

# The perceived threat of COVID-19 and its impact on hygienic precautionary behaviors: A multi-countries study

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## Abstract

**Objective(s):** To explore the perceived threats of COVID-19 and how it changed the personal hygienic precautionary behaviors across multiple countries in the Middle East and North Africa (MENA) region.

**Design:** A cross-sectional descriptive design was used to survey the four targeted MENA countries: Jordan, Palestinian territories, Saudi Arabia, and Egypt.

**Sample:** A nonprobability convenience sampling design was utilized. The link to the survey questionnaire was distributed through social media groups within Facebook® and Twitter®. The groups are known and accessible by known across the general population at the targeted countries.

**Measurement:** Data was collected using The Brief Illness Perception Questionnaire and an adapted instrument that examine the hygienic precautionary behaviors during COVID-19 pandemic.

**Results:** Answers of participants ( $n = 2604$ ) were valid and included in the study. The results show that a minimal perception of threat among the participants on most of the BIP-Q5 items ( $M = 12.9, SD = 7.2$ ). Moreover, the highest compliance rates to recommended hygienic precautionary behaviors were found among populations above the age of 50 years ( $F = 2.89, p = .04$ ), females ( $t = 5.18, p = .003$ ), being married ( $F = 3.09, p = .029$ ), and being a health care professional ( $t = -2.20, p = .028$ ).

**Conclusion:** The perceived threat of COVID-19 and compliance rates with the recommended hygienic precautionary behaviors among Arab societies were found to below and need critically urgent attention.

## KEYWORDS

behaviors, compliance, COVID-19, hygienic precautions, perceived threat

## 1 | BACKGROUND

COVID-19 outbreak spread rapidly around the world and was labeled as a global pandemic. By mid-2020, more than 4,396,392 people with more than 300,441 confirmed deaths had occurred across 216 countries (World Health Organization, 2020). COVID-19 is a respiratory

disorder that is transmitted largely by air droplets and close contact and has a mean incubation period of 6.4 days (Chen et al., 2020). In the wake of COVID-19 outbreak, strict public health measures have been enforced globally to contain its spread (Adhikari et al., 2020). Such measures include curfews, travel restrictions, and suspending most academic and business activities, and social events. Public health

measures were not sustainable for long periods, thus the need to take into consideration the enforcement of the long term, sustainable personal hygienic precautionary behaviors among the populations to help mitigating the virus transmission (Qazi et al., 2020).

Public awareness and compliance with the recommended hygienic precautionary behaviors play a vital role in the prevention and control of COVID-19, considering its rapid spread by person-to-person interactions (Hussain et al., 2020). Moreover, adherence to enforced control measures such as social distancing, travel ban, self-quarantine, and wearing face masks, were thought to be enforced by the rising public fear of getting infected with “unknown” novel COVID-19 infection (Atchison et al., 2020; Roy et al., 2020). Therefore, health care authorities through media strongly all recommended precautionary measures like frequent hand-washing, mask-wearing, self-isolating, and social distancing as all populations realized that the enforced measures decrease the change of getting infected, and breaks the chain of infection to others (Hu et al., 2020).

Like many countries around the globe, Jordan, Palestinian territories, Saudi Arabia, and Egypt were affected by the spread of COVID-19 and enforced many recommended precautionary measures to control the virus spread like curfews, travel bans, and moving toward online education at schools and universities (Al-Maraira & Shennaq, 2021; Alzoubi et al., 2020; Naser et al., 2020; Shahin & Hussien, 2020). However, the effectiveness of governments’ enforced precautionary measures to reduce transmission rates is highly dependent on public awareness and compliance with personal hygienic precautionary behaviors (Naser et al., 2020). To date, there has been insufficient published data about public perceived threat of COVID-19 and the resulted compliance with personal hygienic precautionary behaviors, specifically among Arab societies (Naser et al., 2020).

