

# Knowledge, Perceptions, and Prevention Practices among Palestinian University Students during the COVID-19 Pandemic: A Questionnaire-Based Survey

INQUIRY: The Journal of Health Care Organization, Provision, and Financing  
Volume 58: 1–11  
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DOI: 10.1177/0046958021993944  
journals.sagepub.com/home/inq



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## Abstract

The purpose of this study is to offer a timely understanding of university students' knowledge, perception, and preventative practices related to COVID-19 in Palestine and to determine affecting factors (gender, region, and type of locality). A cross-sectional design was used and data was collected over 2 weeks in April 2020 through an online survey. A total of 484 surveys were collected from students from different Palestinian universities. Participants showed high levels of knowledge across multiple topics (symptoms and characteristics of COVID-19, prevention practices, and at-risk groups), although respondents were less likely to indicate mask wearing as an effective prevention practice compared to other practices, and almost one-third reported incorrectly that taking antibiotics is effective in preventing COVID-19 infection. Respondents reported the most trust in the Ministry of Health as a source of information, and the least trust in social media. A generally high level of acceptance of government regulations related to the COVID-19 pandemic was found. Given the current global situation and the second wave of infections in Palestine, plans should be in place to disseminate correct information and combat newly-emerging rumors and misinformation through channels that are trusted by the university student population.

## Keywords

COVID-19, infectious disease outbreak, knowledge, perceptions, public health, attitudes, pandemic

### What do we already know about this topic

Our knowledge about the topic is based on official information provided by the WHO and the Palestinian Authority Ministry of Health. That being said, the pandemic is still evolving, and new research is being published on a daily basis that will for sure enrich our knowledge and understanding of COVID-19 and the pandemic situation.

### How does your research contribute to the field?

Understanding the attitude of Palestinian university students during the pandemic that is still going on is crucial to prevent any future uncontrolled situation among students once the local government decides to open up the campuses as well as in the case of remote learning. We hope that results presented in our research will highlight the specificity of our society and help in any future strategic preventive planning.

### What are your research's implications toward theory, practice, or policy?

By shaping and effecting new policies within the educational system, a reflective practices model can be developed during any future epidemic crisis. Accordingly, our research will influence the preventive practices of students during the new academic year as part of our main research objectives and may help in giving general perspective on student perception, which will enrich any future intervention with students.

## Background

The COVID-19 pandemic unquestionably presents an era-defining challenge to public health and the global economy. The east Mediterranean region has witnessed a steady rise in the number of infections. While the first case of COVID-19

infection in the region was reported in the United Arab Emirates (UAE) on 29 January 2020, the human cost has been heaviest in Iran, with infections there constituting some 90% of all cases in the region. By 6 April 2020 there were 81 010 confirmed infections in the Middle East, of which 62 589 were in Iran, 4005 in Pakistan, and 2795 in Saudi



Arabia.<sup>1</sup> Surprisingly, there is a low number of confirmed cases and deaths in the Arab world. This trend fosters epidemiologists to pick up different explanations. Some correlate this to BCG vaccination in the region, others highlight the fact that populations may have had earlier exposure and possess immunity against SARS-CoV-2 nowadays.<sup>2</sup>

Palestine joined the COVID-19 pandemic on March 5, 2020 when it reported the first 7 confirmed cases in Bethlehem. Imported cases were linked to Greek tourists who were found to have positive SARS-CoV-2 when they had returned to their homes. Since then, the entire Bethlehem area was quarantined as a preventive measure to mitigate the spread and hotels were used to quarantine contacts and isolate cases.

As of June 24th Palestine had 1517 confirmed cases distributed over 11 governorates and 5 reported deaths.<sup>3</sup> Palestine required residents to self-quarantine as a national preventative measure to mitigate the spread of the disease until early June during which restrictions on movement and business were eased. Currently, the number of cases is still being counted based on reverse transcription RT-PCR. Molecular diagnosis by RT-PCR for COVID-19 is the recommended method for the identification and laboratory confirmation of COVID-19 cases.<sup>4</sup> It confirms the disease through the amplification of the RNA of the virus. However, sensitivity of the test doesn't exceed 75%, beside the difficulties of taking samples from patients and the need for biosafety level 3 facilities as well as professional, trained experts.<sup>5</sup> Additionally, there is a shortage in the laboratory supply of primers and positive controls due to the huge demand all over the world, which requires other more practical, sensitive, and specific methods.

RT-PCR reflects the presence of the virus but cannot give any evidence of pre-exposure of recovered asymptomatic patients or the immunological status in the acute infection. Interestingly, asymptomatic carriage of SARS-CoV-2 has been described,<sup>6,7</sup> and the role of asymptomatic SARS-CoV-2 infected individuals in disseminating the infection must be defined in order to direct protective measures as well as to explicate trends in disease epidemiology. Of note, evidence suggest that MERS-CoV-2 can infect individuals in an asymptomatic fashion, yet induce signs of a "protective" immune response,<sup>8</sup> which may explain the current Middle East trend. This also endorses experts' argument about the earlier circulation of SARS-CoV-2 expected in the last quarter of 2019; an argument that is supported by significant

increases in the number of people hospitalized for pneumonia and flu in different countries, as an Italian epidemiologist declared.<sup>9</sup>

The task now facing the Palestinian government and national regulators including the Ministry of Health is to balance urgency against everyday concerns about the economic impact and the burden of disease in Palestine, which is considered to be mild with low case fatality.

