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Barriers and Drivers of Public Preventive Behavioral Responses to COVID-19 Outbreak: Evidence from Iran

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Abstract

Background: When an epidemic outspreads, the society engagement seems essential to make sure of the population's preparedness for taking individual precautions.
Objectives: The primary objective of this study was to examine public's preventive behavioral responses to protective behaviors during the COVID-19 pandemic to provide a description of conceptual frameworks for deeper understanding of these behaviors.
Methods: A self-administrated questionnaire was used in this online survey through social networks during March 19th to 26th, 2020 (n = 2550). A Likert scoring scale was employed to investigate barriers and drivers affecting the participants' preventive behaviors. Using personal protective equipment and good hand hygiene practices were identified as person-based measures. Social distancing and the restriction of social and economic activities during the past two months were determined as community-based measures. Univariate logistic regression and multiple - logistic regression were used to identify and assess influencing factors.
Results: The study results indicated that 2426 (95.1%) of the participants intended to restrict their social and economic activities, and 1968 (72.2%), 1637 (64.2%), and 2492 (97.7%) persons intended to observe social distancing, use personal protective equipment, and have good hand hygiene, respectively. The most important barriers for preventive behaviors were the lack of risk perception, economic and financial barriers, lack of access, and cultural barriers, respectively. The perceived benefit was among the most significant driver. Intention for person-based measures was less affected by demographic and economic characteristics in comparison with community-based measures.
Conclusions: Considering the substantial impact of preventive behaviors on managing COVID-19 epidemic, this study findings have remarkable implications for governments to manage future communications as well as interventions during this ongoing outbreak and subsequent national risk events.

Keywords: COVID-19 Pandemic, Behavior, Non-pharmaceutical Measures, Prevention

1. Background

Despite considerable advancements in the field of medicine, infections have still remained one of the main causes of death worldwide, taking millions of lives annually (1). During recent years, the emergence of infectious diseases has been the focus of attention due to the worldwide pandemics of Severe Acute Respiratory Syndrome (SARS), Middle East Respiratory Syndrome (MERS), bird flu, Ebola, new H1N1 flu, and finally, COVID-19 (2-4). The essence of these diseases is their transmission, which is the main subject of studies addressing the issue in various science branches (5). On the other hand, such pandemics largely affect societies because of their negative impacts on morbidity and mortality rates, unemployment, world economy, and inequalities; hence, preventing and controlling these diseases is given the highest priority by health systems (6-8).

According to the World Health Organization (WHO), when an epidemic outspreads, the social engagement seems essential to make sure of the population's preparedness for taking individual precautions (9, 10). Society engagement is the concept that represents the extent that society members participate in a broad range of social roles and relationships (11, 12).

Previous experiences of infectious diseases support the presence of a presumed behavioral immune system in human beings. Some examples of this behavioral immune

system exhibited in previous epidemics are as follows: (1) wearing face masks, (2) washing hands, and (3) keeping off public transportation, restaurants, shops, and other crowded places (6). Based on what prior research has suggested, preventive measures to be adopted by individuals can be efficient in the reduction of disease infection rates (13). Although numerous models associated with the transmission of infectious diseases have been proposed so far to inform and guide policymakers toward preparedness for and response to the (re) emergence of infectious diseases, especially in the absence of sufficient information about controlled trials, the incorporation of behavioral changes against the transmission of infectious diseases has attracted broad attention (6, 13).

Olapegba et al. found a significant relationship among preventive health behaviors, fear of COVID-19, post - traumatic stress symptomology, and psychological distress. This was confirmed by Harper et al., (cited in Olapegba et al., 2020), who stated that those participants who were more fearful of COVID-19 tended to engage more in regular hand washing, social distancing, and other preventive health behaviors. Another study conducted in the US, the UK, and Germany (Kuper-Smith et al. cited in Olapegba et al., 2020) found a similar effect of the fear of coronavirus in determining social distancing and hand washing (14). Dwipayanti et al., in line with previous studies in other pandemic contexts, found that sex, perceived susceptibility, and effectiveness were the main predictors of hand hygiene practices. Furthermore, addressing the social norm related to perceived hand hygiene practices of friends and important people was reported a potential health promotion strategy implemented through creating hand hygiene norms in the community (15).

There are several theories associated with health behavior proposing explanatory models of individuals' reactions to threats to their health, including the health belief model (HBM), the theory of planned behavior (TPB), and the protective motivation theory (PMT) (16).

Since Iran and several other countries around the world are experiencing the epidemic for the first time and, in some cases, after a long time, it is unknown that how long the COVID-19 outbreak remains will exist; hence, the primary objectives of this study were to examine public's preventive behavioral responses to person - and community-based measures during the COVID-19 pandemic to promote and institutionalize preventive behaviors and reduce the negative effects of epidemics on the health of the society and the economy of countries. In addition, the barriers and drivers of preventive measures during the COVID-19 outbreak were investigated as the first and most cost - effective measure to control epidemics.

2. Objectives

In this study, individuals reveal their intention for some behaviors in real life and in the face of real challenges during the COVID-19 outbreak. Accordingly, some practical and realistic implications are proposed for effective risk and health communication in the current and future national public health issues.