The perceived threat of COVID-19 pandemic plays a vital role in estimating the extent of population awareness regarding the seriousness of COVID-19 and the resultant willingness to comply with hygienic precautionary behaviors (Iorfa et al., 2020). In looking into the literature addressing that, a research gap exists between the extent of threat perception in response to COVID-19 pandemic among various populations, especially Arab societies and the resultant compliance, if any, with hygienic precautionary behaviors (Shahin & Hussien, 2020). Moreover, exploring the level of awareness among populations regarding COVID-19 pandemic perceived threats, and the compliance with recommended preventive hygienic precautionary behaviors may formulate useful baseline data for healthcare authorities to use to enforce optimizing interventions (Shahin & Hussien, 2020). The baseline data is also useful for nursing researchers and academics who may suggest action plans to improve the effectiveness of recommended interventions to limit the effects of the COVID-19 pandemic. The results can also be useful for enhancing societal compliance to public health precautionary measures and behaviors in any future pandemics (Ning et al., 2020). Therefore, assessing the perceived threat of COVID-19 and public compliance with hygienic precautionary behaviors among Arab societies during the pandemic is imperative. The authors of the current study aimed to collect the largest possible sample of the targeted populations and utilized a cross-sectional descriptive study design to explore the perceived threats and their impact on the com-

pliance with hygienic precautionary behaviors from the perspective of Arab societies that are accessible to the researchers including Jordan, Palestinian territories, Saudi Arabia, and Egypt.

## 2 | METHODS

### 2.1 | Design

A cross-sectional descriptive design was used to gather information from four Arab countries (Jordan, Palestinian territories, Saudi Arabia, and Egypt).

### 2.2 | Sample

A nonprobability convenience sampling design was used and the questionnaire link was circulated via known and accessible social media groups within Facebook® and Twitter® aiming to reach the general population in order to reach as many participants as possible for the study.

The sample size for this study was calculated by using the OpenEpi, version 3.01 software package on the assumption that the participants were from four different Arab communities. Using a confidence interval of 99%, confidence limits of 5%, anticipated frequency of 50%, with the value of 1.0 as a design effect, the total number of participants needed were 664 participants. However, to enhance representation and to ensure the achievement of the targeted confidence level, all complete answers of participants ( $n = 2604$ ) from general population of four Arab countries were included in the analysis. The general population includes all person that meet the following inclusion criterion; participants aged 18 years and elder who were living either in Jordan, Palestinian territories, Saudi Arabia, or Egypt. Participants were excluded if they were: (a) below 18 years of age; or (b) unable to understand Arabic language. However, the accessible population included participants accessible to the authors through social media.

### 2.3 | Measurement

Data was collected by an online-built questionnaire, and the link was distributed by all of the authors through social media between July 5, 2020 and September 5, 2020. The questionnaire was built using Google® forms. The responses to the survey questionnaire were accessible only to the research team members and treated with confidentiality and privacy at all stages of the study. The data collection questionnaire consisted of three sections. The first section consisted of questions about sociodemographic data including age, gender, marital status, educational level, employment status, and location (i.e., City, Town, or Village).

The second section consisted of the short version of “The Brief Illness Perception Questionnaire” BIPQ (Broadbent et al., 2006). It is a nine-item scale that is designed to measure the perceived threats associated with the outbreak of infectious disease. The generic

questionnaire was tailored to address COVID-19. "The Brief Illness Perception Questionnaire" version BIPQ-5 which is a shorter version of the BIPQ, was created by the authors to focus on COVID-19. The BIPQ-5 is widely used in various diseases for assessing illness perceptions. The changes from the 9-item scale to the 5-item scale included removal of the third "personal control" item, fourth "treatment control" item, seventh "illness comprehensibility" item, and ninth "list the three most important causal factors" item (Pérez-Fuentes et al., 2020). The BIPQ-5, therefore, consists of five items on perception of threat from illness, where participants rate their agreement with the statements on a Likert-type scale from 0 to 10. It provides an overall score ranging from 0 to 50 on the individual's perception of the pandemic. The higher the score is the greater perception of the pandemic as a threat. The five items of BIP-Q5 are (1) consequences "How much do you feel that your life would be affected in case you got infected by the Coronavirus?," (2) timeline "How long do you think COVID-19 will continue?," (3) identity "How well do you feel that you know what the new pandemic disease is and what the symptoms are?," (4) concern "How much are you worried about being infected by the Coronavirus?," and (5) emotion "How much does the possibility of contracting the COVID-19 affect you emotionally (e.g., make you feel anxious, afraid or scared)?." The BIPQ-5 was previously translated to and validated in Arabic. The validity and reliability of the scale were achieved by Saarti and colleagues (2016). The tool holds promising evidence of validity and reliability, the internal consistency of the tool was assessed and indicated acceptable reliability with a Cronbach's alpha of 0.71. Besides, the internal consistency of BIP-Q5 in the current study has been computed and found to be borderline satisfactory with a Cronbach's alpha of 0.67.

