Journal of Umm Al-Qura University for Medical Sciences

Journal homepage: https://uqu.edu.sa/en/mj

Commitment to COVID-19 Precautionary Measures in Saudi Arabia: An Application of the Health Belief Model

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ARTICLE INFO

Article History:
Submission date: 29/08/2021
Accepted date: 31/01/2022

Keywords:
COVID-19, Infection Control, Motivation, HBM.

ABSTRACT

Background: COVID-19 pandemic mandated nationwide public health initiatives and social measures to take place to limit cross contamination and save lives.
Aim of the study: This study used the Health Belief Model (HBM) to help finding barriers and motivating factors for commitment to precautionary measures to COVID-19 infection among the public in Kingdom of Saudi Arabia (KSA).
Methods: This was a cross sectional study that included 739 participants recruited using nonprobability random sampling. Data was collected via a self-administered questionnaire in June 2020. Data were analyzed using JMP software version 14.2.
Results: The study showed high commitment to COVID-19 precautionary measures (84.8%). The most commitment was reported in mask wearing (77.5%) and hand washing (69.8%), while the least was in keeping physical distance (54.9%) and avoiding social gathering (43%). Commitment level was significantly associated with the six components of health belief model (P<0.05). Self-efficacy and 'cues to action' were found as significant predictors of commitment (P<.001).
Conclusions: High commitment rates to COVID-19 precautionary measures were reported mainly in mask wearing and hands washing. There is a need for public health programs that are supported by public policies. The focus of the programs should be on building self-efficacy and facilitating motivating factors.

1. Introduction

In December 2019, COVID-19 started in a location around the Huanan Seafood Market in Wuhan, China. A few weeks later, the virus had spread steadily, with a rapid rise in the number of suspected and confirmed cases higher than that of severe acute respiratory syndrome (SARS) in 2003 (1). Until now the control of the pandemic relied heavily on precautionary measures, namely, isolation of cases, quarantine of contacts, social and physical distancing among the public and travel restriction measures (2, 3).

Public compliance to non-pharmaceutical precautionary measures has been proven to be cost effective in controlling the spread of the disease (4). In their study in Saudi Arabia, Asamoah et al (5) identified social distancing in particular to be the most effective control measure. Yet, the commitment to those measures have been an issue in many countries around the world, such as Italy and Spain (6). Many barriers exist that affect commitment to these measures. For example, wearing facemasks for prolonged periods over the day, result in difficulty of breathing and other discomforts (7, 8). Avoiding loneliness and having family members who needed help was also found as barrier to commitment to social distancing (9). If people are not actually motivated to overcome such barriers, then they are more likely to hinder commitment behavior. Proper commitment to COVID-19 precautionary measures is possible only after overcoming the various barriers which may delay the application of the infection control programs.

This research has adopted the Health Belief Model (HBM) which was developed in the 1950s to describe population's behavior in reducing the risk of getting ill (10, 11), to investigate the barriers and motivating factors to commitment. HBM also helped to highlight the severity and susceptibility of the COVID-19 infection, detect barriers to commitment to precautionary measures, find out ways to overcome these barriers by the public, and strengthen motivating factors through self-efficacy beliefs (12). The rationale of conducting this study was to provide an understanding of the barriers and motivating factors which are of great significance for the success of public policies and expanding commitment to the suggested social precautionary measures (13).

2. Aim of the study:

This study aims to assess barriers and motivating factors of the commitment to control measures of COVID-19 infection among the public in KSA.