Behavioral practices have been found to be important in the control of the crisis throughout the COVID-19 pandemic.<sup>10</sup> University students are often a target group for many scientific studies, due to their social representations. Palestinian university students are more or less coming from different parts of the country and belong to various social and economical categories and classifications. As such their knowledge, perception, and preventative practices related to COVID-19 should be highly considered because they have a direct impact on their family and communities' members. The aim of our study is to investigate university students' knowledge, perceptions, and practices during the current COVID-19 outbreak in Palestine. In addition, this study's aim is to determine factors (gender, region, and type of locality) that may affect the degree of knowledge, risk perceptions, and preventive behavioral practices regarding COVID-19.

## Methods

### *Design, Setting, and Sample*

A cross-sectional design was used to conduct the study. Data was collected over 2 weeks in April 2020 through a survey that was used to assess knowledge, risk perceptions and preventive behaviors in the current COVID-19 outbreak in Palestine.

**Sample size.** Due to mobility restrictions as a result of the government-mandated self-quarantine, the survey was administered through a web link. A general invitation was sent out to all faculties in 5 universities located across the West Bank. Undergraduate students received the link for the survey with the invitation through the offices of the academic vice president and posted on online platform which is official connection between the university and students. A total of 484 were collected from students from different Palestinian universities who agreed to participate and were over 18 years

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Received 30 July 2020; revised 14 November 2020; revised manuscript accepted 4 January 2021

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old and answered all the questions and submitted the final survey via Google Form during the permitted period maintaining their anonymity.

### Data Collection Tool

A structured questionnaire was developed by the WHO Regional Office in Europe, which approved our use of the questionnaire.<sup>10</sup> The questionnaire was translated into Arabic and reverse translated. To ensure national validation of the survey in Arabic, the questionnaire was tested by 10 students from the various national universities. To obtain the validity of the tool, considering that it was already built on a protocol approved and validated by the WHO, 5 university professors from various disciplines were asked to review and approve its validity and accordingly and modifications were done accordingly. The same validation took into consideration the length of time required to complete the survey. The students who agreed to participate completed a self-report questionnaire that covered the 4 areas of study: (1) demographic characteristics, (2) knowledge, (3) perceptions, and (4) prevention practices. Reliability was assessed using Cronbach's alpha internal-consistency correlation measure with the following values for the different sections of the tool: Perception: 0.71; Prevention: 0.73; and Knowledge: 0.65.

### Data Analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS) software V21.0. Basic descriptive statistics (averages and frequencies) and bar charts with error bars were obtained. Differences in frequencies between levels of categorical variables (eg, gender, region, and type of locality) were tested using Fisher Exact Test. For variables measured using the Likert scale (eg, 1 = not severe to 6 = very severe), differences were tested using independent-samples *t*-test. Significance was declared when the *P*-value was less than 0.05 ( $P < .05$ ). When several variables were considered together (eg, in bar charts), a missing case for 1 variable was removed for all variables considered.

### Ethical Considerations

The study was approved by the An-Najah National University ethical committee (IRB) Number Med1/4/20. The WHO Regional Office for Europe approval for the study protocol and the use of the questionnaire. In addition, formal consent forms were signed by all participants included in the study. Finally, participants took part in the survey voluntarily and they had the right to withdraw at any time without any penalties.

## Results

### Demographic Characteristics

In the current study, more than half of the participants were female students (66.7%,  $n=323$ ) and 33.3% ( $n=161$ ) were

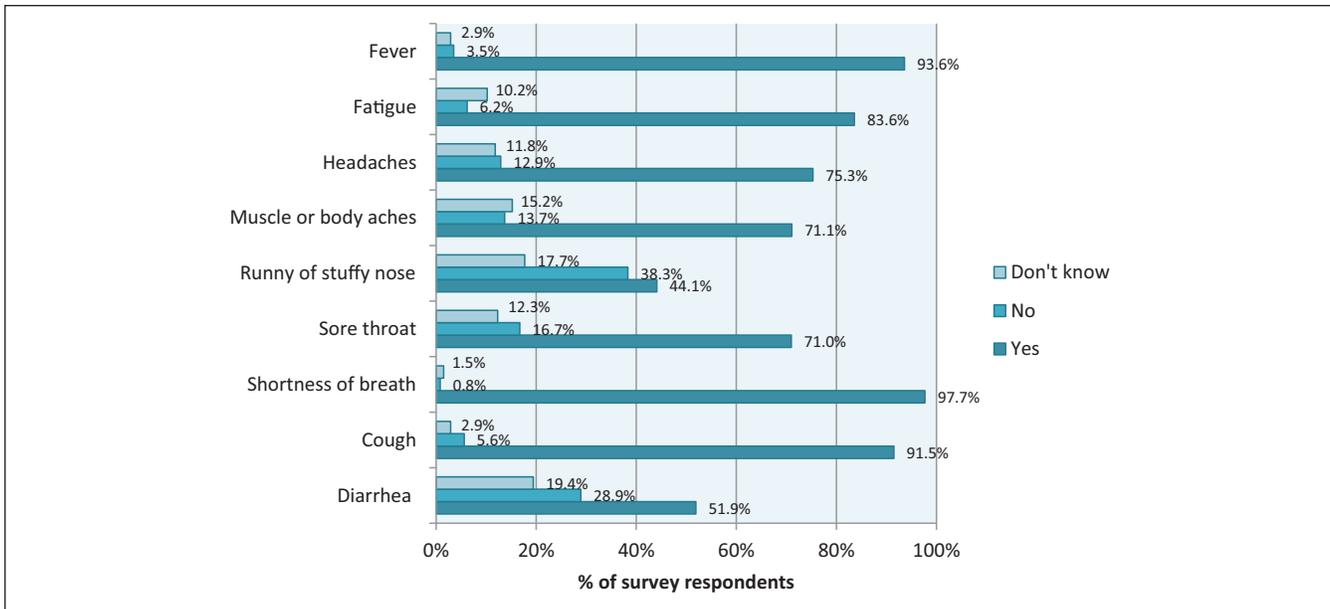
male. 96.3% ( $n=466$ ) of the students were aged between 18 and 24 years, while only 18 respondents (3.7%) were older than 24 years of age. 76.0% ( $n=368$ ) of respondents were from the northern region of Palestine, and 24% ( $n=116$ ) were from the south or center region. Almost half of the respondent students were from an urban locality 48.4% ( $n=233$ ), 48.9% ( $n=235$ ) were from a rural locality, and 2.7% ( $n=13$ ) were from a refugee camp. Only 3.3% ( $n=16$ ) of the students reported having a chronic disease. Note that while gender and region are often found to be associated with different aspects of knowledge, attitudes and practices of university student respondents (explained in detail below), significant relationships were not found between type of locality (urban, rural, or refugee camp), and any of the variables studied. As such, results presented are not disaggregated by type of locality, although this finding is analyzed in the "Discussion" section.