3. Methods

3.1. Study Design

A cross - sectional online survey was carried out using a researcher - made questionnaire according to behavioral theories, namely HBM, TPB, and PMT (16-18). Using a Likert scoring scale, we sought to investigate the barriers and drivers affecting the participants' intention to exhibit four protective/preventive behaviors during COVID-19 outbreak, including using personal protective equipment (e.g., mask-wearing) (PPE), good hand hygiene practices (GHH), social distancing (SOD), and the restriction of social and economic activities during the past two months. The first two are person-based measures, and the second two are community-based measures.

3.2. Study Population and Sampling

A population-based random sample of Iranian adults aged 18 years or over was invited to fill a nationally anonymous survey via the social media (WhatsApp, Telegram etc.). To this end, the link was sent to anyone who could only answer or send it to anyone else; hence, the questionnaire link was sent randomly.

3.3. Data Collection and Instrument

The data were collected from March 19th (23 p.m.) to 26th (17 p.m.), 2020. From 5204 views, an overall number of 2550 respondents were willing to take part in the study, which subsequently led to 49% completion rate of the online self - administrated questionnaire. To test the questionnaire, face, and content validity, 10 members of the academia were asked to provide their comments on the questions and propose modifications if any. The final questionnaire contained four dimensions as outcome variables with if sequence and 11 control variables. Cronbach's alpha (= 0.79) was used to check the questionnaire's reliability.

The components of this questionnaire are described below.

3.3.1. Outcome Variables

The participants were asked about their intention to exhibit protective behaviors, such as using personal protective equipment (e.g., mask wearing), good hand hygiene practices, social distancing, and restriction of social and economic activities. The possible responses were 'never' (1), 'almost never' (2), 'sometimes' (3), 'almost always' (4), or 'always' (5). Those participants who indicated that they 'never', 'almost never' or 'sometimes' exhibited the protective behaviors were asked why they had not engaged in such behaviors. A list of 10 possible reasons for not exhibiting the recommended behaviors, which was generated in accordance with previous studies, was provided in the question (16, 19-23) and experts' opinion. The participants could select as many options as they wished. The opportunity was also provided for them to choose the option 'other' and bring their personal reasons, in the case that they were not mentioned in the list. Those reporting the exhibition of the protective behaviors (by indicating that they 'almost always' or 'always' performed the protective behaviors) were presented a list of 10 potential reasons addressing why someone performed the recommended behaviors. Similarly, this list was also developed using previous studies (19-23) and experts' opinions.

Besides, the respondents were expected to count the barriers for protective and hygienic behaviors. The barriers were also developed by experts' opinion, as well. They included lack of risk perception, inaccessibility, cultural barriers, and financial and economic barriers.

3.3.2. Control Variables

To increase the results' accuracy, we considered demographic variables, risk perception, having enough knowledge, access getting preventive advice (from others), and perceived benefits of the protective measures as the control variables. Demographic variables included age, gender (1 = male, 2 = female, 51.1% female), number of children, and level of education ranging from 1 (elementary education) to 5 (MA or PhD). Moreover, household's economic status was classified into three categories (i.e., expense > income; expense = income; expense < income). Additionally, previous studies revealed that employment and marital status (married vs. others) were associated with behavioral intention; thus, they were included as control variables. We defined eight employment categories, including governmental employment, non-governmental employment, freelancer, student, housekeeper, retired, unemployed and daily-paid employment. Risk perception was measured using a five-point scale (strong agreement (5), agreement (4), neither agreement nor disagreement (3), disagreement (2), or strong disagreement (1). The respondents had to show the degree of their agreement with this statement: "COVID-19 is serious". The responses were re-classified into two categories: high against low. It was supposed that risk perception variables had positive associations with intentions for preventive/protective behavior, according to the theory underpinning the Health Belief Model (21). In addition, the participants were categorized with regard to the following criteria: whether they were encouraged to exhibit protective behaviors (get preventive advice), whether they were aware how to exhibit such practices, and whether they faced difficulties in having access to the needed hygiene and protective equipment. The responses were re-classified into two categories: no/yes. In another question, the participants' attitudes were uncovered by asking whether adherence to protective behaviors is effective in preventing the spread of COVID-19 in the community. They were scored using a 5-point Likert scale ranging from 1 (absolutely no) to 5 (absolutely yes), after which their re-classification into the three categories of no/maybe/yes took place.

3.4. Data Analysis

The statistical analyses were performed using SPSS version 18. Mean ± SD was considered to describe quantitative variables, while the description of qualitative variables was through frequency (%). The majority of the participants selected 'almost always' or 'always' for adherence to protective behaviors) social distancing, using personal protective equipment, good hand hygiene practices, and restriction of social and economic activities). Accordingly, this variable was recoded and dichotomized as those who do not adhere to protective behaviors as 'never (0)', 'almost never (0)' or 'sometimes (0)' and those who adhere to such measures as 'almost always (1)' and 'always (1)'. Assessment of every free - text response in terms of barriers and drivers was performed for accuracy, and their coding was subsequently carried out. As an example, a respondent could probably raise concerns about the adverse effects of disinfectants or lack of social responsibility. Such concerns were considered as barriers. Moreover, any response representing superstitions and misconceptions were classified as cultural barriers.

Further, odds ratio (OR) and relative confidence interval (95% CI) were estimated through univariate logistic regression to test the association of every individual predicting variable with primary outcome variables. To determine the independent relationship of individual predicting variables with primary outcome variables, multiple-logistic regression was carried out while all the variables were present. A P-value of less than 0.05 was considered significant.

