

A Web-Based Study of Differences in Jordanian People's Knowledge and Attitudes toward COVID-19

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ABSTRACT

Background: Coronavirus disease-19 (COVID-19) is a worldwide public health issue. Adequate knowledge, a positive attitude, and appropriate control of COVID-19 are essential to eradicate the disease. People's knowledge of and attitudes toward COVID-19 should be analyzed and explained; this helps decision-makers understand the general public knowledge about the disease. The attitudes of the general public are necessary to implement measures to stop the spread of the disease. Thus, this study aimed to describe people's knowledge about and attitudes toward COVID-19 and compare both concepts based on subjects' characteristics.

Methods: This cross-sectional web-based survey was conducted in January 2021. The snowball sampling method was used.

Results: A total of 281 adult subjects participated in this study. Most participants demonstrated good knowledge and a positive attitude (80.5% and 77.11%) towards the COVID-19, respectively. Better knowledge about COVID-19 was among older age, females, and highly educated subjects. A significantly positive attitude towards the COVID-19 was among married subjects and subjects who had health insurance.

Conclusions: The findings are relevant for the evaluation of the knowledge and attitudes of the general public. Knowledge is a crucial factor for shaping people's attitudes, but this is influenced by various factors related to people's knowledge and attitudes. Thus, continuous and updated learning efforts are still required from the overall public. This study provided valuable insights into how public health initiatives can better protect the population's health during public health emergencies.

Keywords: COVID-19, knowledge, attitude, Jordan, web-based survey

INTRODUCTION

Coronavirus is a huge family of respiratory viruses that cause Acute Respiratory Syndrome [1,2]. The current outbreak is caused by strains of coronavirus that were not detected in the world before the explosion of Wuhan, China, in December 2019. Coronavirus disease-19 (COVID-19) causes most people's mild disease, but it can make some people very sick [3] and may lead to death. Seniors and those with pre-existing medical conditions (such as hypertension, heart problems, obesity, or diabetes) seem to be more fragile [4].

COVID-19 has high transmittance [5]. There is still some uncertainty in the mechanism of viral infection in COVID-19; however, human-to-human transmission has been reported through respiratory droplets and aerosols caused by direct contact with infected individuals and contaminated bodies [2]. World Health Organization (WHO) declared it an epidemic on March 12, 2020, and called for global efforts to stop its further spread. Different countries worldwide adopted different preventive and control measures at different levels to combat the COVID-19 epidemic [6].

In Jordan, almost four months after the disease's onset, the virus's first confirmed case was recorded inside the country on March 2, 2020, by public officials Jordanian Ministry of Health (MOH). The source of the virus was linked to Italy [7]. Around the end of January 2021, there were more than (320,453) confirmed COVID-19 cases in Jordan, with (4224) confirmed deaths [8]. The Government of Jordan has also taken numerous measures to regulate the spread of COVID-19 transmission. Measures included the initial closing of public spaces, tourism, educational institutions, and business organizations. The current government's particular policy measure is a sensible lockdown that the WHO officials appreciated. First, the MOH used the media to educate the public about the disease, its transmission mode, the importance of social distancing, washing hands, using disinfectants, home hygiene, and advising people to avoid any gatherings. Then, the Jordanian Government applied a nationwide lockdown and activated the Defense Law, which allows the army and police to ensure public adherence to the curfew. Vaccines are one of the most reliable and cost-effective public health interventions ever implemented to save millions of lives each year [5,9-11]. However, with the new strains of the virus and until the full benefits of the COVID-19 vaccine have been utilized the preventive measures and guidelines are

crucial. The important thing is that the success of any strategy to combat COVID-19 relies heavily on the general public's adherence to the guidelines issued by the relevant authority [12].

The existing literature has indicated that knowledge and attitude concerning infectious diseases are significantly correlated with protective behavior [5,6,9]. Therefore, the behaviors of the general public and other people in potential risk groups can play a huge role in both the prevention and control of infectious diseases [9,13]. Therefore, it is essential to assess the public's knowledge and attitudes regarding COVID-19. However, little is understood about the knowledge and attitudes among the Jordanian public regarding COVID-19. Specifically, this study was conducted to evaluate knowledge and attitudes among the Jordanian public and to assess potential influencing factors associated with preventive behaviors. The study results can provide information about the effectiveness of the health education efforts of health authorities in Jordan and how to design evidence-based interventions to scale back the danger of contracting COVID-19. Recent studies on COVID-19 revealed that knowledge [5,9,13] might account for the precautionary actions of the general public. In addition, the results of previous studies revealed that a better level of knowledge is positively associated with the practice of preventive measures [13-18], and attitudes also associate positively with preventive behaviors [9,13-18].