The third section of the questionnaire consisted of 15 statements describing the recommended hygienic precautionary behaviors developed by members of the research group, AbuKmail, and Bottcher. As one of the main objectives of the study was examine what types of personal hygienic precautionary behaviors were used before COVID-19 and continued to be used, this tool was developed in an attempt to measure change in personal hygienic behaviors. It includes hygienic precautionary behaviors which were used before and during the current pandemic. However, some preventive measures such as the use of Personal Protective Equipment (PPE) like face masks were not included in the tool as PPE was not commonly used before the start of the pandemic. Table 4 lists the 15 recommended precautionary behaviors and include statements about hand washing, distancing, covering face upon sneezing, using of hand sanitizers, and other precautionary behaviors. The rating for each item by the participants was completed using a 5-point Likert-type scale ranging from never = 1 to always = 5 which reflects the compliance of the participant with each stated hygienic precautionary behavior. The higher score denotes higher compliance with the personal hygienic precautionary behavior.

## 2.4 | Statistical analysis

Data were analyzed using Statistical Package for Social Sciences (SPSS) V21.0®. Descriptive statistics were generated for sociodemographic

variables and threat perception level. Independent sample t-test and one-way analysis of variance were used to compare the means difference of groups, and multiple linear regressions were used to predict the association between demographical characteristics and compliance rates.

## 2.5 | Ethical considerations

This study was exempt from ethical review as it considered survey procedure to public (Amdur & Bankert, 2010). Informed consent that clearly discloses the details of the study and the rights of the participants was displayed at the beginning of the questionnaire. The completion of the questionnaire was considered as an agreement to participate in the study, no personal information was requested from the participants, and data were kept in a safe place on personal encrypted laptop and password protected to ensure confidentiality. The authors of the BIPQ were contacted and granted approval to use it in this study. Once the data was collection complete, the corresponding author downloaded the participant responses and saved it on a laptop secured with a password, and the original dataset was removed from Google drive of the corresponding author.

## 3 | RESULTS

A total of 2604 participants were included in this study. The demographics of the study participants are presented in Table 1. The results showed that the mean age of participants was 31.2 years old (SD = 8.5, range 18–61). Of the participants, 1456 (55.9%) were females, 1468 (56.4%) were married, 1540 (59.1%) held Bachelor degrees, 1608 (61.8%) participants were employed, 1616 (62.1%) were not health-care professionals, and 2220 (85.3%) lived in the city.

The overall compliance rate to precautionary behaviors during COVID-19 pandemic among the study participants was 39%. Table 1 showed that personal hygiene behaviors differ significantly across; age groups ( $F = 2.89, p = .04$ ) where the highest compliance rate is among participants aged 50 years and above, gender ( $t = 5.18, p = .003$ ) where females had a higher compliance rate of 40.9% compared to 37.3% for males, marital status ( $F = 3.09, p = .029$ ) where married participants had a higher compliance rate (40.9%) compared to singles (38.3%), and being a health care professional had a higher compliance rate of 81.6% ( $t = -2.20, p = .028$ ). However, the other demographics didn't show a statistically significant difference in compliance rates among the different groups. Further analysis was conducted using multiple linear regressions to explore predictors of compliance with precautionary behaviors (Table 2). The model turned to be statistically significant in predicting 47% of the observed compliance rates ( $F(20, 2580) = 6.63, p < .05, R^2 = .47$ ). The predictors were gender ( $b: -.41, p < .05$ ), educational level ( $b: -.22, p < .05$ ), being a healthcare professional ( $b: -.19, p < .05$ ), and urban living location ( $b: -.29, p = .04$ ).