3. Objectives:

1. Assess the publics' commitment to precautionary measures against COVID-19 infection
2. Assess barriers hindering the publics' commitment to precautionary measures against COVID-19 infection in KSA
3. Assess motivating factors for the publics' commitment to control measures against COVID-19 infection in KSA

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4. Materials and Methods:

Design and participants:

This was a cross sectional study, used the HBM to describe and assess barriers and motivating factors of the commitment to COVID-19 precautionary measures in Saudi Arabia. The study was carried out among the public of Saudi Arabia during June 2020. Participants were recruited using a non-probability convenient sampling method. A self-administered questionnaire was developed using Microsoft forms and was distributed via social media mainly twitter ad WhatsApp in both Arabic and English languages. The study sample was calculated using The Survey System (14) to be 666 participants, out of 25.8 million total KSA residents (15). This sample size was estimated to have a 99% confidence level. A total of 760 participants have completed the questionnaire, but 21 questionnaires were excluded as the participants did not meet the age criteria, giving 739 included participants in the study. **Inclusion criteria:** All the population of Saudi Arabia, 18+ years old were eligible for the study regardless of their nationality or residence region. **Exclusion criteria:** those below the age of 18 years.

Research instrument:

The research questionnaire was adopted from Costa (6) based on HBM (10) and modified by the researchers to meet the objectives of the study. The study questionnaire consisted of 3 sections with a total of 44 questions:

The first section of the study questionnaire composed of 10 questions covering the participants' socio-demographic characteristics: age, gender, level of education, residential region, marital status, household type, employment status, and income.

The second section of the study questionnaire was developed using the HBM six constructs which are: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy and cues to action (10). Questions about the first 4 constructs were adopted from Costa (6) with some modification to match the context and the progressive changes regarding COVID-19 control measures. Questions regarding the self-efficacy and cues to action were developed by the researchers. Perceptions about susceptibility, severity, benefits and barriers were assessed using five questions each, while self-efficacy was assessed by four questions and six questions to tackle cues to action. All the six constructs' questions were developed using a 5-points Likert scale (16) where the highest score was five and the lowest was one. Perceptions ranged from extremely strong which was given the highest Likert score of 5, to weak which was given the lowest Likert score of one. The cut-off points for interpretation were based on quartiles where the scoring low was considered as equal or less than the median. The maximum total score for each of the perception constructs was 25 and the minimum was 5 and was interpreted as follows: for susceptibility perception >9 was considered high and low if ≤9, for severity perception >15 is considered high and low if ≤15, for benefits perception >17 is considered high and low if ≤17 and finally for perception of barriers >12 is considered high and low if ≤12. The maximum total score for self-efficacy was 20 and the minimum was 4 and it was interpreted as high if >17 and low if ≤17. The extent to which 'cues to action' affected commitment to control measures ranged from strongly agree to strongly disagree. The maximum total score for cues to action was 30 and the minimum was 6 and was interpreted as high if >28 and low if ≤28.

The third section of the study questionnaire assessed participants' commitment to the four main control measures which are wearing masks, keeping physical distance, washing hands as recommended by the Saudi Ministry of Health and avoiding gatherings. The participants were asked about the extent of commitment to the control measures on a 5-points Likert scale, ranging from extremely strong which was assigned a score five to nothing at all which was assigned a score of one. The maximum total score of this section was 20 and the minimum was four and was interpreted based on the percentage of the maximum total score. Thus, poor commitment behavior was considered for those who scored less than 50% which is 4-9, moderate commitment behavior was considered for those who scored between 50%-75% which is 10-15 and good commitment behavior was considered for those who scored more than 75% which is >15.

The questionnaire was developed after thorough review of the literature. It was displayed to participants in both Arabic and English languages and translated using a forward backward translation check process (17). Content validity, tested by five experts in community medicine and public health who reviewed both the original tool which was developed by Costa (6) and the modified version. The experts approved the modifications and suggested further changes in the structure of the questions. The questionnaire was then piloted with 10% of the sample and the resulted changes and clarifications were done. The piloted sample questionnaires were included in the total study sample. The reliability of the tool was tested using Cronbach alpha test which resulted in α= .72,.79,.8,.73,.2,.77,.74 for commitment to behaviors, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy and 'cues to actions' respectively.

Ethics approval and consent to participate.