Thus, the massive challenge it entails for global health and economics, ordinary people's knowledge of and attitudes toward COVID-19 should be analyzed and explained; this helps decision-makers understand the general public knowledge of and attitudes toward the disease [5,13]. Therefore, this study aimed to describe people's knowledge about and attitudes toward COVID-19 and compare both concepts based on subjects' characteristics of age, gender, marital status, education level, income, and health insurance status.

METHODS

Design and Sample

This is a secondary analysis of large-scale cross-sectional data collected from subjects using a web-based survey recruited through convenience snowballing sampling. Jordanian adult subjects were invited to participate through social media, including Facebook and Whatsapp. Subjects were recruited if they were willing to participate, read and write Arabic, and had access to the Internet.

Measures

We collected subjects' sociodemographic characteristics (i.e., age, gender, marital status, level of education, income level, and health insurance) and questionnaires on the knowledge about and attitudes toward COVID-19. The face validity of these tools was checked by three PhD-prepared nurses who agreed that the items appeared to be appropriate and relevant to what they intend to measure.

Knowledge about COVID-19

A scale consisting of 18 items was used to measure the knowledge about the COVID-19. The research team developed the items based on a literature review and the previous studies measuring knowledge about COVID-19 [13-18]. These items covered knowledge of the signs and symptoms, transmission,

prevention, and treatment of COVID-19. The responses of the items were "true," "false," or "I do not know," with one point was given for each correct answer and 0 points given for either incorrect answer or the "I do not know" response. Thus, the total score of this scale was the total number of correct answers, and in turn, the total scores could range between 0 to 18; higher scores indicated a higher level of knowledge. The Cronbach's reliability alpha for the knowledge scale was 0.73.

Attitudes toward COVID-19

A 6-item scale was used to measure the attitudes toward COVID-19, especially data on attitudes toward guidelines for preventing COVID-19, governmental measures and directions, and people's role in controlling the virus. The scale items were adapted from previous studies in the COVID-19 context [13,14,18]. The items asked participants regarding their level of agreement "Do you agree with the following statements" with the six items statements. The responses designed on a 5-Likert scale ranged "1" = strongly disagree and "5"=strongly agree. The total scores calculated by summing the items' responses ranged from 6 to 30; higher scores indicated positive attitudes toward COVID-19. The Cronbach's reliability alpha for the attitudes scale was 0.76.

Procedures and Human Protection

Before collecting the data, the ethical approval for this study was granted by The Hashemite University- Jordan. The subjects were asked to answer the survey (informed consent) or decline to participate in the study (finish the survey without collecting any data). The data were collected using a web-based survey prepared with the Google platform. The survey was distributed to the public through multiple social media platforms, including Facebook and WhatsApp. Voluntary participation and answering any questions were assured as the survey was designed to skip a question. No identifiable personal information was collected. The responses were stored in the principal investigator's Google Drive and personal computers that were password-protected. Data were collected over the last ten days of January 2021. As it was a snowball conscience sampling, subjects were also invited to share the survey link to their contacts. After four days to the potential subjects, a reminder was announced, whereas we emphasized subjects to take the survey once.

DATA ANALYSIS

The Statistical Package for the Social Sciences (SPSS) version 25 was used in analyzing the data. A significance level of $\leq .05$ was used. Subjects' characteristics and subjects' scores on individual items on knowledge about and attitudes toward COVID-19 were described with mean and standard deviations or frequencies and percentages, as appropriate to the measurement level. Bivariate Pearson's correlation coefficient was used to examine the association between age and total scores on knowledge about and attitudes toward COVID-19. Independent samples t-test was used to examine differences in subjects' knowledge about and attitudes toward COVID-19 scores for variables with two categories, while a One-way ANOVA test was used for variables with more than two categories.