The results revealed a minimal perception of threat among the participants on most of the BIP-Q5 items, with a mean and standard

**TABLE 1** Compliance to hygienic precautionary behaviors by demographics (N = 2604)

Variable	n	%	Compliance rate (%)	t-F	p
<b>Country</b>				<b>0.965</b>	<b>.561</b>
Jordan	776	29.8	35.6		
Palestinian Territories	319	12.3	31.9		
Saudi Arabia	851	32.7	40.7		
Egypt	658	25.2	32.4		
<b>Age groups</b>				<b>2.89</b>	<b>.04</b>
18–30	1396	54	38.4		
31–40	872	33	38.9		
41–50	236	10	40.8		
+50	100	3	44		
<b>Gender</b>				<b>5.18</b>	<b>.003</b>
Female	1456	55.9	40.9		
Male	1148	44.1	37.3		
<b>Marital status</b>				<b>3.09</b>	<b>.029</b>
Single	1064	40.1	38.3		
Married	1468	56.4	40.9		
Divorced	60	2.3	40.0		
Widowed	12	.5	38.8		
<b>Educational level</b>				<b>2.24</b>	<b>.065</b>
Primary school	68	2.6	44.8		
Secondary school	388	14.9	38.8		
Diploma	344	13.2	39.5		
Bachelor's degree	1540	59.1	39.5		
Graduate education	264	10.1	37.8		
<b>Employment status</b>				<b>.715</b>	<b>.543</b>
Employed	1608	61.8	39.6		
Unemployed	608	23.3	39.1		
Student	348	13.4	38.2		
Retired	40	1.5	40.8		
<b>Working or studying healthcare specialty</b>				<b>−2.20</b>	<b>.028</b>
No	1616	62.1	37.7		
Yes	988	37.9	81.6		
<b>Living location</b>				<b>2.72</b>	<b>.077</b>
Village	208	8	38.9		
Town	176	6.8	37.8		
City	2220	85.3	39.5		

deviation equal to  $12.9 \pm 7.2$  ranging from 1 to 5.2 as shown in Table 3. Specifically, participants had a higher perception of threat when asked about the consequences of the COVID-19 pandemic on their life ( $5.2 \pm 2.6$ ). Among five items of the BIP-Q5, “identity” and “timeline” had the lowest scores ( $1 \pm 1.3$ ) and ( $2 \pm 1.1$ ), respectively, which meant that participants did not believe that COVID-19 would last long and did not experience symptoms associated with Coronavirus. “Concern” also scored low ( $2.6 \pm 1.5$ ), that indicated that the participants were not highly worried about being infected by the Coronavirus.

The detailed responses of participants appeared in Table 4. The results indicated that the majority of the participants are “always” per-

**TABLE 2** Predictors of compliance to hygienic precautionary behaviors (N = 2604)

Variable	b	SE	t	R <sup>2</sup>
1. Gender (male vs. female)	−0.41	0.68	−5.18*	0.47
2. Age (18–30 vs. 31 and above)	0.27	0.73	0.71	
3. Marital status (married vs. not married)	0.015	2.15	1.14	
4. Educational level (secondary school vs. higher degrees)	−0.22	1.69	−3.76*	
5. Employment status (employed vs. unemployed)	−0.09	0.77	−1.41	
6. Employment status (employed vs. student)	0.10	.974	1.13	
7. Healthcare professional versus non-healthcare professional	−0.19	1.91	2.69*	
8. Living location (rural vs. city)	−0.29	.77	3.78*	

Note. SE: Standard error, \*  $p < .05$ .

**TABLE 3** Results of BIPQ-5 items (N = 2604)

BIPQ-5	M ± SD
Consequences	$5.2 \pm 2.6$
Timeline	$2 \pm 1.1$
Identity	$1 \pm 1.3$
Concern	$2.6 \pm 1.5$
Emotional response	$2.1 \pm 1.6$
Total BIPQ-5 score	$12.9 \pm 7.2$

Note: BIPQ-5, the Brief Illness Perception Questionnaire, version BIPQ-5.