3.5. Ethical approval

The Ethics Committee at Shiraz University of Medical Sciences (Code: IR.SUMS.REC.1399.093) evaluated and approved the research. All the participants confirmed their agreement to participation in this study before completing the online questionnaire. All the participants then completed the questionnaire willingly, and they were assured of the confidentiality of the collected data.

4. Results

4.1. General Characteristics of Participants

The mean age of the participants was 36.38 $\pm$ 10.64 years (range: 18 to 57 years). More than half of the participants (n = 1304, 51.1%) were female, and 1698 persons (66.6%) were married. Overall, 1729 persons (81.7%) had an academic degree, and most of them had one to two children (n = 1128, 44.2%). About 160 (6.3%) persons were unemployed, and 1133 (44.4%) claimed that their expenditure-to-income ratio was appropriate.

4.2. Participants' Intention to Exhibit Protective Behaviors

In total, 1968 (72.2%), 1637 (64.2%), 2492 (97.7%), and 2426 (95.1%) participants had the intention for social distancing (SOD), using personal protective equipment (PPE), good hand hygiene (GHH), and restriction of social and economic activities (ROA), respectively. Therefore, 51 (2.0 %) persons claimed that they had no intention for good hand hygiene. No statistical analysis could investigate the differences between the two groups of having and not having the "intention to GHH".

Table 1 shows the most frequently selected reasons for adopting and denying the protective behaviors from participants' viewpoint. Since there were different reasons for not accepting or denying different protective measures, the options for each case were different.

According to the results, the most important barriers raised by the participants were the lack of risk perception, economic and financial barriers, lack of access, and cultural barriers, respectively. Only 10% of the participants claimed that they had no problem in having access to protective equipment, with the rest experiencing some sort of difficulties to have access during the first two months of outbreak.

4.3. The Influencing Factors on Participants' Preventive Behaviors

The results of the univariate analysis and multiple logistic regression for each measure are presented in Tables 2 - 4.

In univariate analysis, the results showed that women had higher intention for PPE than men (OR = 1.53; 95% CI: 1.30 - 1.80). Those aged above 50 years, compared to individuals aged below 30 years, had higher intention to observe PPE (OR = 1.18; CI: 0.88 - 1.57). Daily - paid workers had lower intention for PPE, compared to other employment types. For example, housekeepers had at least 1.83 times higher intention for PPE, compared to daily - paid workers (OR = 1.83; CI: 1.17 - 2.87). In comparison with the respondents with the lowest levels of education, the highly educated were more likely to have intentions to use personal protective equipment (OR = 1.56; CI: 1.10 - 2.25). The respondents who perceived a higher risk of the disease showed a higher likelihood of exhibiting intention for PPE (OR = 2.33; CI: 1.44 - 3.79). The measures of getting preventive advice (OR = 1.65; CI: 1.39 - 1.95) and having positive attitudes towards the effectiveness of preventive measures (OR = 1.74; CI: 1.38 - 2.20) showed consistent associations with the behavioral intentions for PPE in models subject to adjustment as well as unadjusted models.

In univariate analysis, the results indicated that women had greater intention for SOD than men (OR = 1.15; CI: 0.96 - 1.39). Individuals aged > 50 years in comparison to those aged < 30 years olds (OR = 2.42; CI: 1.71 - 3.44), highly educated participants in comparison to those with elementary education (OR = 2.21; CI: 1.53 - 3.20), and retired in comparison to daily-paid workers (OR = 2.25; CI: 1.19 - 4.26) had higher intention for SOD. Although risk perception, enough knowledge, getting preventive advice, access, perceived benefit of the protective measures also had positive effect on the intention for SOD, knowledge had the greatest effect (OR = 3.69; CI: 1.85 - 7.35).

As exhibited in Table 4, in univariate analysis, the intention for ROA was higher in women than in men (OR = 2.68; CI: 1.80 - 3.98), those aged > 50 years old than the younger (OR = 1.17; CI: 0.61 - 2.25), highly educated (MSc or Ph.D) individuals than those with elementary education (OR = 2.73; CI: 1.47 - 5.07), and students than daily-paid workers (OR = 3.97; CI: 1.53 - 10.27). No significant correlations were found between ROA and marital status (P = 0.95) and household economic status (P = 0.90).

4.4. The Relationship of Individual Predicting Variables with the Preventive Behaviors

In multiple logistic regression, the results indicated that women had higher intention for PPE than men (OR = 1.60; 95% CI: 1.32 - 1.94), and single participants, compared to married ones, also had higher intention for PPE (OR = 1.36; CI: 1.08 - 1.70). Those with non - governmental employment had 2.02 times higher intention for PPE, compared to daily-paid workers. The results confirmed no significant relationship between access, knowledge, and household eco-

Table 1. The Most Selected Reasons for Accepting or Denying Protective Behaviors and Its Theoretical Basis