An ethical approval was obtained from the Institutional Review Board (IRB) in Princess Nourah Bint Abdulrahman University (IRB Log Number 20-0249). A written informed consent form was displayed in the first page of the survey. The participants were informed that by completing the survey they are agreeing to participate in the research, recruitment is voluntarily, anonymity was maintained throughout the research and the collected data will be used exclusively for research purposes.

Data analysis:

Data analysis was done using JMP software version 14.2. The descriptive statistics were presented in frequency tables. Association between categorical variables was assessed using Fisher's Exact test for 2 by 2 tables. Multiple linear regressions were performed to predict commitment to precautionary measures using the six components of the HBM. Results were considered significant if p-value was ≤ 0.05.

5. Results:

Table 1: Sociodemographic characteristics of the studied sample (n=739)

Sociodemographic characteristics	No	%
Gender:		
Female	507	68.8
Male	230	31.2
Age (years):		
19 - 35 years	211	28.7
36 - 50 years	307	41.8
51+ years	217	29.5
Marital Status:		
Married	563	76.2
Not married	176	23.8
Education:		
Less than college degree	129	17.5
College degree or postgraduate	610	82.5
Working status:		
Working	435	58.9
Not working	186	25.2
Retired	118	15.9
Residential region in KSA:		
East	51	6.9
Central	463	62.7
North	20	2.7
South	32	4.3
West	173	23.4
Nationality:		
Saudi	649	87.2
Non-Saudi	90	12.8
Income (Saudi Riyal per month):		
< 8000	232	31.4
8000 – 16000	251	33.9
16000 +	256	34.7
Family members:		
≤ 5 members	372	50.5
6 – 9 members	336	45.6
10 + members	29	3.9
Being a health practitioner?		
Yes	115	15.6
No	624	84.4

Table 1 presents the sociodemographic characteristics of the studied sample (n=739). Their age ranged from 19 to 75 years (mean age 43.1

±12.6). About one-fourth of the participants aged from 19 to 35 years (28.7%) and 29.5% aged more than 50 years. Participants came from different regions in KSA. More than half of them were from the Central Region, one fourth from the Western Region and those from other regions were about 14% of the total sample. About one third were males and two thirds were females. Most of them were married (76%), highly educated (college degree or more, 82%), working (58.9%) and not health care practitioners (84%).

Table 2: The number and percentages of participants according to level of commitment to the precautionary measures against COVID-19 infection through different regions in KSA (n=739)

Region	Level of commitment			Total
	High	moderate	Low	
Eastern Region	39 (76.47%)	12 (23.53%)	0 (0.00%)	51
Central Region	406 (87.69%)	55 (11.88%)	2 (0.43%)	463
North Region	17 (85.00%)	2 (10.00%)	1 (5.00%)	20
South Region	24 (75.00%)	7 (21.88%)	1 (3.13%)	32
West Region	141 (81.50%)	32 (18.50%)	0 (0.00%)	173
Total	627 (84.8%)	108 (14.6%)	4 (0.5%)	739

Commitment to COVID-19 precautionary measures through different regions in KSA are presented in table 2. The overall prevalence of high commitment was 84.8% while the low commitment was only 0.5%. The best commitment was found in the central region (87%) while the lowest commitment was in the south (75%) and East (76%) regions.

Figure 1: Bar chart of the frequency of level of commitment to different COVID-19 precautionary measures