**Knowledge.** Survey respondents were asked to rate their level of knowledge about the novel coronavirus. Scores were measured on a scale from 1 (very poor knowledge) to 5 (very good knowledge). No significant differences were found among gender, region, or type of locality ( $P > .05$ ). 81.4% ( $n=394$ ) rated their knowledge level on the novel coronavirus in general as very good or good, and 90.7% ( $n=439$ ) rate their knowledge on how to prevent the spread of the novel coronavirus as very good or good.

Survey respondents were asked if certain groups are more at risk for contracting the novel coronavirus. Knowledge of at-risk groups was generally of a high level, with 97.5% ( $n=472$ ) of respondents correctly identifying older persons (60 years+) as an at-risk group and the same percentage of respondents identifying people with chronic illnesses as an at-risk group. A smaller proportion of respondents, but still a majority (71.5%,  $n=346$ ) correctly responded that pregnant women are an at-risk group, while only 37.6% ( $n=182$ ) of respondents correctly responded that small children under 6 years of age are not an at-risk group.

In relation to knowledge of symptoms of COVID-19, the vast majority of respondents correctly identified fever (93.6%,  $n=452$ ), shortness of breath (97.7%,  $n=471$ ), and cough (91.5%,  $n=441$ ) as symptoms. Fewer respondents, but still a majority correctly identified fatigue (83.6%,  $n=403$ ), headaches (75.3%,  $n=363$ ), muscle or body aches (71.1%,  $n=342$ ), and sore throat (71.0%,  $n=341$ ) as symptoms of COVID-19, and only 51.9% ( $n=251$ ) knew that diarrhea is a symptom of COVID-19 infection. Only 38.3% ( $n=184$ ) of respondents knew that a runny or stuffy nose is not a symptom directly associated with COVID-19 infection. These results are depicted in the chart below (Figure 1).

The final knowledge questions of the survey were related to the transmission of COVID-19 and treatment for it. 89.5% ( $n=433$ ) of respondents correctly responded that there is not a drug for the treatment or a vaccine for COVID-19. 90.7% ( $n=439$ ) knew that COVID-19 is transmissible via droplets through coughing, sneezing, or intimate contact. 97.5%



**Figure 1.** Percentage of survey respondents by knowledge of symptoms of COVID-19.

( $n=472$ ) correctly reported that the incubation period is up to 14 days, and 74.5% ( $n=357$ ) knew that after a person has recovered from COVID-19 that he/she is not necessarily immune to the virus.

Respondents were then asked which of a list of practices are effective in preventing COVID-19 infection. The vast majority of participants responded correctly in relation to key practices that are effective in preventing infection, such as avoiding touching eyes, nose and mouth with unwashed hands, using sanitizer to clean hands when soap and water is unavailable, staying home when you are sick, not traveling abroad, covering your mouth when you cough, avoiding contact with infected people, avoiding places where people gather, self-quarantining, and social distancing. Only 79% of respondents ( $n=381$ ) reported that wearing a face mask is a preventative practice, and 29.8% (143) responded incorrectly that using antibiotics is a preventative measure for COVID-19 infection. 77.1% ( $n=371$ ) reported the prayer can be used to prevent infection, indicating a fairly high level of religiosity among the population, which could prove to be a protective factor in regards to mental health and emotional well-being and could be informative in choosing future awareness promotion channels and sources (places of worship and clergy).

No significant differences ( $P > .05$ ) were found in relation to region for any of the practices. Females incorrectly reported that avoiding eating meat is a preventative practice in higher proportions than males and males reported self-quarantining in higher proportions than females with significant differences ( $P < .05$ ). No significant differences were found in relation to gender for all other practices. Table 1 presents the distribution of responses.