Drivers, Barriers, and the Reasons	Theoretical Basis	No. (%)
Reasons for accepting protective behaviors		
I want to prevent that I transfer COVID-19 to people around me.	Perceived susceptibility	1850 (72.5)
COVID-19 can be serious.	Perceived severity	1724 (67.6)
I feel responsible for my health.	Perceived susceptibility	1673 (65.6)
I want to prevent contracting COVID-19.	Perceived susceptibility	1605 (62.9)
I trust that the measures help.	Perceived benefits/Coping appraisal	1347 (52.8)
Reasons for denying protective behaviors		
SOD; Total number: 579		
Because I don't want others to feel that I have disrespected them.	Attitude towards the behavior	219 (37.8)
Because I have received little information about its importance.	Perceived behavioral control	175 (30.2)
For principle reasons (e.g., religion/ beliefs /anthroposophical conviction).	Subjective norms/ Cues to action	105 (18.1)
PPE; Total number: 911		
Because I don't have access.	Perceived costs/ Perceived behavioral control	626 (68.7)
I think hygiene and washing hands are enough to avoid COVID-19.	Perceived susceptibility	407 (44.7)
Because these actions are difficult and takes too much effort (time, cost etc.).	Perceived costs	63 (6.9)
GHH; Total number: 51		
Because I'm not used to doing it.	Perceived behavioral control	5 (9.8)
Because I don't want to look obsessive.	Perceived behavioral control	4 (7.8)
Because I think using gloves is enough.	Perceived susceptibility	3 (5.9)
ROA; Total number: 124		
Because of my job.	Perceived behavioral control	63 (50.8)
Due to lack of financial reserves.	Perceived costs	45 (36.3)
People in my environment will not do that either.	Subjective norms	22 (17.7)

Abbreviations: SOD, social distancing; PPE, using personal protective equipment; GHH, good hand hygiene; ROA, restriction of social and economic activities.

nomic status, and PPE. Table 3 presents the results regarding the intention for SOD.

In multiple logistic regression, the results indicated that older individuals had higher likelihood of observing social distancing (OR = 3.15; CI: 1.98 - 5.01). Compared to those with the lowest level of education, highly educated individuals had a higher likelihood of showing the intention for SOD (OR = 2.04; CI: 1.35 - 3.07). Knowledge (OR = 2.66; CI: 1.29 - 5.48) and positive attitude towards the effectiveness of preventive measures (OR = 1.35; CI: 1.02 - 1.77) showed consistent associations with the behavioral intentions for SOD in unadjusted and adjusted models. Multiple logistic regression confirmed no significant relationship between risk perception, access, getting preventive advice, and household economic status and SOD.

Furthermore, some variables (e.g., perceived benefit) were statistically significant in the univariate model (OR = 1.76; CI: 1.11 - 2.80; P = 0.017) but became non - significant in the multiple logistic regression (OR = 1.29; CI: 0.77 - 2.16; P = 0.329). The results of multiple logistic regression indicated that men, in comparison to women, and respondents aged 30 years and below, in comparison to older participants, were less likely to intend to restrict their social and economic activities when they encountered COVID-19 pandemic. In contrast, highly educated respondents, in comparison to those with elementary education, (OR = 2.79; CI: 1.34 - 5.81), and respondents who perceived a higher risk of the disease (OR = 3.71; CI: 1.81 - 7.56) and had higher knowledge (OR = 6.29; CI: 2.53 - 15.64) were more likely to restrict their social and economic activities than their counterparts.

Table 2. Association Between Intention for Using Personal Protective Equipment (E.G., Mask-Wearing), Socio-Demographic Factors, Risk Perception, Access, Knowledge, Get Preventive Advice, and Perceived Benefits