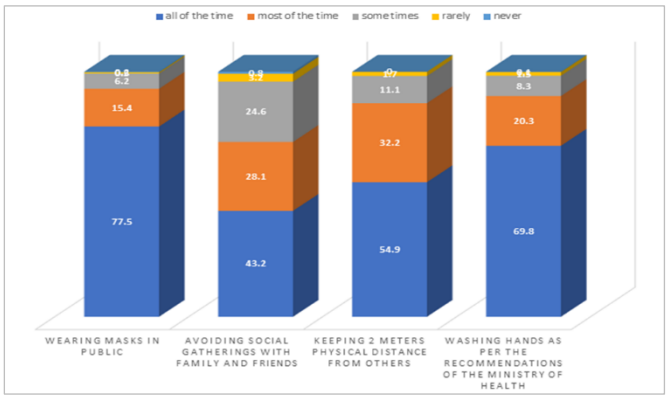

Figure 1: Shows the level of commitment to COVID-19 precautionary measures among population in KSA. Most of the sample were completely committed to wearing masks in public places (77.5%) and washing hands properly (69.8%). However, only half of them were completely committed to keeping 2m distance from others, and an even smaller proportion was completely committed to avoiding social gathering (43%).

Table 3: The number and percentages of participants in each Health Belief Model (HBM) component, in association with the level of commitment to precautionary measures against COVID-19 infection (n=739)

Components of HBM	Level of commitment		P-value
	High	Intermediate or low	
Perceived susceptibility:			0.03*
High	344 (87.53%)	49 (12.47%)	
Low	283 (81.8%)	63 (18.2%)	
Perceived severity:			0.0009**
High	296 (89.70%)	34 (10.30%)	
Low	331 (80.9%)	78 (19.1%)	
Perceived barriers:			0.0001**
High	276 (78.63%)	75 (21.37%)	
Low	351 (90.46%)	37 (9.54%)	
Perceived benefits:			0.0001**
High	137 (94.48%)	8 (5.52%)	
Low	490 (82.49%)	104 (17.5%)	
Cues to action:			0.0001**
High	274 (95.80%)	12 (4.20%)	
Low	353 (77.9%)	100 (22.1%)	
Self-efficacy:			0.0001**
High	363 (99.18%)	3 (0.82%)	
Low	264(70.78%)	109 (29.2%)	

*P<0.05 **P<0.01

The Health Belief Model (10) successfully explained level of commitment to COVID-19 precautionary measures among the surveyed population in KSA, as shown in table 3. Those who had high scores in all the components –other than perceived barriers- demonstrated significantly higher level of commitment than those with low scores (perceived susceptibility 87.5% Vs 81.8%, perceived severity 89.7% Vs 80.9%, perceived benefits 94.4% Vs 82.4%, cues to action 95.8% Vs 77.9% and self-efficacy 99.1% Vs 70.7%, respectively). Regarding perceived barriers, those who had low scores have demonstrated better behavior than others (90.4% Vs 78.6%). All these findings were statistically significant (P<0.05).

Table 4: Mean (SD) scores for barriers and motivating factors related to commitment to the precautionary measures against COVID-19 infection (n=739)

Variables	Factors	Mean score	SD
Barriers	Being worried due to these measures	2.8	1.0
	Lack of possibility of avoiding all family gatherings	2.4	1.0
	Lack of the ability to do work from home or remotely	2.4	1.2
	Lack of the possibility of staying home at for 14 days	2.3	1.2
	The possibility of losing the job if working from home	2.2	1.1
Motivating factors	Desire to protect the family	4.8	0.5
	Having accurate information regarding the disease	4.6	0.6
	The existence of enforcing regulations and laws	4.5	0.8
	Accessibility and availability of masks	4.4	0.8
	Availability of masks with affordable prices	4.3	0.9

Table 4 demonstrates the barriers and the motivating factors related to commitment to COVID-19 precautionary measures among the studied population. Regarding the barriers that prevented their commitment, the highest mean scores were for being worried due to these measures (2.8 ±1.0) and lack of possibility of avoiding all family gatherings (2.4 ±1.0). The motivating factors were considered the 'cues to action' for enhancement of commitment. The highest scores of these factors were for: *desire to protect the family* (4.8 ±0.5), having *accurate information regarding the disease* (4.6 ±0.6) and the *existence of enforcing regulations and laws* (4.5 ±0.8).