Respondents were asked what they feel that they still need in terms of information related to COVID-19. As we can see from Table 2, most of the students need more knowledge regarding “scientific progress in development of treatment for novel coronavirus” and “scientific progress in development of a vaccine against novel coronavirus” (94.4%,  $n=457$  and 93.8%,  $n=454$ , respectively) and less knowledge was seen as needed related to “details on travel restrictions” (55.8%,  $n=270$ ).

**Perceptions.** Participants were asked to rate their level of trust in different sources of information concerning COVID-19. Scores were measured on a scale from 1 (very little trust) to 6 (great deal of trust). The highest levels of trust were recorded in the Ministry of Health and hospitals, and the lowest level of trust was found in social media. Average scores differed between males and females ( $P < .01$ ) for public television and for daily or weekly newspapers with females having higher average trust scores than males. Average scores differed among regions in the trust in public television, daily or weekly newspapers, and the Ministry of Health ( $P < .05$ ) with respondents from the north having higher average trust scores than respondents from the south and central regions, as shown in Figure 2.

Respondents were then asked to evaluate their perceptions of susceptibility and severity of COVID-19. Scores were measured on a scale from 1 (not probable, not severe, or not at all susceptible) to 6 (very probable, very severe, or very susceptible). Higher means were found for the perception of severity if coronavirus were contracted than for the perception of probability of contracting it or susceptibility to infection. The mean scores of for perception regarding the

**Table 1.** Practices Reported by Palestinian University Students Taken to Prevent COVID-19 Infection.

Preventative practices	Responses	n (%)
Avoiding touching your eyes, nose, and mouth with unwashed hands	Yes	456 (94.4)
	No	21 (4.3)
	Don't know	6 (1.2)
Use of sanitizer to clean hands when soap and water is not available for washing hands	Yes	467 (96.7)
	No	9 (1.9)
	Don't know	7 (1.4)
Staying home when you are sick or when you have a cold	Yes	468 (97.3)
	No	8 (1.7)
	Don't know	5 (1.0)
Not traveling abroad	Yes	476 (98.6)
	No	3 (0.6)
	Don't know	4 (0.8)
Taking herbal supplements	Yes	264 (54.5)
	No	136 (28.1)
	Don't know	84 (17.4)
Taking food supplements	Yes	347 (72.1)
	No	87 (18.1)
	Don't know	47 (9.8)
Covering your mouth when you cough	Yes	479 (99.2)
	No	3 (0.6)
	Don't know	1 (0.2)
Ensuring a balanced diet	Yes	344 (71.7)
	No	91 (19.0)
	Don't know	45 (9.4)
Avoiding close contact with someone who is infected	Yes	477 (99.2)
	No	2 (0.4)
	Don't know	2 (0.4)
Using caution when opening mail	Yes	419 (86.6)
	No	49 (10.1)
	Don't know	16 (3.3)
Avoiding eating meat	Yes	63 (13.0)
	No	371 (76.7)
	Don't know	50 (10.3)
Getting the flu shot	Yes	130 (27.0)
	No	268 (55.6)
	Don't know	84 (17.4)
Exercising regularly	Yes	304 (63.1)
	No	130 (27.0)
	Don't know	48 (10.0)
Wearing a face mask	Yes	381 (79.0)
	No	89 (18.5)
	Don't know	12 (2.5)
Avoiding places where many people gather	Yes	478 (98.8)
	No	5 (1.0)
	Don't know	1 (0.2)
Using antibiotics	Yes	143 (29.8)
	No	272 (56.7)
	Don't know	65 (13.5)
Drinking ginger tea	Yes	192 (39.8)
	No	209 (43.3)
	Don't know	82 (17.0)

(continued)

**Table 1. (continued)**

Preventative practices	Responses	n (%)
Prayer	Yes	371 (77.1)
	No	83 (17.3)
	Don't know	27 (5.6)
Social distancing	Yes	444 (92.3)
	No	28 (5.8)
	Don't know	9 (1.9)
Self-quarantine	Yes	462 (96.0)
	No	14 (2.9)
	Don't know	5 (1.0)

**Table 2. Knowledge Needed.**

Type of information	Respondents reporting need n (%)
Symptoms of novel coronavirus	347 (71.7)
Personal stories from others about how they cope	384 (79.3)
Scientific progress in development of a vaccine against novel coronavirus	454 (93.8)
Scientific progress in development of treatment for novel coronavirus	457 (94.4)
How I can personally prevent spread of the disease	349 (72.1)
How I can take care of a person who is in a risk group	425 (87.8)
Details on travel restrictions	270 (55.8)

probability that the respondent would become infected with COVID-19 and the susceptibility of the respondent to infection were higher among male and south/center region respondents with significant differences ( $P < .05$ ), while no significant differences were found with region and gender in regards to the perception of severity if having contracted the novel coronavirus. Figure 3 presents this data disaggregated by gender and region.

Respondents were asked to report their level of agreement with a number of policies and/or practices that governments and people could undertake in response to the COVID-19 pandemic. Scores were measured on a scale from 1 (strongly disagree) to 6 (strongly agree). Respondents were most likely to agree that "People who come from countries where there have been cases of coronavirus should be quarantined, whether they are sick or not," "Community facilities such as schools or kindergartens should be closed," and "In risk areas, major events should be cancelled by the organizers." Respondents were the least likely to agree with the statement: "I think that the measures currently being taken are greatly exaggerated."