Table 1. The subjects' scores on the knowledge about and attitudes toward COVID-19 according to their sociodemographic and clinical characteristics (N=281)

Characteristics	Total sample Mean \pm SD* or n (%)	Characteristics association's with			
		ξ Knowledge total scores	p- value	ξ Attitudes total scores	p-value
Age, years	27.45 \pm 11.07	r=0.131	0.028	r=0.091	0.130
Gender					
Male	83 (29.53)	13.95 \pm 3.12	0.039	24.34 \pm 3.71	0.389
Female	198 (70.47)	14.75 \pm 2.44		24.73 \pm 3.25	
Marital status					
Single/Widow/divorced	200 (71.17)	14.31 \pm 2.71	0.105	24.41 \pm 3.34	0.048
Married	81 (28.83)	15.01 \pm 2.53		25.13 \pm 3.48	
Level of education					
\leq high school	30 (10.67)	13.53 \pm 2.75	0.033	25.46 \pm 3.9	0.148
>high school	251 (89.33)	14.63 \pm 2.65		24.51 \pm 3.32	
Monthly income, USD					
<420	64 (22.77)	14.01 \pm 3.04	0.089	27.73 \pm 3.92	0.945
421-700	93 (33.09)	14.27 \pm 2.81		24.63 \pm 3.82	
701-1120	66 (23.48)	14.66 \pm 2.5		24.71 \pm 2.65	
1121-1400	32 (11.38)	15.12 \pm 2.15		24.65 \pm 2.71	
>1400	26 (9.25)	15.46 \pm 1.92		24.07 \pm 2.91	
Health insurance					
No	84 (29.89)	14.46 \pm 2.38	0.833	23.94 \pm 3.56	0.028
Yes	197 (70.11)	14.53 \pm 2.8		24.9 \pm 3.28	

*M \pm SD; mean \pm standard deviation, ξ =Data presented as mean \pm standard deviation or as Pearson's correlation coefficient (r); Independent samples t-test was used to examine differences in scores for variables with 2 categories while One-way ANOVA test was used for variables with >2 categories

RESULTS

Sample Characteristics

A total of 281 subjects participated in this study. The majority of subjects were female, married, highly educated, had a monthly income between 421 and 700 USD, and had health insurance. The detailed characteristics of the subjects are presented in **Table 1**.

Subjects' Characteristics Relations with Knowledge and Attitudes towards COVID-19

Table 1 also shows the associations between subjects' characteristics and their scores on knowledge about and attitudes towards COVID-19. The age had a weak although a significant positive association with knowledge about COVID-19 but not with attitudes towards COVID-19. The association indicated that as age increases, the subjects' knowledge about COVID-19 tends to increase. Similarly, gender and education level had significant associations with knowledge about but not with attitudes towards COVID-19. The associations indicated that females and highly educated subjects had higher total scores on knowledge about COVID-19.

Marital status and health insurance showed significant association with attitudes towards COVID-19 but not with the knowledge; in a way, married subjects and subjects with health insurance had significantly higher scores on attitudes towards COVID-19. Monthly income did not show significant associations with both knowledge about and attitudes towards COVID-19.

Knowledge about COVID-19

The subjects answered on average 14.5 (\pm 2.68) out of the 18 items correctly (**Table 2**). Most subjects had answered the knowledge items correctly using the scale's level, with the range of correct answers ranging between 35.2% to 96.1%. The lowest percentage of the correct answer was for the item asking about the duration of protection that the natural active

immunity (being infected with COVID-19) can offer to the infected individual. "The body of the infected individuals with COVID-19 may develop immunity that protects them for 3-12 months only," while the highest was for the question "isolation and treatment of people who are infected with the COVID-19 virus are effective ways to reduce the spread of the virus". The detailed description of the items and the responses are presented in **Table 2**.

The Attitudes toward COVID-19

A high percentage of subjects showed positive attitudes toward COVID-19 on the individual items (**Table 3**). The highest percentage of a positive attitude toward COVID-19 was for the item of "I fear infection for myself and my family." The lowest percentage of a positive attitude toward COVID-19 was that the item of "regulations taken by the government is enough to combat disease." In concordance with the individual items, subjects had a mean score of 24.6 out of 30 on the attitude scale, indicating they had a relatively high positive attitude toward COVID-19. In addition, the mean scores of individual items of the scale indicated that the majority of respondents were in the "agree" or "strongly agree" categories. The detailed description of the attitude scale items and the subjects' responses are presented in **Table 3**.