Table 5: Multiple linear regression coefficients in predicting commitment to different precautionary measures against infection with COVID-19 (n=739)

Term	Estimate	Std Error	t Ratio	P value
Intercept	5.2085325	0.775123	6.72	<.0001**
Perceived susceptibility	-0.035552	0.021366	-1.66	0.0965
Perceived severity	0.0191158	0.017156	1.11	0.2655
Perceived benefits	0.0064757	0.02235	0.29	0.7721
Perceived barriers	-0.014412	0.022107	-0.65	0.5147
Self-efficacy	0.5033382	0.024345	20.68	<.0001**
Cues to action	0.1554115	0.020247	7.68	<.0001**

Dependent variable: commitment to precautionary measures against infection with COVID-19 **P<0.01 is statistically significant.

The six components of the HBM namely, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy and 'cues to action' were used to predict the commitment to COVID-19 precautionary measures. Multiple linear regression model was constructed and analysis performed (table 5). The variables entered into the model were the six components of the HBM. Self-efficacy and 'cues to action' can significantly predict the commitment score P<0.001 for both items and for the whole model.

6. Discussion:

This study was set out with the aim of using HBM to describe and assess barriers and motivating factors regarding commitment to COVID-19 precautionary measures in Saudi Arabia.

The current study indicated high commitment rates towards COVID-19 precautionary measures among the study population 84.8% which is similar to the findings of a number of studies that indicated high commitment rates in different settings (18-20). Al-Hanawi, Angawi (18) have indicated that good practices were recorded among the public. The highest commitment rate (87%) was found in the central region. This supports the findings of Almoayad et al (2020) (20) which assessed practices in city of Riyadh. In the current study, high commitment was found in mask wearing and hands washing, while the least commitment was in keeping physical distance and avoiding social gatherings (see fig. 1). This differs from previous studies in KSA where avoiding gatherings was the most adopted precautionary behavior (19, 20). However, this difference in behavior commitment is understandable as the current study was conducted in June 2020 after the precautionary measures were eased and the lockdown restrictions were relaxed (21), while the other studies were conducted during the lockdown (22) which might reflect that this commitment was obligatory as result of legislations.

While infection control practices were assessed among the public in previous studies, by reviewing the literature, at the time of conducting this research, it appeared that this was the first study that used HBM to explain the factors leading to commitment among the public in Saudi Arabia. The results of the study could provide decision makers with tools that can support informed decisions when planning public health and health education programs through highlighting both the barriers and motivating factors that help to commit to precautionary measures. In this study the six constructs of the health belief model successfully explained public commitment to precautionary measures. To be explicit, higher level of commitment was demonstrated among people who had high perceptions of susceptibility and severity of COVID-19, and those who had high perception of the benefits of the precautionary measures. Also, higher level of commitment was demonstrated among those who had high self-efficacy and among those who considered the cues to action to be important element for practice. Interestingly, the perceived barriers had negative correlation with practice. Better commitment was found among participants who perceived low level of challenges. It should be noted that when perceived benefits outweigh the perceived barriers, people tend to commit to healthy behaviors especially on feeling of threat is high, that is the perceptions of susceptibility and severity. Additionally, high perception of self-efficacy plays a major role in overcoming barriers (10).