Variables	Intention to Using Personal Protective Equipment (e.g., Mask Wearing) (PPE)						
	No	Yes	P-Value	Odds Ratio (95% CI) [a]	P-Value	Odds Ratio (95% CI) [b]	P-Value
Sex			< 0.001				
Male	507 (40.7)	738 (59.3)		1	-	1	-
Female	404 (31.0)	899 (69.0)		1.53 (1.30 - 1.80)	< 0.001	1.60 (1.32 - 1.94)	< 0.001
Age			0.132				
< 30	248 (34.9)	463 (65.1)		1	-	1	-
30 - 50	567 (37.1)	963 (62.9)		0.91 (0.76 - 0.88)	0.319	1.12 (0.88 - 1.43)	0.371
> 50	96 (31.3)	211 (68.7)		1.18 (0.88 - 1.57)	0.264	1.57 (1.07 - 2.31)	0.022
Education			< 0.001				
Under diploma	65 (43.9)	83 (56.1)		1	-	1	-
Diploma	135 (43.4)	176 (56.6)		1.02 (0.69 - 1.52)	0.918	0.93 (0.62 - 1.42)	0.749
Associate's degree	83 (42.6)	112 (57.4)		1.06 (0.69 - 1.63)	0.802	0.93 (0.59 - 1.48)	0.769
Bachelor's degree	279 (32.9)	570 (67.1)		1.60 (1.22 - 2.28)	0.009	1.36 (0.91 - 2.00)	0.123
Higher education (MSc or PhD)	348 (33.4)	694 (66.6)		1.56 (1.10 - 2.25)	0.012	1.31 (0.88 - 1.93)	0.182
Marital status							
Married	644 (37.9)	1053 (62.1)	0.004	1	-	1	-
Single	250 (31.3)	549 (68.7)		1.34 (1.12 - 1.61)	0.001	1.36 (1.08 - 1.70)	0.008
Divorced or widow	15 (31.3)	33 (68.8)		1.35 (0.73 - 2.497)	0.347	1.13 (0.60 - 2.13)	0.718
Employment			0.003				
Governmental employment	287 (37.8)	473 (62.2)		1.87 (1.20 - 2.75)	0.003	1.38 (0.88 - 2.15)	0.163
Non-governmental employment	111 (30.4)	254 (69.6)		2.52 (1.61 - 3.94)	0.005	2.02 (1.26 - 3.25)	0.004
Freelancer	114 (35.7)	205 (64.3)		1.98 (1.26 - 3.11)	< 0.001	1.70 (1.06 - 2.7)	0.029
Student	127 (33.2)	255 (66.8)		2.21 (1.42 - 3.44)	0.003	1.51 (0.92 - 2.46)	0.104
Housekeeper	115 (37.6)	191 (62.4)		1.83 (1.17 - 2.87)	< 0.001	1.36 (0.84 - 2.23)	0.215
Retired	35 (29.4)	84 (70.6)		2.65 (1.52 - 4.60)	0.009	1.86 (0.98 - 3.53)	0.056
Unemployed	62 (35.4)	113 (64.6)		2.01 (1.22 - 3.30)	0.001	1.62 (0.96 - 2.72)	0.071
Daily-paid	54 (52.4)	49 (47.6)		1	-	1	-
Household economic status			0.377				
Expense < income	208 (35.1)	384 (64.9)		1	-	1	-
Expense = income	391 (34.5)	741 (65.5)		1.03 (0.83 - 1.27)	0.806	0.93 (0.75 - 1.16)	0.526
Expense > income	306 (37.5)	509 (62.5)		0.90 (0.72 - 1.12)	0.354	0.93 (0.74 - 1.17)	0.554
Get preventive advice			< 0.001				
No	378 (43.4)	493 (56.6)		1	-	1	-
Yes	533 (31.8)	1144 (68.2)		1.65 (1.39 - 1.95)	< 0.001	1.55 (1.30 - 1.850)	< 0.001
Perceived benefits			< 0.001				
No	162 (44.4)	20.3 (55.6)		1	-	1	-
Maybe	276 (40.8)	401 (59.2)		1.16 (0.90 - 1.50)	0.259	1.07 (0.82 - 1.40)	0.638
Yes	473 (31.4)	10.33 (68.60		1.74 (1.38 - 2.20)	< 0.001	1.63 (1.28 - 2.09)	< 0.001
Access			0.085				
No	78 (30.8)	175 (69.2)		1	-	1	-
Yes	833 (36.3)	1462 (63.7)		0.78 (0.59 - 1.04)	0.086	0.76 (0.57 - 1.02)	0.065
Knowledge			< 0.001				
No	15 (45.5)	18 (54.5)		1	-	1	-
Yes	896 (35.6)	1619 (64.4)		1.51 (0.76 - 3.02)	0.245	1.01 (0.49 - 2.09)	0.984
Perceived severity			< 0.001				
Low	38 (55.9)	30 (44.1)		1	-	1	-
High	873 (35.2)	1607 (64.8)		2.33 (1.44 - 3.79)	< 0.001	1.83 (1.09 - 3.08)	0.023

[a] Calculated by univariate logistic regression.
[b] Calculated by multiple logistic regression (in the presence of all variables).

Table 3. Association Between Intentions for Social Distancing, Socio-Demographic Factors, Risk Perception, Access, Knowledge, Get Preventive Advice, and Perceived Benefits

