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# Knowledge and performance of the Iranian general population in the use of masks during the 2019 coronavirus

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## Abstract:

**BACKGROUND:** The use of personal protective equipment (especially face masks) has increased in different communities amid the COVID-19 pandemic. Therefore, the present study aimed to assess knowledge and performance of Iranian general population in wearing face masks.

**MATERIALS AND METHODS:** The present study is a cross-sectional study conducted using a valid and reliable questionnaire on 1843 eligible individuals. The questionnaires were shared by Link (www.porsall.com) in groups and social networks. Data were analyzed using SPSS (Version 24.0, SPSS Inc., Chicago, IL).

**RESULTS:** The mean age of the participants was 42.84 years (standard deviation: 16.84). The majority had inadequate and low knowledge of masks (69.2%), nearly 30% had moderate (30.1%), and few had adequate and high knowledge of masks. The individuals' knowledge on when to wear a mask was also assessed and the results showed poor and low in 42.2%, 46.9% moderate and high performance in 10.7%. The participants' performance on how to properly wear a mask was also assessed and 12% showed poor, 69.3% showed moderate, and 18.7% showed high performance. Safe removal of masks was also assessed, and the results showed 52% low and poor, 27.6% moderate, and 20.3% high performance. A significant and direct correlation was found between the overall score knowledge and performance regarding use of masks ( $P < 0.001$ ).

**CONCLUSION:** The results showed poor to moderate knowledge and performance of majority of Iranian general population regarding the masks. Therefore, further effective training courses and action plans are needed in Iran given the importance of masks for the prevention of COVID-19, especially in public places. Educational package about how to use the mask and its benefits, through the media and health centers is recommended.

## Keywords:

COVID-19, knowledge, masks, pandemics, practice

## Introduction

COVID-19 is caused by a novel coronavirus named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and poses a threat to public health.<sup>[1]</sup> Coronaviruses are widespread in humans and several other vertebrates and cause respiratory, enteric, hepatic, and neurologic diseases.

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The novel coronavirus is spread from person to person (human-to-human transmission) through respiratory droplets (aerosols) or close contact. The virus infects people of all ages. However, current evidence suggests that two groups of people are at a higher risk of getting severe disease, namely, older people and those with underlying medical conditions. Therefore, the WHO emphasizes that all people should protect themselves from.<sup>[2]</sup>

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Transmission of the disease in health facilities is a very serious threat. Of 138 patients infected with COVID-19 in a hospital, 40 (29%) were reported to be medical personnel. Although further studies are needed, asymptomatic people are also carriers of CoV-2019.<sup>[3]</sup>

WHO recommends that people should wear masks in public areas because face masks have restricted transmission of respiratory droplets from patients with respiratory infections (e.g., flu) to healthy people in earlier times. Face mask usage as a public health intervention by asymptomatic infected people could interrupt the transmission chain given the high viral load in early phase of the disease.<sup>[4]</sup>

Wearing a medical mask is one of the prevention measures that can limit the transmission of certain respiratory viral diseases including COVID-19. However, masks alone do not prevent and protect people from the disease and other measures including hand hygiene should also be taken. The use of medical masks can create a false sense of security if proper usage was not taught to people who could easily neglect other preventive measures including hand hygiene. There is not adequate evidence supporting this recommendation that wearing a surgical mask would significantly reduce the risk of disease transmission to a healthy person.<sup>[5]</sup> The WHO called for a 40% increase in the production of personal protective equipment (PPE) including face masks. Meanwhile, health authorities should optimize face mask distribution to prioritize the needs of frontline health-care workers and the most vulnerable groups of society including older adults (particularly those older than 65 years) and people with underlying health conditions.<sup>[5]</sup>