form the following behaviors: “I avoid using personal tools of others like a toothbrush” (80.3%), “I wash my hands before eating” (55.5%), “I wash my hands after using the toilet” (84%), “I avoid touching my mouth or eyes with dirty hands” (54.2%), “I shake hands when meeting someone I know” (80.5%), “Sometimes I wash my hands when I feel they are not clean” (61.2%). On the other hand, the personal hygiene behaviors were reported mostly as practiced “rarely” were; “I stay 1 or 2 meters away when I meet someone with Flu” (60.4%), “I use hand sanitizer after coughing or sneezing” (66%), “I use hand sanitizer after hand shaking or close contact with others” (73.5%), and “I wash my hands after touching any surface even if it looks clean” (46.6%). Moreover, some personal hygiene behaviors were reported mostly as practiced “sometimes” which were; “When sneezing, I cover my mouth and nose with a tissue” (60.4%), “I cover my face with my elbow when I sneeze” (35.6%), “I hug and kiss when meeting someone I know” (41%) and “I wash my hands after touching any not clean surface” (65.4%).

The results as shown in Table 5 indicated that most of the personal hygiene behaviors have not changed. Some examples of the hygiene behaviors that did not change due to COVID-19 and still practiced as before the pandemic were; “When sneezing, I cover my mouth and nose with a paper tissue” (78.25%), “I stay 1 or 2 meters away when I

**TABLE 4** Description of participant's responses to hygienic precautionary behaviors (N = 2604)

Hygienic precautionary behavior	Response	n	%
1. I avoid using personal tools of others like toothbrush	Never	236	9.1
	Rarely	36	1.4
	Sometimes	32	1.2
	Most of the times	208	8
	Always	2092	80.3
2. I wash my hands before food	Never	28	1.1
	Rarely	24	0.9
	Sometimes	282	10.8
	Most of the times	834	32.0
	Always	1436	55.2
3. I wash my hands after using the toilet	Never	12	0.5
	Rarely	0	0
	Sometimes	88	3.4
	Most of the times	316	12.1
	Always	2188	84
4. When sneezing, I cover my mouth and nose with a paper tissue	Never	16	0.6
	Rarely	56	2.2
	Sometimes	1572	60.4
	Most of the times	752	28.8
	Always	208	8
5. I stay 1 or 2 meters away when I meet someone with Flu	Never	16	0.6
	Rarely	1576	60.5
	Sometimes	708	27.2
	Most of the times	256	9.8
	Always	48	1.9
6. I avoid touching my mouth or eyes with dirty hands	Never	40	1.5
	Rarely	96	3.7
	Sometimes	316	12.2
	Most of the times	740	28.4
	Always	1412	54.2
7. I wash my face at least three times a day	Never	100	3.8
	Rarely	260	10
	Sometimes	632	24.3
	Most of the times	852	32.7
	Always	760	29.2
8. I cover my face with my elbow when I sneeze	Never	168	6.5
	Rarely	212	8.2
	Sometimes	932	35.6
	Most of the times	780	30
	Always	512	19.7

(Continues)

TABLE 4 (Continued)

Hygienic precautionary behavior	Response	n	%
9. I shake hands when meeting someone I know	Never	10	0.3
	Rarely	13	0.5
	Sometimes	139	5.4
	Most of the times	347	13.3
	Always	2095	80.5
10. I hug and kiss when meeting someone I know	Never	468	18
	Rarely	436	16.7
	Sometimes	1068	41
	Most of the times	336	12.9
	Always	296	11.4
11. Sometimes I wash my hands when I feel they are not clean	Never	12	0.5
	Rarely	52	2
	Sometimes	224	8.6
	Most of the times	716	27.5
	Always	1600	61.4
12. I wash my hands after touching any not clean surface	Never	16	0.6
	Rarely	60	2.3
	Sometimes	1704	65.4
	Most of the times	632	24.3
	Always	192	7.4
13. I use hand sanitizer after coughing or sneezing	Never	37	1.4
	Rarely	1720	66
	Sometimes	793	30.5
	Most of the times	34	1.3
	Always	20	0.8
14. I use hand sanitizer after hand shaking or come in close contact with others	Never	420	16.1
	Rarely	1914	73.5
	Sometimes	247	9.5
	Most of the times	15	0.6
	Always	8	0.3
15. I wash my hands after touching any surface even if it looks clean	Never	642	24.7
	Rarely	1214	46.6
	Sometimes	382	14.7
	Most of the times	205	7.8
	Always	161	6.2