We conducted further analysis to examine whether the attitudes questionnaire's individual items score differs according to the subjects' sociodemographic characteristics of gender, marital status, education level, and health insurance using independent samples t-test and according to the subjects' income using One-way ANOVA test. The results of the analyses indicated that most of the items did not differ according to the subjects' characteristics except for the following items: item 5, "I am willing to follow the provided precautions to control the virus," in which the males had lower scores than females (4.36 \pm 0.84 vs 4.58 \pm 0.65, $t(124.503)=-2.155$, $p=0.033$); item 2 "I pay close attention to the development of the epidemic situation" in which single subjects scored lower than married subjects (3.75 \pm 0.91 vs 4.01 \pm 0.84, $t(279)=-2.221$,

Table 2. Subjects total scores and individual items on knowledge about COVID-19 (N=281)

No	Item	Incorrect n (%)	Correct n (%)
1	The main clinical symptoms of COVID-19 are fever, fatigue, dry cough, loss of smell and/or taste [35], and muscle pain [18].	12 (4.3)	269 (95.7)
2	Unlike the common cold, stuffy nose, runny nose, and sneezing are less common in persons infected with the COVID-19 virus [18].	85 (30.2)	196 (69.8)
3	There currently is no effective cure for COVID-2019, but early symptomatic and supportive treatment can help most patients recover from the infection [18].	59 (21.0)	222 (79.0)
4	Not all persons with COVID-2019 will develop severe cases. Only those who are elderly, have chronic illnesses, and are obese are more likely to be in severe cases [18].	121 (43.1)	160 (56.9)
5	Persons with COVID-2019 cannot infect others with the virus when they do not have a fever (13). (Reworded)	69 (24.6)	212 (75.4)
6	The COVID-19 virus is highly infectious and spreads quickly via the respiratory droplets of infected individuals [18]. (Reworded)	29 (10.3)	252 (89.7)
7	It is not necessary for all people including children and young adults to take measures to prevent the infection by the COVID-19 virus [18]. (Reworded)	31 (11.0)	250 (89.0)
8	To prevent the infection by COVID-19, individuals should avoid going to crowded places such as public transportations [18].	26 (9.3)	255 (90.7)
9	Isolation and treatment of people who are infected with the COVID-19 virus are effective ways to reduce the spread of the virus [18].	11 (3.9)	270 (96.1)
10	Washing hands frequently, wearing medical masks and other measures can effectively prevent infection [14].	16 (5.7)	265 (94.3)
11	The incubation time of the disease is up to 14 days, typically 3–7 days [14].	40 (14.2)	241 (85.8)
12	COVID-19 may lead to pneumonia, respiratory failure [17], and death (added by the PI's).	26 (9.3)	255 (90.7)
13	In the control of COVID-19, Foods with Vitamin B and C [15]. (Reworded)	42 (14.9)	239 (85.1)
14	It is possible that COVID-19 could spread without showing symptoms [16]. (Reworded)	33 (11.7)	248 (88.3)
15	Antibiotics can prevent or kill the coronavirus [16].	104 (37.0)	177 (63.0)
16	Smoking can prevent or kill the coronavirus. (PI's Item)	59 (21)	222 (79.0)
17	The body of the infected individuals with COVID-19 may. develop immunity that protects them for 3-12 months only. (PI's Item)	182 (64.8)	99 (35.2)
18	Preventive measures against COVID-19 include frequently cleaning and disinfecting surfaces [17]	34 (12.1)	247 (87.9)
Total (mean)		54.39 (19.35)	226.6 (80.6)
Individuals mean scores (correct answers out of 18)		14.51	±2.68

Table 3. Subjects total scores and individual items on attitudes towards COVID-19 (N=281)