The mean scores were higher (more likely to agree) among respondents from the south/center region regarding the statements: "Community facilities such as schools or kindergartens should be closed"; and "In risk areas, major events should be cancelled by the organizers" with significant differences ( $P < .01$ ). Also, the mean scores were higher (more likely to agree) in female students regarding the statement: "It should only be allowed to leave your house for professional, health,

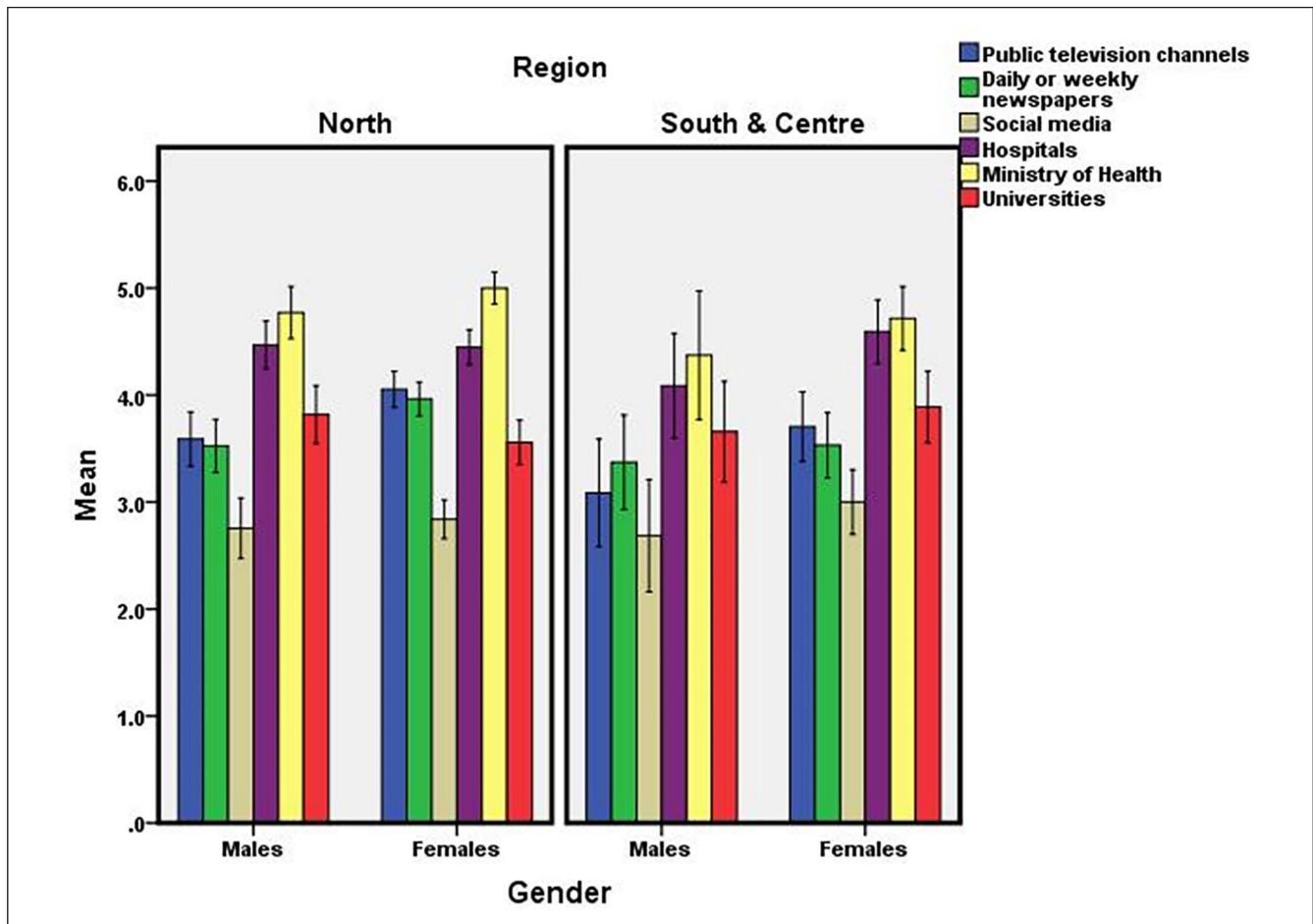
or urgent reasons" and "Palestinians living abroad should not be allowed to return to the country during the epidemic" ( $P < .01$ ). Table 3 presents this data.

Also in regards to perceptions, respondents were asked how they feel about the coronavirus in a number of different aspects. Respondents were more inclined to find the coronavirus worrying and stressful, than they were to find it fear-inducing and making them feel helpless. The vast majority of respondents perceive the virus to be spreading fast. A significant differences between region and (1) how close or far-away respondents feel the virus is and (2) how stressful the virus makes the respondent feel, were found ( $P < .05$ ), with respondents from the south and center regions feeling that it is closer, but less stressful than respondents from the north.

In regards to gender, significant differences were found with the extent to which the virus is found to be fear-inducing ( $P < .05$ ) and media-hyped ( $P < .01$ ), with females finding the virus to be more fear-inducing, and males finding the virus to be more media-hyped. The results can be reviewed in Table 4.