Outbreak of a respiratory infection is associated with huge human and economic costs including illness of healthcare workers. Therefore, planning and strategizing in response to such crises should put on the agenda health-care services and preventive measures. Infection prevention and control are the most important measures taken during epidemics given the available evidence. Therefore, the optimal use of PPE including masks by health-care workers and the general population is the first solution to protect against respiratory pathogens and prevent transmission of the diseases while caring for infected patients or attending public places. However, little is known about general population awareness, attitudes, decisions, and practice of wearing protective masks.<sup>[6]</sup>

Use of PPE and masks by general population has dramatically increased in Iran since the COVID-19 pandemic. The proper use of masks is a crucial point in this crisis. Various guidelines on how to wear face mask and assessment of health behaviors help to make practical health policies that would allow development

of effective prevention and protection training programs as well as rational use of masks and financial resources. Therefore, the study aimed to assess Iranian general population knowledge and performance regarding the use of masks during the COVID-19 epidemics in Iranian general population.

## Materials and Methods

### Study design and setting

The research method is descriptive correlation study. The necessary license was obtained from the Ethics Committee of the deputy of Research and Technology of Tehran University of Medical Sciences (Code: IR.TUMS.VCR.REC.1399.143). This study was performed on 1915 members of the general population living in Iran from April 10, 2020 to May 6, 2020. Inclusion criteria were willingness to participate in the study, possession of a smartphone, and 15–80 age group. Exclusion criteria were the questionnaires completed with the same ID twice and incomplete questionnaires.

### Study participants and sampling

To estimate the sample size, sample size formula for estimating the population ratio ( $n = \frac{\approx^2 p(1-p)}{d^2}$ ) was used. The  $p = 0.34$ , confidence interval ( $z$ ) = 95% and  $d = 0.03$  were considered into account, considering the design effect = 2. Therefore, the sample size was obtained equal to 1915 people.

Nonrandom sampling was used in this study. The questionnaire as an online link was posted on different social media groups and channels. Objectives of the research, data confidentiality, and inclusion criteria were carefully explained on the first page of the questionnaire to respect ethical considerations. Eligible individuals were asked to participate in the study if they were willing. An Iranian website specialized in design of online questionnaires was used to prepare the questionnaire. This website also had the ability to provide time to complete the questionnaire. ID of the person filling out the questionnaire could also be found.

### Data collection tool and technique

A self-report questionnaire based on the WHO, Center for Disease Control and Prevention (CDC) website, and related article was developed by the research team to meet the research objectives.<sup>[7-10]</sup>

To assess face validity of the questionnaire, a small group of people (20 men and 20 women) were asked to complete the questionnaire and write down their views on attractiveness, suitable format and sequence, and comprehension of items. Necessary changes were made to the questionnaire based on their views. To

assess content validity of the questionnaire, ten experts in health education, reproductive health, and midwifery of Tehran University of medical sciences were asked to write down their views on grammar, wording, sequence of items, and scoring. The questionnaire was modified based on their views. Cronbach's alpha was calculated to assess the reliability of the questionnaire. The Cronbach's alpha was obtained more than 0.7 for each item and domains of the questionnaire. The reliability of questionnaire for all questions was confirmed (Cronbach's alpha = 0.84).

The final questionnaire was prepared following necessary modifications. It was divided into three main parts. The first part collected data on demographic information including age, gender, marital status, education, occupation, place of employment, place of residence, source of information on mask and how to access it, and information on infected persons among friends, family members, and acquaintances. The second part consisted of 17 items assessing general knowledge on mask specification and usage. Each item had three options of true, false, and I don't know (true = 1, false and I don't know = 0). The third part consisted of 16 items assessing general population performance regarding the use of masks. Three domains of when and where to wear masks (5 items), how to properly put masks on (8 items), and how to properly take masks off (3 items) were included in this third part. The items were scored based on a five-point Likert scale (always, often, sometimes, rarely, and never). The highest score was assigned to "always" (4) and the lowest score belonged to "never" (0) in positive phrases. The lowest score was dedicated to "always" (0) and the highest score was allocated to "never" (4) in negative phrases.