No	Item	Disagree		Neutral		Agree		Items M±SD*
		n	%	n	%	n	%	
1	The world including Jordan can win the battle against the COVID-19 virus? [18]	6	2.1	42	14.9	233	82.9	4.14±.74
2	I pay close attention to the development of the epidemic situation [14].	25	8.9	59	21.0	197	70.1	3.82±.90
3	I play an important role in controlling the epidemic [14].	10	3.6	49	17.4	222	79.0	4.11±.85
4	I fear infection for myself and my family [14].	5	1.8	15	5.3	261	92.9	4.60±.68
5	I am willing to follow the provided precautions to control the virus. (PI's Item)	4	1.4	20	7.1	257	91.5	4.51±.72
6	Regulations taken by the Government are enough to combat disease [17].	57	20.3	94	33.5	130	46.3	3.40±1.06
Total scores (possible range 6-30)		--	--	--	--	--	--	24.61±3.39
Average of each categories		17.83	6.35	46.5	16.53	216.67	77.11	--

* M±SD; mean ±standard deviation

p=0.027) and those who had no insurance scored lower than insured subjects (3.45±0.91 vs 3.94±0.87, t(279)= -3.433, p=0.001); and item 6 “regulations taken by the government are enough to combat disease” in which subjects with education level of high school or less had higher scores than subjects who had higher than high school level of education (3.80±0.91 vs 3.36± 1.05, t(279)= 2.132, p=0.034).

DISCUSSION

The COVID-19 pandemic has had a devastating impact worldwide, which prompted mitigation policies to contain the pandemic [2,6,14]. The bottom strategy followed by most countries worldwide was to scale back the transmissibility of the disease, often by non-pharmaceutical interventions,

including enforcing masks policy, hand sanitization, social distancing, travel restrictions, schools' closures, and partial or complete lockdowns [6,12]. At the start of the pandemic, a comparatively small number of confirmed cases in Jordan attributed to government measures. However, recent confirmed cases are worrying.

The sample of 281 subjects who participated in this study was mainly well-educated, with females predominating. The skewed in the sample toward females and well-educated participants have also been seen in previous studies in Jordan [19,20] and Saudi Arabia [21]. In general, the education enrollment rate for females in Jordan is higher than for males. These data reflect the Jordanian woman's awareness and awareness of the value and importance of education. The vast majority of participants were below 30 years, representing the generally younger Jordanian population [22]. Similarly,

females [21] and highly educated subjects were predicted and consisted of previous studies comparing the overall population's knowledge with higher education levels. The latter would have far better knowledge [5,19,21,23-26].

A positive attitude about the COVID-19 pandemic was among married subjects; this finding is analogous to other studies with higher knower, attitudes, and practices among married subjects [14,24-28]. This positive attitude might be because married people have the responsibility of caring for their families and self-protection. Therefore, they tend to find out more about protection, have a more positive attitude, and interact in proactive protective actions.

Also, subjects who had health insurance had significantly higher scores on attitudes towards COVID-19. This result is in line with a vast body of research that yields broadly consistent and significant findings of the relationship between health insurance and health-related outcomes [24-26,28]. Thus, health insurance improved the likelihood of appropriate care and is likely to result in the more exceptional and more appropriate use of health services. Health insurance appears to achieve these positive effects by facilitating ongoing care with a regular healthcare provider and reducing financial barriers to obtaining those services. That contributes to appropriate care; having insurance plays a role in enhancing efficacy beliefs, which had a significant and robust impact on practicing preventive behaviors, implying that promoting preventive behaviors toward COVID-19 would promote efficacy beliefs. This result is consistent with evidence that efficacy belief is a significant predictor of preventive behaviors [5,14,29].

Knowledge about COVID-19

Generally, the respondents' knowledge was adequate (total knowledge score 14.5 out of 18). It validates that the respondents have adequate knowledge about COVID-19. This result coincides with similar studies in Jordan and abroad [5,12-15,17-19,24-27]. The result was expected because the government in Jordan at all levels has released relevant education materials and has delivered COVID-19-related content through various channels, including television, the Internet, and publicity boards.

The vast majority of respondents had excellent knowledge about the required measures to prevent the disease. This result may be credited to the subjects' characteristics because significant associations between these demographics and knowledge and attitudes towards COVID-19 were verified in the present study.

On the one hand, the more scientific question related to the duration of protection that the natural active immunity can offer to the infected individual was correctly answered by few respondents. On the other hand, somehow, this result might be accepted as it required some professional background; however, it implies that the public has incomplete knowledge of COVID-19, especially regarding some expert topics, and still needs further education.