**Prevention practices.** In terms of prevention attitudes and practices, Table 5 presents results. Males and students from the south/center had higher mean scores (better knowledge of how to protect oneself and higher perception of ease in avoiding infection) than females and respondents from the north with statistically significant differences.

Respondents were asked how they view washing hands with water and soap for 20s in terms of convenience. Scores



**Figure 2.** Average scores of degree of trust of Palestinian students in different sources of information concerning COVID-19 crisis by gender and region. Error bars are 95%CI.

were measured on a scale from 1 (very inconvenient) to 6 (very easy to do). Approximately two-thirds of respondents (63.9% of males and 68.4% of females) viewed it as convenient or very easy to do (Figure 4) with no significant differences ( $P > .05$ ) found among gender or region.

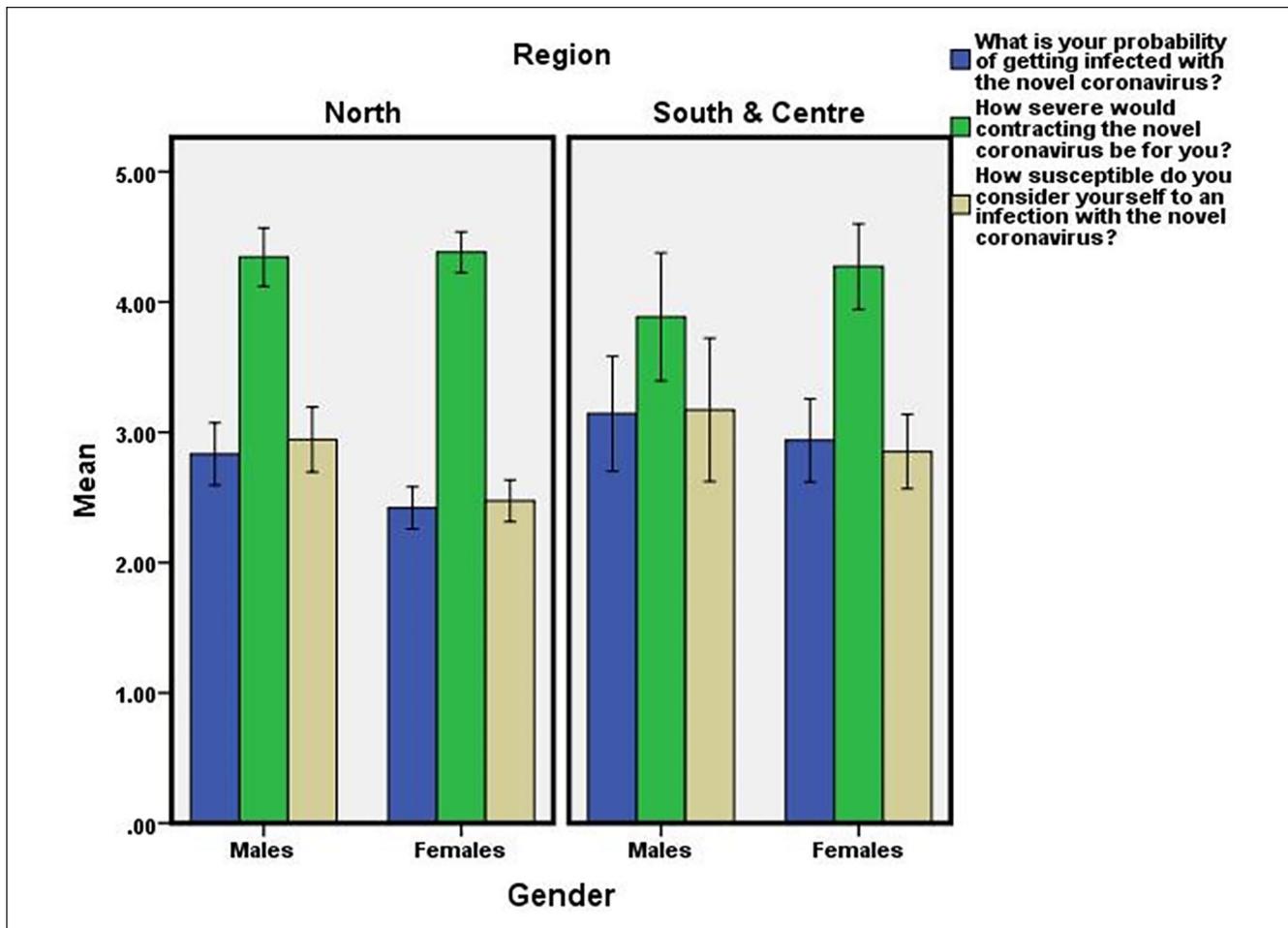
Lastly, respondents were asked another set of preventative practice questions in relation to their movement and social interactions. 90.1% ( $n=436$ ) reported that they had already canceled flights or train rides or plan to do so; 90.3% ( $n=437$ ) already cancelled holiday trips or plan to do so; and 86.9% ( $n=421$ ) already cancelled business trips or plan to do so. Respondents reported abstaining from social visits in lower proportions, with 80.6% ( $n=390$ ) having already avoided visiting family or friends or planning to do so, and 74.8% ( $n=362$ ) having already or planned to ask family or friends not to visit them.