Variables	Intention to Social Distancing (SOD)						
	No	Yes	P-Value	Odds Ratio (95% CI) [a]	P-Value	Odds Ratio (95% CI) [b]	P-Value
Sex			0.131				
Male	299 (24.0)	976 (76.0)		1	-	1	-
Female	280 (21.5)	1022 (78.5)		1.15 (0.96 - 1.39)	0.131	1.23 (0.99 - 1.52)	0.066
Age			< 0.001				
< 30	216 (30.5)	493 (69.5)		1	-	1	-
30 - 50	316 (20.6)	1215 (79.4)		1.69 (1.38 - 2.06)	< 0.001	1.99 (1.53 - 2.560)	< 0.001
> 50	47 (15.3)	260 (84.7)		2.42 (1.71 - 3.44)	< 0.001	3.15 (1.98 - 5.01)	< 0.001
Education			0.001				
Under Diploma	53 (35.6)	96 (64.4)		1	-	1	-
Diploma	77 (24.8)	233 (75.2)		1.67 (1.09 - 2.55)	0.017	1.57 (1.01 - 2.44)	0.045
Associate's degree	45 (23.1)	150 (76.9)		1.84 (1.15 - 2.95)	0.011	1.80 (1.10 - 2.95)	0.02
Bachelor's degree	196 (23.1)	653 (76.9)		1.84 (1.27 - 2.67)	0.001	1.75 (1.17 - 2.62)	0.006
Higher education (MSc or PhD)	208 (20.0)	833 (80.0)		2.21 (1.53 - 3.20)	0.000	2.04 (1.35 - 3.07)	0.001
Marital status			0.908				
Married	382 (22.5)	1314 (77.5)		1	-	1	-
Single	186 (23.3)	612 (76.7)		0.96 (0.78 - 1.17)	0.663	1.38 (1.07 - 1.78)	0.013
Divorced or widow	11 (22.4)	38 (77.6)		1.00 (0.51 - 1.98)	0.990	0.82 (0.41 - 1.65)	0.577
Employment			0.038				
Governmental employment	159 (20.9)	60.1 (79.1)		1.70 (1.08 - 2.68)	0.021	1.17 (0.72 - 1.90)	0.536
Non-governmental employment	87 (23.8)	278 (76.2)		1.44 (0.89 - 2.33)	0.138	1.08 (0.65 - 1.79)	0.776
Freelancer	68 (21.3)	251 (78.7)		1.66 (1.01 - 2.73)	0.044	1.27 (0.76 - 2.13)	0.367
Student	102 (26.8)	279 (73.2)		1.23 (0.77 - 1.98)	0.388	1.21 (0.72 - 2.06)	0.473
Housekeeper	62 (20.3)	244 (79.7)		1.77 (1.07 - 2.93)	0.025	1.54 (0.89 - 2.64)	0.121
Retired	20 (16.7)	100 (83.3)		2.25 (1.19 - 4.26)	0.012	1.17 (0.56 - 2.45)	0.679
Unemployed	47 (26.9)	128 (73.1)		1.23 (0.72 - 2.09)	0.453	1.11 (0.64 - 1.95)	0.708
Daily-paid	32 (31.1)	71 (68.9)		1	-	1	-
Household economics status			0.692				
Expense < income	133 (22.5)	459 (77.5)		1	-	1	-
Expense = income	250 (22.1)	882 (77.9)		1.02 (0.81 - 1.30)	0.856	0.96 (0.75 - 1.23)	0.762
Expense > income	193 (23.7)	621 (76.3)		0.93 (0.73 - 1.20)	0.585	0.99 (0.77 - 1.29)	0.958
Get preventive advice			0.066				
No	216 (24.9)	653 (75.1)		1	-	1	-
Yes	363 (21.6)	1315 (78.4)		1.20 (0.99 - 1.45)	0.066	1.20 (0.98 - 1.47)	0.079
Perceived benefits			0.017				
No	101 (27.6)	265 (72.4)		1	-	1	-
Maybe	162 (24.0)	513 (76.0)		1.21 (0.90 - 1.61)	0.203	1.16 (0.86 - 1.53)	0.338
Yes	316 (21.0)	1190 (79.0)		1.44 (1.11 - 1.86)	0.007	1.35 (1.02 - 1.77)	0.033
Access			0.455				
No	62 (24.6)	190 (75.4)		1	-	1	-
Yes	517 (22.5)	1778 (77.5)		1.12 (0.83 - 1.52)	0.456	1.05 (0.77 - 1.44)	0.754
Knowledge			< 0.001				
No	17 (51.5)	16 (48.5)		1	-	1	-
Yes	562 (22.4)	1952 (77.6)		3.69 (1.85 - 7.35)	< 0.001	2.66 (1.29 - 5.48)	0.008
Perceived severity			0.183				
Low	20 (29.4)	48 (70.6)		1	-	1	-
High	559 (22.5)	1920 (77.5)		1.43 (0.84 - 2.43)	0.185	1.12 (0.63 - 1.97)	0.702

[a] Calculated by univariate logistic regression.
[b] Calculated by multiple logistic regression (in the presence of all variables).

Table 4. Association Between Intention for Restriction of Social and Economic Activities, Socio-Demographic Factors, Risk Perception, Access, Knowledge, Get Preventive Advice, and Perceived Benefits