**TABLE 5** Changes in hygienic precautionary behaviors in response to COVID-19 ( $N = 2604$ )

Hygienic precautionary behavior	Responesen (%)	
	No	Yes
1. I avoid using personal tools of others like toothbrush	2032 (78)	572 (22)
2. I wash my hands before food	2148 (82.5)	456 (17.5)
3. I wash my hands after using the toilet	1804 (69.3)	800 (30.7)
4. When sneezing, I cover my mouth and nose with a paper tissue	2036 (78.2)	568 (21.8)
5. I stay 1 or 2 meters away when I meet someone with Flu	2408 (92.5)	196 (7.5)
6. I avoid touching my mouth or eyes with dirty hands	2320 (89.1)	284 (10.9)
7. I wash my face at least three times a day	1768 (67.9)	836 (32.1)
8. I cover my face with my elbow when I sneeze	2056 (79)	548 (21)
9. I shake hands when meeting someone I know	2224 (85.4)	380 (14.6)
10. I hug and kiss when meeting someone I know	404 (15.5)	2200 (84.5)
11. Sometimes I wash my hands when I feel they are not clean	464 (17.8)	2140 (82.2)
12. I wash my hands after touching any not clean surface	380 (14.6)	2224 (85.4)
13. I use hand sanitizer after coughing or sneezing	2256 (86.6)	348 (13.4)
14. I use hand sanitizer after hand shaking or come in close contact with others	2328 (89.4)	276 (10.6)
15. I wash my hands after touching any surface even if it looks clean	2272 (87.3)	332 (12.7)

meet someone with Flu" (92.5%), "I shake hands when meeting someone I know" (85.4%), "I use hand sanitizer after coughing or sneezing" (86.6%), and "I use hand sanitizer after hand shaking or come in close contact with others" (89.4%).

#### 4 | DISCUSSION

COVID-19 is a global pandemic with devastating effects since it was first detected in December 2019 (Al-Maraira & Shennaq, 2021; Bhagavathula et al., 2020). Studies conducted at several countries showed different compliance rates with the recommended hygienic precautionary behaviors. It was 94.2% in the United Kingdom (Atchison et al., 2020), 74.5% in Lebanon (Saab & Domiati, 2021), 96.9% among Egyptian medical students (Hussein et al., 2021), and ranged between 41.43% and 87.8% across different other countries around the globe (Azlan et al., 2020; Hussain et al., 2020). In the current study, the overall compliance rate with the recommended hygienic precautionary behaviors

was low and below the reported ranges elsewhere. On the other hand, for healthcare professionals only, the reported compliance rate with the recommended hygienic precautionary behaviors was 81.6%, but it is still below an acceptable benchmark of 90% for healthcare areas (Chavali et al., 2014). Several points can explain the reported results for the current study. First, the low levels of compliance with hygienic precautionary behaviors can be a reflection of COVID-19 information exchange landscape among Arab societies. Although the governments have consistently communicated information from reliable sources and the related precautionary actions about COVID-19 pandemic since the virus was first detected in Arab countries, there has been a surge in the spread of inaccurate information about the pandemic. Thus, the overload of information and misleading communications may have caused general confusion and difficulties among the populations in ascertaining correct information. Second, the variation in compliance levels with the recommended hygienic precautionary behaviors might also be explained through the lenses of a number of theoretical models used to predict health-seeking behaviors, such as the Health Belief Model (HBM) (Rosenstock et al., 1988), Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980), and Theory of Planned Behavior (TPB) (Ajzen, 1991). These models illustrated that health-seeking behaviors might be affected by different variables including perceived susceptibility, perceived severity of the virus, relevant norms and attitudes, behavioral intention, and perceived behavioral control (Rosenstock, Strecher & Becker, 1988). In other words, when individuals and societies are convinced of the severity of the pandemic, they perceive that they are highly susceptible to it, and may become more confident that hygienic precautionary behaviors are effective to protect the public and fight against the spread of the pandemic. Then, they will be more willing to adopt such hygienic precautionary behaviors in everyday life. In the current study, the participants were maybe too optimistic about the pandemic, that is, it will end soon and not perceived as major threat, which may lead to undermining the effectiveness of hygienic precautionary behavior. In addition, the findings may suggest that individuals had a negative world view and mistrust in healthcare and regulatory bodies which may lead them to not follow hygienic precautionary behaviors.