The web-based survey was posted on various social media groups and channels. The participants could easily click on the link and answer questions. The first page of the questionnaire showed a brief introduction on the research team, the objectives, methods, voluntary participation, data confidentiality, and anonymity of participants.

### Ethical consideration

The project was approved by the ethics board of Ethics Committee of the deputy of Research and Technology of Tehran University of Medical Sciences (Code: IR.TUMS.VCR.REC.1399.143).

### Statistical analysis

Data were analyzed using SPSS (Version 24.0, SPSS Inc., Chicago, IL). Descriptive statistics including frequency, percentage, mean, and standard deviation (SD) were used to describe the sociodemographic characteristics of the participants. Normal distribution of data was

examined using skewness and kurtosis. Pearson correlation test was used at a significance level of <0.05.

## Results

The number of people completed the questionnaire was 1843 from April 10, 2020 to May 6, 2020 (response rate: 0.96%). The main social media were WhatsApp (96%) and Telegram (4%). The average time to complete the questionnaire was 9:19 min.

The mean age (SD) of the participants was 42.84 (16.84). Of these, 77.6% were females and 22.4% were males. About two-thirds of the participants were married (73.1%). About one-third (32.3%) of the participants were living in Tehran and 27% were living in Azerbaijan Province-Iran (western and eastern Azerbaijan). Education of about half of the participants' (44.96%) studies was unrelated to the fields of health care. More than a third had a bachelor degree (40%) and <15% had a high school diploma (14.6%). Less than 80% (76.98%) did not report any case of COVID-19 among their first-degree relatives, friends, or acquaintances and 23.2% reported a case of infection among their relatives and acquaintances [Table 1]. Assessment of stay-at-home status showed that 37.5% left home to go to work, 32% rarely left their home, and 30.5% left their home to walk around, shop, visit families and relatives, and take care of administrative and banking affairs.

Assessment of general population knowledge regarding the use of masks showed that 69.2% had low and poor knowledge, 30.1% had moderate knowledge, and 0.7% had high knowledge. Independent *t*-test results showed no statistically significant difference levels of knowledge in terms of gender, history of infection among relatives and acquaintances, and marital status ( $P > 0.05$ ). However, statistically significant differences were found in knowledge between different occupational groups (people with medical group jobs versus and people with nonmedical group jobs), between different educational degrees, different places of residence, and different types of employment ( $P < 0.05$ ). Mean score of knowledge of people with medical jobs, higher degrees, living in places except Tehran and Azerbaijan, and nurses or midwives were higher than others [Table 2].

Of all participants, 42.2% showed low and poor performance, 46.9% showed moderate performance, and 10.7% showed high performance regarding proper time to wear masks. The participants also showed low (12%), moderate (69.3%), and high (18.7%) performances regarding the proper use of surgical masks. The participants also showed low (52%), moderate (27.6%), and high (20.3%) performances regarding proper removal of surgical mask.

**Table 1: Sociodemographic characteristics of the participants (n=1843)**

Characteristics	n (%)*
Sex	
Female	1430 (77.6)
Male	413 (22.4)
Province of residence	
Tehran	595 (32.3)
Azerbaijan	498 (27.0)
Others	750 (40.7)
Have enough knowledge about the mask	
No	981 (53.2)
Yes	101 (5.7)
I am not sure	691 (39.0)
Family and acquaintances history of COVID-19	
No	428 (23.2)
Yes	1415 (76.9)
Marital status	
Single	495 (26.9)
Married	1348 (73.1)
Medical group	
No	932 (50.6)
Yes	911 (49.4)
Source of information	
Social media groups and channels	958 (52.0)
Television	450 (24.4)
Health care staff	614 (33.3)
Personal study	514 (27.9)
Friends and acquaintances	179 (9.7)
Others	88 (4.8)
No source	97 (5.3)
Education	
Diploma and less	267 (14.6)
Advanced diploma	124 (6.8)
Bachelor	734 (40.0)
Master	408 (22.2)
PhD	243 (13.2)
Student	58 (3.2)
Job	
Specialist physician	75 (4.1)
General practitioner	55 (3.0)
Pharmacist	12 (0.7)
Dentist	1 (0.1)
Nurse or midwife	552 (30.0)
Laboratory	31 (1.7)
Other health disciplines	199 (10.8)
Nonmedical	827 (44.9)