Variables	Intention to Restriction of Social and Economic Activities (ROA)						
	No	Yes	P-Value	Odds Ratio (95% CI) [a]	P-Value	Odds Ratio (95% CI) [b]	P-Value
Sex							
Male	88 (7.1)	1158 (92.9)	0.004	1	-	1	-
Female	36(2.8)	1268(97.2)		2.68 (1.80 - 3.98)	< 0.001	2.70 (1.66 - 4.40)	< 0.001
Age							
< 30	124(4.9)	2426(95.1)	0.008	1	-	1	-
30 - 50	35(4.9)	676(95.1)		0.99 (0.66 - 1.50)	0.969	1.18 (0.69 - 2.01)	0.541
> 50	76(5.0)	1456(95.0)		1.17 (0.61 - 2.25)	0.635	1.23 (0.54 - 2.81)	0.631
Education							
Under Diploma	13(4.2)	294(95.8)	0.039	1	-	1	-
Diploma	124(4.9)	2426(95.1)		2.06 (0.99 - 4.30)	0.053	2.12 (0.97 - 4.66)	0.060
Associate's degree	15(10.1)	134(89.9)		1.57 (0.72 - 3.40)	0.256	1.80 (0.76 - 4.24)	0.182
Bachelor's degree	16(5.1)	295(94.9)		2.33 (1.25 - 4.34)	0.008	2.36 (1.16 - 4.80)	0.018
Higher education (MSc or PhD)	13(6.7)	182(93.3)		2.73 (1.47 - 5.07)	0.001	2.79 (1.34 - 5.81)	0.006
Marital status							
Married	39(4.6)	811(95.4)	0.954	1	-	1	-
Single	41(3.9)	1001(96.1)		0.86 (0.59 - 1.26)	0.431	0.64 (0.40 - 1.04)	0.072
Divorced or widow	124(4.9)	2423(95.1)		1.15 (0.27 - 4.81)	0.851	0.63 (0.15 - 2.73)	0.538
Employment							
Governmental employment	79(4.7)	1619(95.3)	0.047	2.11 (0.98 - 4.55)	0.057	1.19 (0.50 - 2.87)	0.692
Non - governmental employment	43(5.4)	756(94.6)		1.65 (0.73 - 3.75)	0.230	1.09 (0.44 - 2.71)	0.852
Freelancer	2(4.1)	47(95.9)		1.08 (0.49 - 2.38)	0.851	0.90 (0.38 - 2.16)	0.821
Student	124(4.9)	2422(95.1)		3.97 (1.53 - 10.27)	0.005	4.24 (1.42 - 12.64)	0.010
Housekeeper	33(4.3)	727(95.7)		2.35 (0.96 - 5.76)	0.061	0.89 (0.32 - 2.50)	0.821
Retired	20(5.5)	345(94.5)		3.73 (0.98 - 14.18)	0.053	2.38 (0.52 - 10.90)	0.263
Unemployed	26(8.2)	293(91.8)		1.43 (0.57 - 3.57)	0.447	1.14 (0.42 - 3.09)	0.799
Daily-paid	9(2.4)	373(97.6)		1	-	1	-
Household economics status							
Expense < income	12(3.9)	295(96.1)	0.907	1	-	1	-
Expense = income	3(2.5)	117(97.5)		0.86 (0.54 - 1.36)	0.511	0.83 (0.51 - 1.341)	0.440
Expense > income	11(6.3)	164(93.7)		1.14 (0.68 - 1.91)	0.611	1.45 (0.85 - 2.47)	0.175
Get preventive advice							
No	9(8.7)	94(91.3)	0.001	1	-	1	-
Yes	123(4.9)	2408(95.1)		1.37 (0.95 - 1.98)		1.10 (0.74 - 1.64)	0.637
Perceived benefit							
No	28(4.7)	564(95.3)	0.016	1	-	1	-
Maybe	62(5.5)	1071(94.5)		1.60 (0.94 - 2.72)	0.081	1.32 (0.74 - 2.33)	0.345
Yes	34(4.2)	782(95.8)		1.76 (1.11 - 2.80)	0.017	1.29 (0.77 - 2.16)	0.329
Access							
No	124(4.9)	2417(95.1)	0.612	1	-	1	-
Yes	88 (7.1)	1158 (92.9)		1.81 (1.10 - 2.98)	0.019	1.87 (1.10 - 3.18)	0.021
Knowledge							
No	36(2.8)	1268(97.2)	< 0.001	1	-	1	-
Yes	124(4.9)	2426(95.1)		7.83 (3.56 - 17.23)	< 0.001	6.29 (2.53 - 15.64)	< 0.001
Perceived severity							
Low	35(4.9)	676(95.1)	0.021	1	-	1	-
High	76(5.0)	1456(95.0)		5.59 (3.01 - 10.37)	< 0.001	3.71 (1.81 - 7.56)	< 0.001

[a] Calculated by univariate logistic regression.
[b] Calculated by multiple logistic regression (in the presence of all variables).

5. Discussion

COVID-19 is an imminent public health concern. To manage the spread and social impact of this pandemic, it is crucial that citizens be engaged in preventative behaviors such as social distancing, use of personal protective equipment, personal hygiene, and limited presence in the community as much as possible. Understanding the cause of differences in these behaviors is imperative, as such, the present study aimed to investigate the public's preventive behavioral responses and their barriers and drivers during the COVID-19 outbreak.

The findings indicated that socio - demographic and economic characteristics differently affect some aspects of protective behaviors (PPE, SOD, GHH, and ROA). For example, although women have greater intention to use protective equipment than men, they exhibit equal intention to adhere to social distancing. Additionally, the intention to adopt person-based measures was less affected by demographic and economic characteristics, compared to community-based measures. Previous studies have shown that exhibiting preventive behaviors over the outbreak of infectious diseases varies depending on the transparency of measures (exactly what they should do) and their practicality (if it is possible for the individual to adopt them) (24, 25). Based on a study on preventive behaviors in the initial phases of the influenza A virus subtype H1N1 outspread in 2009, a larger proportion of participants tended to wash their hands more frequently or avoid those with cold symptoms (55 - 67%) compared to the individuals who were willing to avoid going to crowded places, contact with specific races, or cancel their traveling programs (13 - 27%) (24). According to an examination of preventive behaviors over the SARS outbreak in 2003, the practice rates of hygienic behaviors, including washing hands, using face masks, and disinfecting, were reported as high as approximately 65 - 87%; however, the rates of avoiding specific places including markets or hospitals along with the use of public transport were as low as 24 - 75% (25).

In line with previous research, the findings of this study showed that the main drivers for protective behaviors are related to risk perception, social responsibility, and sensitivity to ensure personal and family health. Kim and Kim (2018) showed that individuals perceiving a lower risk of contracting MERS had totally undesirable attitudes regarding quarantine (2). Choi and Kim (2016) confirmed that attitude and perceived risk were the main variables strengthening preventive behaviors among nursing students during the MERS outbreak (26). Moreover, Brug et al. (2004) found a correlation between the perception of risk and precautionary actions to avoid SARS (27). Yoo et al. (2016) recommended public health authorities and communication professionals to employ social network sites (SNS) for the effective management of social and economic challenges brought by the outspread of infectious diseases through highlighting the impact of SNS communications on public perceptions regarding risk as well as preventive behaviors (28). Accordingly, with considerable stress on the severity of COVID-19 along with social responsibility to frame messages about the importance of preventative behaviors during the pandemic, citizens' compliance with health officials and government recommendations may be improved (29).