## Discussion

The current study assessed knowledge, perceptions and practices related to the COVID-19 pandemic among university

students in Palestine. Participants were found to have high levels of knowledge across multiple topics, including symptoms and characteristics of COVID-19, prevention practices, and at-risk groups. This high level of knowledge was also found in another study of Jordanian university students by Khasawneh et al.,<sup>11</sup> and KAP studies from Taiwan<sup>12</sup> and China.<sup>13</sup> Other studies found lower rates of knowledge related to COVID-19.<sup>13-17</sup>

Our study did find that respondents were less likely to indicate mask wearing as a prevention measure compared to other preventative practices such as social distancing and washing hands, among others. This is in congruence with the Khasawneh et al.<sup>11</sup> study as well. A study of the general public in the US and UK published in the *Annals of Internal Medicine* reported an even lower percentage of respondents that consider wearing a face mask to be an effective preventative measure (37.8% of US respondents and 29.8% of UK respondents),<sup>14</sup> while the Zhong et al.<sup>13</sup> study of the Chinese public found that the vast majority reported wearing face masks when going out. These differences may be explained in the different approaches countries have taken in promoting the



**Figure 3.** Average scores of perceptions of susceptibility and severity of COVID-19 for Palestinian university students by region and gender. Error bars are 95%CI.

numerous preventative practices and the different regulations governments have issued regarding preventative practices. In Palestine, as of mid-June, 2020 more attention has been given to the benefits of wearing masks in public as a preventative measure to the spread of COVID-19. This campaign has been in response to the second wave of infections during which the government did not enforce extensive closures as it did during the first wave. In many areas mask-wearing in public has become mandated with a monetary fine issued to non-compliers. As such, it is expected that knowledge has increased among the study population in this regard since the time of data collection.

Almost one-third of respondents in our study reported incorrectly that taking antibiotics is effective in preventing COVID-19, which is similar to the findings of Khasawneh et al.<sup>11</sup> Only half of respondents in our study correctly identified diarrhea as a symptom of COVID-19, which is similar to findings of a study of university student KAPs related to swine flu.<sup>18</sup>

In terms of perceptions, respondents felt that COVID-19 is stressful and worrying more than fear-inducing or making

them feel helpless. Female respondents tended to consider COVID-19 as fear-inducing more than male respondents, with significant differences. This is congruent with a previous study, which found that female participants showed more severe anxiety and fear than male participants.<sup>19</sup> Respondents reported the most trust in the Ministry of Health as a source of information, and the least trust in social media. Male respondents found COVID-19 to be media-hyped in higher proportions than female respondents.

Participants of our study showed positive attitudes related to vaccination, with the majority reporting that they would be vaccinated when a vaccine is available. Research conducted by Akan et al.<sup>20</sup> in Turkey related to pandemic influenza found, contrary to our study, that the vast majority of university students surveyed were unwilling to get vaccinated. It is expected that the major disruptions to daily life and the seemingly higher mortality rate of COVID-19 compared to influenza have positively affected people's willingness to get vaccinated.

Our study found a generally high level of acceptance of government regulations related to the COVID-19 pandemic

**Table 3.** Average Scores of Perceptions of Palestinian Students about Policies and Practices by Gender and Region.

Question	Overall mean	Gender			Region		
		Males	Females	<i>P</i> value <sup>a</sup>	North	South and Center	<i>P</i> value <sup>a</sup>
If a vaccine becomes available and is recommended for me, I would get it	4.95	4.91	4.97	ns	4.98	4.86	ns
People who come from countries where there have been cases of coronavirus should be quarantined, whether they are sick or not	5.45	5.32	5.51	ns	5.49	5.33	ns
In the event of an outbreak it's appropriate to avoid certain people on the basis of their country of origin	3.92	3.78	3.99	ns	3.97	3.76	ns
The government should restrict personal liberty rights to combat the novel coronavirus	4.74	4.68	4.77	ns	4.82	4.52	ns
The government should restrict access to the Internet and social media to combat the spread of misinformation about the novel coronavirus	4.10	4.09	4.11	ns	4.18	3.85	ns
Community facilities such as schools or kindergartens should be closed	5.40	5.30	5.46	ns	5.50	5.09	***
Major events should be cancelled by the organizers	5.24	5.15	5.28	ns	5.29	5.08	ns
I think that the measures currently being taken are greatly exaggerated	2.39	2.46	2.36	ns	2.34	2.56	ns
It should only be allowed to leave your house for professional, health, or urgent reasons	5.04	4.78	5.17	***	5.07	4.97	ns
In risk areas, major events should be cancelled by the organizers	5.49	5.28	5.59	***	5.55	5.30	**
Palestinians living abroad should not be allowed to return to the country during the epidemic	4.18	3.84	4.34	***	4.26	3.92	ns
I think the decisions are fair	4.65	4.54	4.70	ns	4.71	4.46	ns
I have a hard time making it through stressful events	3.55	3.35	3.64	**	3.57	3.48	ns
It does not take me long to recover from a stressful event	3.76	3.86	3.71	ns	3.73	3.83	ns
It is hard for me to snap back when something bad happens	3.20	3.04	3.28	ns	3.16	3.35	ns

<sup>a</sup>Independent samples *t*-test; ns = *P* > .05. \*\**P* < .05. \*\*\**P* < .01.

in regards to adhering to government recommendations, and not believing that the measures taken were exaggerated. This is in congruence with a study of high school and university students' COVID-19-related KAP in the Philippines by Baloran,<sup>21</sup> which found that students were satisfied with the government's actions to mitigate risks.

