CDC. The authors attributed this behavior to the uncoordinated efforts of US authorities to lockdown the nation and the debate whether the federal government had constitutional authority, so that individual states were left to make decisions about "shelter at home" policies and similar efforts (14).

The same American study reported only 24% of the American citizens were using masks outside home, in contrast to 91% and 98% reported in ours and in the Chinese study respectively. This extremely lower rate of practice reported by Clements et al. was explained by lack of supply combined with hoarding behavior and ignoring governmental recommendations (14).

The optimistic attitude of the Egyptian citizens could be associated to the exceptional COVID-19 management measures such as traffic limits and the shutdown of cities, which enhanced people's self-assurance in the battle against the virus. Second, the concerted governmental efforts also contributed for the Egyptian people's confidence in overcoming the epidemic.

Our findings are also in line with Azlan et al., who suggested that Malaysians had an acceptable level of knowledge on COVID-19 and were generally positive

in their outlook on overcoming the pandemic (15). Another Nigerian study recorded good knowledge and attitudes among Nigerian participants (16).

A study from Saudi Arabia reported that the majority of the studied individuals were knowledgeable about COVID-19 with optimistic attitudes and good practices. However, in distinction to our observations, their results showed that men had less knowledge, less optimistic attitudes, and less good practices toward COVID-19 than women. They also found that older people were likely to have better knowledge and practices than younger people (17).

In contrast to our findings, a Sudanese study reported incomplete knowledge and poor practices towards COVID-19 among Sudanese residents (18). Haque et al. reported that Bangladeshi peoples had good knowledge, while their attitude and practices towards COVID-19 during the pandemic had not been impressive (19).

### **Implications of the study**

Surveys of KAP can gather data on what is known, believed, and carried out by a specific population. Such data are necessary because unclear information and negative attitude toward infectious diseases may lead to public distress and panic. The findings of our study could be used by public health policy-makers and campaigns, health care workers, and media for targeting the populations in need for COVID-19 prevention and health education.

### **Limitations of the study**

Being an online study, illiterates, farmers, rural and semi-urban residents, underprivileged and vulnerable, and in particular older adults were not included in the study. Thus, our sample population was obviously over-representative of well-educated people. Additionally, due to the very limited time for developing the survey during the early phase of pandemic, attitudes were measured with only three simple questions. Further research studies could use open-ended questions, in-depth interviews or focus group discussion for assessment of citizens' attitudes towards COVID-19. With the current authorities plan to initiate gradual release of the lockdown, public health experts could visit households to verify adequate KAP regarding COVID-19. In summary, our observations suggest that Egyptian citizens have had good knowledge, optimistic attitudes, and

appropriate practices towards COVID-19 during the early phase of COVID-19 pandemic.

## CONCLUSION

Most of the studied Egyptian citizens were knowledgeable about COVID-19, positive in their attitudes, and had appropriate practices regarding COVID-19 pandemic. However, these observations must be generalized with caution due to the limited sample representativeness of low socioeconomic level citizens.

**RECOMMENDATIONS:** Health education programs should be implemented among Egyptian citizens to maintain appropriate and updated knowledge and practices and keep positive attitudes towards COVID-19.

## AUTHOR CONTRIBUTIONS

Dina M. Ali is the principle investigator, and contributed to conception and design, acquisition, analysis and interpretation of data, drafting the manuscript and revising it critically. Mona S. Hamed & Lubna A. El-Korashi are co-authors, and contributed to critical revision of the data analysis and reviewing the final manuscript.

## CONFLICT OF INTEREST

The authors have declared no competing interests.

## FUNDING

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