Using the Theory of Reasoned Action, a recent study conducted in Saudi Arabia found that the higher level of knowledge of the non-physician group led to a better improvement in their precautionary and hand hygiene behaviors (90% of nonphysicians) compared to the physician group (80% of physicians) (Alsubaie et al., 2019). Another study from US and Canada found that the majority of participants intended to comply with precautionary behaviors. Compliance in both studies was explained by linking the compliance with the subjective norms of following instructions which was viewed as a social duty. This point of view by study participants led to the desire to engage in and comply with precautionary behaviors (Wang et al., 2021).

Despite the low levels of compliance to precautionary behaviors in the current study, selected sociodemographic variables helped explain the compliance rates of precautionary behaviors. As shown in Table 1, the results showed that there was a significant difference among age groups in their compliance with hygienic precautionary behaviors.



People above the age of 50 had the highest compliance rate, possibly due to higher risk perception of contracting the diseases and complications that can be inflicted. Another finding at the current study was that females had a higher compliance rate than males. The results are consistent with a previous study that also showed that males were less willing to comply with health recommendations as they perceive less fear and more control in pandemic situations (Głabska et al., 2020). Another study concluded the same in terms of gender associating females with higher levels of a perceived threat to diseases (Lewis & Duch, 2021). Marital status of being married was found to be a statistically significant predictor of compliance with personal hygienic precautionary behaviors which is consistent with literature of risk perception and analysis. A series of studies have reported that risks tend to be judged as higher by married people (Al-Dossary; Ning et al., 2020). This is explained by the "Theory of Planned Behavior," an individual's perception of social norms is influenced by both (a) the extent to which important others, such as spouses, are perceived as thinking the individual should perform the behavior, and (b) the individual's motivation to comply with their expectations (Ajzen, 1991).

It was reasonable to assume that compliance is affected by attitudes and perceptions of the pandemic risk and threat for a general population, and it is reported in literature that healthcare students and professionals are more likely to overestimate their risk (Csenge et al., 2016). The present study consistently found that compliance rates with personal hygienic precautionary behaviors were higher among healthcare professionals including those working in the healthcare sector or studying a healthcare specialty. This can be referred to work duties directly related to having positive attitudes toward patient care, lower risk-taking tendencies, and greater knowledge of the containment of the pandemic.

The effect of individual's perception of the disease and illness on their compliance to precautionary behaviors has been documented previously (Min et al., 2019), and understanding illness perception of people, that are often different from that of healthcare professionals, will help identify those individuals and communities with risks of non-compliance (Csenge et al., 2016). In the current large scale multi-Arab countries study, the majority of respondents showed a lower perception of illness and threat of COVID-19 pandemic. Illness perceptions are the organized cognitive representations or beliefs that people have about their diseases, and it is an important determinant of compliance with any resulted precautionary behaviors (Min et al., 2019).

In the current study, the five dimensions of illness perception measured by BIP-Q5 resulted to show that "identity was ranked the lowest, topped by 'timeline,' then "emotional response," then "concern" and the highest was "consequences," but the overall rank of scores for all of the dimensions were low. The lowest score on "identity" conveys that people were ill-informed about COVID-19 pandemic. The findings of "timeline" and "concern" contradict previous study (Min et al., 2019) as the current study participants were not worried about being infected by the COVID-19 and they perceived that current pandemic will not continue for a long time, which might be caused by the culturally misleading communications about COVID-19 as noninfectious disease or a disorder without serious complications. The low score on "emotional

response" dimension of the current study can be connected to less dangerous perceptions of the pandemic situation; in which feelings of anxiety or fear are less evident or the risk of contracting the COVID-19 is manageable. However, it is debatable whether these results are real representations of the actual perceptions of the participants or it were a defense mechanism deployed to cope with the pandemic. The low scores on "consequences" may result our respondents who did not have the feeling that their lives would be affected in case they got infected by COVID-19. This might be associated with their feelings of good physical health, role, and social functioning, low distress levels, high sense of well-being and vitality. Broadbent et al. (2015) found as well that in their study using BIPQ items that received lower scores may make populations more vulnerable to infections and the spread of pandemics, that is, COVID-19, which may lead to fatal and catastrophic consequences.