Our study did not find that type of locality of residence (urban, rural, or refugee camp) significantly affected responses to any of the knowledge, perception, or practices questions. This is in contradiction with,<sup>19</sup> but may be attributed to the respondents' common characteristic, which is university attendance. Universities in Palestine are few in number, and gather students from all types of localities—urban, rural, and refugee camp—which could have a unifying affect in regards to their knowledge, attitudes, and

practices related to COVID-19. Cases of COVID-19 infection in Palestine also were clustered in certain regions during the time of data collection, but within those regions were not limited to certain types of localities (urban, rural, or camp), which may also account for the lack of differences in KAP of respondents by type of locality.

## Limitations

The distribution of respondents is considered to be a limitation of our study; nevertheless we tried to collect as many surveys as we could to explore knowledge, attitudes, and practices without quota sampling by location due to the sudden epidemic crisis. The timing of the data collection from April 2020 may also be considered a limitation, considering

**Table 4.** Average Scores of Perceptions of Palestinian Students about How They Feel about the Coronavirus by Gender and Region.

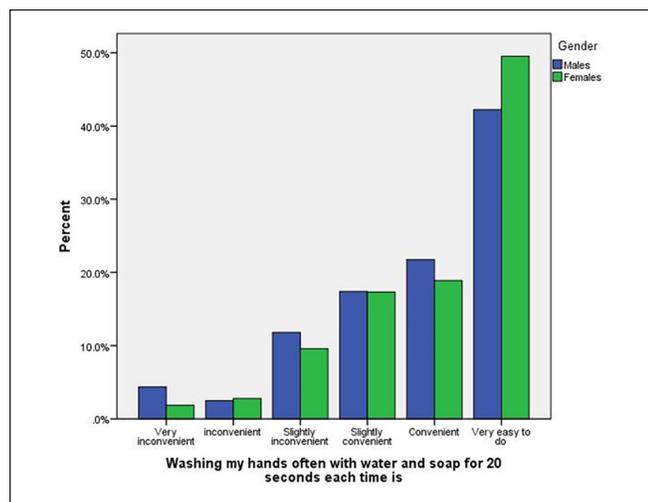
Question	Overall mean	Gender			Region		
		Males	Females	P value <sup>a</sup>	North	South and Center	P value <sup>a</sup>
The novel coronavirus to me feels. . .(1-----6)							
Close-----Far away	4.02	3.89	4.09	ns	4.09	3.80	**
New-----Old	4.38	4.34	4.40	ns	4.39	4.35	ns
Spreading slowly-----Spreading fast	5.49	5.43	5.51	ns	5.52	5.37	ns
Something I think about all the time----- --Something I almost never think about	3.59	3.63	3.57	ns	3.57	3.64	ns
Fear-inducing-----Not fear-inducing	3.17	3.36	3.07	**	3.12	3.32	ns
Media hyped-----Not media hyped	3.69	3.40	3.84	***	3.70	3.68	ns
Worrying-----Not worrying	2.62	2.77	2.55	ns	2.58	2.74	ns
Something that makes me feel helpless- -----Something that I am able to combat with my own action	4.66	4.66	4.66	ns	4.67	4.62	ns
Stressful-----Not stressful	2.95	3.14	2.85	ns	2.85	3.24	**

<sup>a</sup>Independent samples t-test; ns = P > .05. \*\*P < .05. \*\*\*P < .01.

**Table 5.** Average Scores of Perception and Practices Related to Prevention of the Disease for Palestinian University Students by Region and Gender.

Question	Overall mean	Gender			Region		
		Males	Females	P value <sup>a</sup>	North	South and Center	P value <sup>a</sup>
I know how to protect myself from coronavirus (from 1 = not at all to 6 = very much so)	2.66	2.90	2.55	***	2.56	3.0	***
For you, how difficult is avoiding an infection with the novel coronavirus in the current situation? (from 1 = extremely difficult to 6 = extremely easy)	2.71	2.99	2.57	***	2.63	2.95	**
I follow the recommendations from authorities in my country to prevent spread of novel coronavirus (from 1 = not at all to 6 = very much so)	4.31	4.23	4.35	ns	4.36	4.16	ns

<sup>a</sup>Independent samples t-test; ns = P > .05. \*\*P < .05. \*\*\*P < .01.



**Figure 4.** How washing hands with water and soap for 20s as a prevention measure against COVID-19 is viewed by Palestinian students.

the rapidly changing pandemic situation on the ground and the information available to the public. Furthermore, and due to the early stage of the pandemic development, we did not consider the Physical health, Socio-economic consequences, and training programs of COVID-19.<sup>22</sup>

### Conclusion

Overall, Palestinian university students showed high levels of knowledge, positive attitudes, and good precautionary practices related to COVID-19. Given the current global situation and the second wave of infections in Palestine, plans should be in place to disseminate correct information and combat newly-emerging rumors and misinformation through channels that are trusted by the university student population, such as the Ministry of Health. Pandemic burnout is also a new challenge to consider as we move forward, in the face of which even extensive knowledge; positive attitudes and good practice can waiver.

### Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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