The Attitudes toward COVID-19

Relatively, subjects had a high positive attitude toward COVID-19 with a mean score of 24.6 out of 30 on the attitude scale. These results are similar to those of other published studies [5,12-19,24-27,30], likely because the government in Jordan has devoted serious standing to the epidemic and adopted strict prevention and control measures promptly against the disease after the outbreak. Moreover, with the

COVID-19 pandemic and media reports, the public in Jordan understands the severity of the epidemic. In turn, they desire to participate in epidemic prevention and control activities. Also, the exceptional knowledge about COVID-19 among the Jordanians can explain this result. It is imperative to say that higher COVID-19 knowledge scores were found to be strongly associated with a lower possibility of negative attitudes and potentially dangerous practices towards the COVID-19 epidemic in this study. These findings indicate the importance of improving public' COVID-19 knowledge by health education and improving their attitudes towards COVID-19.

The findings of this study concerning the demographic characteristics associated with knowledge and attitude towards COVID-19 are generally consistent with previous studies [5,31]. However, these findings propose that the health education intervention would be more functioning if it targets specific demographic characteristics; for example, the COVID-19 knowledge may significantly increase if the health education programs are specifically designed for men with a low education level with no insurance.

The highest percentage of a positive attitude toward COVID-19 was for the item of "I fear infection for myself and my family." indicating that health authorities should continue to organize corresponding health education campaigns to prevent fear of the spreading of COVID-19. This result is consistent in particular with previous studies [24-26,30,32].

The lowest percentage of a positive attitude toward COVID-19 was that the item of "regulations taken by the government is enough to combat disease." That implies that the subjects believe that the government should take much more action; such belief could be held by individuals who do not have strong self-efficacy, particularly those with low education levels or had no insurance individuals. Similar results were found in India's study in which some respondents were not sure about the government response [25,33].

Limitations

This study has several limitations that should be addressed. The sample size was small and overrepresented participants with higher education and female gender, and moderate to high income. Income and educational attainment are mostly taken as proxy measures of socioeconomic characteristics [34]; therefore, the responses may not be generalizable to all the populations. Another limitation was the use of the Internet with a smartphone or laptop to participate in the study. Thus, individuals who did not have access to the Internet and such electronic devices could not participate. Besides, the results may suffer from geographic biasedness. Self-reporting of data may also result in reporting bias; responses could have been reported based on social desirability, not the participants' actual situation. Also, participants probably searched for the correct answers before answering some of the questions, which may have inflated the score of COVID-19 knowledge; to control this bias, it was stressed by the researchers that the questionnaire was anonymously and emphasized the importance of answering questions honestly before completing the questionnaire. Further, more cross-sectional studies are unable to provide evidence on causality. Therefore, knowledge about and attitudes toward COVID-19 need to be further explored. Further studies about and attitudes toward and practices against COVID-19 should be further studied with a more extensive and randomized sample. Also, it is recommended to publish a

methodology paper from the current data as there were tremendous efforts to collect and propose items of the tools that measure knowledge about and attitudes toward COVID-19.

CONCLUSIONS AND RECOMMENDATIONS

Adequate knowledge, positive attitudes, and proper management and prevention of COVID-19 are essential to control the COVID-19 pandemic. Despite the government's efforts to make awareness about COVID-19 through different official and media channels, actively learning efforts are still required from the overall public. This study provided valuable preliminary insights into how public health initiatives can better protect the population's health during public health emergencies, like emerging COVID-19 pandemics, by establishing strategic behavioral interventions. Knowledge can play an essential role in enhancing the practice of public preventive behavior, as our findings showed that knowledge was related to attitudes. Information disseminated through health interventions to stop and control the epidemic must be supported by scientific evidence and delivered in understandable language to heighten general knowledge of the problem. It is highly recommended that public health practitioners and policymakers promote knowledge and understanding while addressing contextual factors that hinder the public's learning processes concerning health information. Broad-based insurance strategies across the uninsured population would be more likely to supply enhanced health and anticipation advantages than would "rescue" programs aimed only at the seriously ill. Thus, we propose that future research identify and monitor misconceptions about COVID-19 dispersed across communication platforms to supply accurate and evidence-based information about the disease and prevention measures.

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