The relationship between perceived threat and commitment to precautionary measures in respiratory infections has been established in the literature. A literature review of several studies which used HBM to assess factors influencing mask wearing as preventive measure against acute respiratory infection found that both perception of severity and susceptibility were the most significant factors causing individuals to wear masks (8). Contradicting findings were found in Iran by Shahnazi, Ahmadi-Livani (23) as preventive behaviors were significantly influenced by perceived barriers, while no significant correlation was reported with perceived severity and perceived susceptibility. While similar findings were reported regarding the effect of perceived benefit and self-efficacy. On the other hand, a study of the public in China indicated a significant positive correlation between perceived severity and susceptibility and behaviors related to COVID-19 infection control (24). The discrepancy in findings across studies requires caution in interpretation and considering the results within their specific context. Thus, in the current study a multiple linear regression model was performed to determine which constructs of HBM could predict commitment to precautionary measures, directing the results to self-efficacy and 'cues to action'. Self-efficacy has been identified as an important element in increasing the commitment to COVID-19 infection control practices in other regions of the world such as Iran (23) and China (24). Bandura (25) has defined self-efficacy as a person's confidence in their personal ability to take action and overcome barriers. Its main components include mastery experiences, vicarious experiences which can be provided by social modelling, social persuasion and stress reduction. Over the years different strategies has been suggested to improve self-efficacy including but not limited to; gradual goal setting, modelling and social support (10). A study conducted with Chinese health workers, who were in the frontline of COVID-19, has recommended to provide social support for improving self-efficacy (26). Thus, future public programs concerned with COVID-19 prevention should focus on increasing self-efficacy and facilitating the motivating factors that were identified as 'cues to action'.

A detailed analysis has revealed that the most influential factors on commitment to precautionary measures were; the desire to protect family from infection; having accurate information about the disease; and the existence of enforcing regulations and laws. Previous studies in Saudi Arabia, USA, and Malaysia (20, 27, 28 respectively) have indicated the importance of knowledge, which emphasizes the importance of the continuous health education programs offered by the Saudi MOH (29). Additionally, Almoayad (20) highlighted the importance of enforcing policies to enhance commitment and this was revealed earlier in the discussion where a lower commitment on avoiding gatherings was noted across literature when curfews were lifted.

The most significant barriers reported by the study participants were excessive worrying and not being able to avoid family gatherings. Anxiety had been reported as a global issue associated with COVID-19 pandemic. In China for example, Chan, Yuan (1) has reported moderate to severe anxiety in 28.8% of the public. In Saudi Arabia higher rates were reported among the public (30, 31). However, the current study suggests that anxiety may also hinder commitment to infection control practices. While this may sound illogical, in their study on the relationship between anxiety with self-care behaviors and fear of COVID-19 in Kermanshah, Iran, Mohammadpour et. al (2020) who explained how excessive stress as a result of the pandemic may lead to negative emotions such as fear. These emotions in some instances were associated with self-judgment leading to ignoring the pandemic (32). Hence, health education programs should maintain the balance and consider the emotional status of its audience.

Strength and limitations of the study:

This study was conducted during the time of the pandemic which could provide a precise insight into the experience of people. While this research used non-probability convenient sampling technique which could have high risk of selection bias, lack of representation and consequently affect the generalizability of the results, yet with the large sample size we have 99% confidence that the real value is within ±5% of the measured value.

Conclusion and recommendations:

This study had three objectives the first was to assess the publics' commitment to individual preventative control measures against COVID-19 infection. The findings indicated a high commitment to COVID-19 precautionary measures rates among the study sample. The highest commitment was seen in mask wearing and hands washing, while less commitment was reported regarding keeping physical distance from others and avoiding social gathering. The second objective of the study was to assess barriers hindering the publics' commitment to precautionary measures. Excessive worrying and not being able to avoid family gatherings were identified by the study as the main barriers. The last objective was to assess motivating factors for the publics' commitment to control measures. The study revealed that the desire to protect one's own family from the disease, being educated about the disease and the behaviors being enforced by law were the main motivating factors to commitment. A significant association was found between commitment and the different constructs of the HBM. Two constructs were found to be significant predictors of commitment to precautionary measures which are self-efficacy and 'cues to action'. Public health programs in Saudi Arabia should be reinforced in both southern and eastern regions and be preferably supported by public policy. Additionally, they should be focused on increasing self-efficacy and facilitating motivating factors. In term of future research on barriers that could prohibit commitment to precautionary measures, it is needed to be further explored to be tackled by future program especially when restrictions are eased. In

addition, there is a need to explore factors that increases self-efficacy among the target population.

Conflict of interest

The authors declare that they have no competing interests

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