The main barriers to the protective behaviors of social distancing and good hand hygiene are cultural and informational barriers. Therefore, in accordance with a systematic review by Jefferson et al. (2009), efforts should be mainly focused on the reduction of transmission from young children by efficient educational programs at school regarding hygiene. Moreover, social investments need to concentrate on more convenient face masks with more favorable designs and barrier apparatus to make them more compatible with their application (30). Dyson et al. (2010) explained that identifying further barriers can be helpful in addressing non-compliance with hand hygiene (31).

In the case of using protective equipment, the main problem was accessibility, and job was a major obstacle to follow this advice in the case of restricting economic activities. The findings revealed that despite problems with access to masks and disinfectants during the study period, the use of preventive equipment had no significant relationship with the economic situation. Teasdale et al. (2014), in a systematic review, highlighted socio-economic barriers to adoption of social distancing behaviors. This is consistent with our study and showed that individuals engage in the active evaluation of non-pharmaceutical interventions considering their perceived necessity, efficiency, admissibility, and practicality. To promote uptake, addressing primary barriers seems essential, among which beliefs regarding the transmission of the infection, rejecting individual infection risks, concerns regarding the possible costs, and stigma related to specific interventions can be mentioned (32).

Furthermore, Sun et al. (2013) explained the determining factors of health literacy and its relationships with health behaviors. According to their study, these two variables showed positive mutual associations (33). The results of our study also showed that most of the preventive behaviors are exhibited by the educated.

In line with our study, Jang et al. (2019) asserted that awareness regarding the efficiency of preventive behaviors enhances the adoption of these behaviors (13). On the other hand, Lunn et al (2020), in their recent study, specified that

education and information, while important, were not sufficient to change behaviors (34). Furthermore, the level of education not only promotes favorable perceptions of preventive behaviors, but also promotes the quality of preventive measures (13).

Lunn et al. (2020) also displayed that isolation duration is important. In this regard, clarity and certainty of the timelines were both important (34). The issue seems to have indirectly affected our study, as well. This is because the study was conducted in the first months of the epidemic, and the participants were likely to answer questions with the assumption that the outbreak would be controlled soon during the next few months.

In line with our research, Bish and Michie (2010) referred to demographic behavioral differences, including being at an older age and female gender, while having higher education was related to more chances of behavioral adoption (16). Based on the available evidence, higher levels of perceived susceptibility and perceived severity of the disease, along with higher belief in the efficiency of the proposed behaviors for protection against the disease can be considered significant predicting factors of behaviors (16, 22).

In line with our findings, Webster et al. (2020) claimed that the most prevalent factors influencing individuals' commitment to quarantine included their knowledge on the outspread of infectious diseases along with quarantine protocols, social norms, perceived advantages of quarantine, perceived risk of diseases, and practical aspects of applying quarantine (35). It has been also indicated that such factors affect commitment to other protective health behaviors exhibited for infectious diseases, including washing hands, use of face masks, and avoidance of crowds, and vaccination (35). Previous studies have detected various factors having significant effects on behavioral changes toward healthy behaviors in infectious diseases, which include health literacy, education, prior knowledge, age, gender, economic status, health status, attitudes toward the severity of diseases, etc. (22, 23, 26, 29, 33, 36).

5.1. Limitations and Suggestions for Future Research

Several limitations of the current work should be mentioned before generalizing the findings so that they would be dealt with through further studies. First, the uncertainty of the epidemic duration can change the findings, and more studies need to be conducted over time to determine how people behave.

Second, this analysis used cross-sectional survey data; therefore, the correlations observed among the variables in the study are not sufficient to establish causal claims. Nevertheless, the within-regression model was grounded in strong theoretical reasoning, and the interpretation of the findings is in line with previous research. Future research adopting a longitudinal or panel approach is recommended to make stronger causal claims or investigate the changes in preventive/protective behaviors in accordance with changes in the COVID-19 epidemic. Third, the study examined the single issue of COVID-19 in Iran, which may limit the generalizability of the findings to other issues or other countries. Future studies may benefit from examining a broader range of risk and health issues or this topic in various countries to obtain a deeper perception of the barriers and drivers of preventive measures during the COVID-19 outbreak. Fourth, another point to consider is the study timing, which coincided with the New Year's holidays in our country. Under such a condition, many economic and social activities were automatically closed, except for travel and sightseeing businesses, by implementing government policies. Accordingly, it is still unclear whether individuals will still keep their social distance after this period. Finally, the evaluation of preventive behaviors' efficiency was not possible in the present work since only questions concentrating on if participants performed these behaviors or not and the related drivers and barriers had been considered.

5.2. Conclusion

The study findings have remarkable implications for policymakers to have an effective plan for risk and health communication during this ongoing outbreak and future national risk events affecting public health. Therefore, to manage the social response to the COVID-19 pandemic, the drivers should be used effectively, and the obstacles should be controlled as much as possible. Also, each group of the audience should be specifically alerted, and targeting risk communications are recommended. Collaborative prevention measures require appropriate public considerations according to efficient risk communication.

Footnotes

Authors' Contribution: LZ, ST.H, and NM participated in the conception and design of the study. Both GA and NM contributed to the acquired data and performed data analysis. LZ, ST.H and GA drafted the manuscript. NM, LZ, and KB.L revised the manuscript critically for important intellectual content. All the authors read and approved the final manuscript.

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