The current study results of compliance rates of hygienic precautionary behaviors are discouraging as a significant percentage of our respondents did not pay enough attention to personal hygienic precautionary behaviors endangering their own health as well as the health of others. The responses to many questions about hygienic precautionary behaviors were critical and against the recommendations. For example, in the question about avoiding the use of personal tools of others like toothbrush, about 20% of the respondents indicated that they did not avoid using the personal tools of others. Similarly, noncompliance with hand washing before eating was 44.5%. It is worrying to find that almost half of our participants did not always wash their hands before eating despite the general popularity of this personal hygienic precautionary behavior. These findings are even more regrettable when it is taken into consideration that washing hands before eating is a highly recommended effective way for minimizing the spread of infectious diseases (Azor-Martinez et al., 2014). The findings of toilet-related hygienic precautionary behaviors are somehow distressing for both groups (healthcare professionals and general population). The results showed that 16% of participants didn't always wash hands after using the toilet, even though hand-washing after using the toilet prevents the spreading of the pathogens to the others. It can be concluded that some respondents do not take necessary preventive measures against urogenital infections, which poses risks both for the individuals and for the surrounded community. Moreover, the reported rates of compliance with other precautionary behaviors like using sanitizers, and covering face with elbow or with paper tissue when sneezing were noticed below as well. The possible explanation for these behaviors in the Arab society's context is that respondents might be unaware of the threat and risks associated with such noncompliance as well as being unaware of the effectiveness of such precautionary behaviors in the prevention of spread of infectious diseases.

Regarding the reported changes in hygienic precautionary behaviors in response to COVID-19, it is seen that most of the respondents did not change their compliance to most of precautionary behaviors in response to COVID-19 pandemic. In this study, threat perception among respondents was found to be associated with precautionary behavior responses. In general, lower scores in threat perceptions were linked to noncompliance with the necessary precautionary behaviors.



Similar studies have shown that the higher the perceived threat, the higher compliance with precautionary behaviors (Girma et al., 2020). This implies that perceptions of threats and risks associated with any illness are essential in enforcing compliance with precautionary behaviors and possible means of preventing any emerging infectious disease like COVID-19. In other words, it is postulated in the current study that perception of threat will serve as a pathway through which knowledge and awareness of COVID-19, or any other pandemic or infectious disease, may influence compliance with precautionary behaviors. Studies supporting the current findings showed that individuals' willingness to comply with precautionary behaviors largely relies on the perceived threat of contracting a disease and that threat perception is a strong predictor of adhering to precautionary behaviors (Abdelrahman, 2020; Zhang et al., 2019)

## 5 | CONCLUSIONS

The current study provided a comprehensive examination of compliance with recommended precautionary behaviors among Arab societies. During COVID-19 pandemic, it was expected that precautionary behaviors were affected, but perceived threat of COVID-19 and compliance rate with the recommended precautionary behaviors among Arab societies was found to be low. In this respect, there is an undeniable need through nurses and other healthcare professionals to encourage the compliance with precautionary behaviors throughout the pandemic and the post pandemic era. It is therefore necessary to implement educational programs by health authorities that focus on increasing the perception of seriousness and threat perceptions of pandemics and infectious diseases, and the effectiveness compliance with hygienic precautionary behaviors and then measure post implementation outcomes to identify contingent positive results. Nurses, being the major workforce in healthcare systems can be the main contributors to achieving the targeted improvement in compliance to the recommended hygienic precautionary behaviors among Arabic societies and elsewhere around the globe as it is one part of the scope of public health nursing.

## 6 | IMPLICATIONS FOR FUTURE RESEARCH

This finding of the current study brings attention to the interactions between the perceived threats of COVID-19 pandemic and its impact on compliance with the recommended hygienic precautionary behaviors among multi-Arab societies. However, ongoing longitudinal health studies are imperative for clarifying how personal threat perceptions related to COVID-19 and other infectious diseases may change over time. Nursing and other healthcare researchers are invited to continue the efforts envisioned in the current study.

## CONFLICT OF INTEREST

The authors reported no actual or potential conflicts of interest

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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