The participants also showed no statistically significant differences between general population performances regarding mask usage in terms of gender, marital status, place of residence, and access to masks ( $P > 0.05$ ). However, statistically significant differences were found between general population performances regarding masks usage in terms of occupation (medical group and nonmedical group), education, type of employment, infection of family and acquaintances, and knowledge

on masks ( $P < 0.05$ ). Mean scores of performance of mask usage in people with clinical jobs, master degree, nursing or midwifery position, history of infection in family members and acquaintances, and knowledge on masks were higher than others [Table 3].

Pearson correlation test results showed a significant and direct correlation between the overall score of knowledge of mask usage and the overall score of performance regarding mask usage ( $P < 0.001$ ,  $r = 0.368$ ).

## Discussion

The present study aimed to assess knowledge and performance of the general Iranian people regarding mask usage during the COVID-19 pandemic. The results showed that the majority had low-to-moderate knowledge and performance regarding mask usage for prevention of COVID-19. A significant correlation was found between individuals' knowledge and performance regarding mask usage. As knowledge on masks increases, performance of mask usage will improve.

Although the CDC recommended that people should wear cloth face coverings in public settings at April 3, 2020, guidelines and instruction for the use of masks are different and constantly changing in different populations.<sup>[11]</sup>

Knowledge and awareness has a crucial role in human life. Knowledge is the unique privilege of humans over their peers. It is used as a unique tool to distinguish advanced societies from backward societies. Awareness affects health behaviors of people. It encourages people to acquire knowledge, affects their interests, beliefs, and actions, creates incentives to make more productive decisions, and helps people to control their behaviors. Awareness is also an important factor in health promotion and help people to recognize their health problems, resolve these problems, and preserve their health.<sup>[12]</sup>

Effective control and prevention of viral diseases are the most important measures in COVID-19 pandemics.<sup>[13]</sup> However, fake news and misleading information on COVID-19 on different social media and websites obliged WHO to design a discussion forum in its official website to interact with people on social media and answer their questions about COVID-19.<sup>[14]</sup>

Awareness is an important step in disease control and prevention. The Chinese government put on the agenda effective measures to develop training courses for general population to control and prevent the COVID-1.<sup>[15,16]</sup> The results showed unfavorable knowledge and performance of Iranian people regarding mask usage despite abundant

**Table 2: Relationship between the sociodemographic characteristic with knowledge of the mask in the Iranian general population (n=1843)**

Variable	Mean (SD)	P
Sex		
Female	9.42 (2.09)	0.66
Male	9.37 (2.19)	
Marital status		
Single	9.54 (2.14)	0.12
Married	9.37 (2.11)	
Medical group		
No	8.86 (2.13)	<0.001
Yes	9.96 (1.96)	
Family history of COVID-19		
No	9.42 (2.1)	0.94
Yes	9.41 (2.17)	
Education		
Diploma and less	9.04 (2.19)	<0.001
Advanced diploma	8.29 (2.04)	
Bachelor	9.04 (2.3)	
Master's degree	9.58 (2.09)	
Ph.D. degree	9.73 (2.02)	
Specialist and subspecialty	9.9 (1.85)	
Province of residence		
Tehran	9.27 (2.16)	0.05
Azerbaijan	9.3 (2.07)	
Other	9.61 (2.11)	
Have enough knowledge about the mask		
No	8.99 (2.06)	<0.001
Yes	9.79 (2.09)	
Job		
Specialist physician	8.91 (1.85)	<0.001
General practitioner	9.99 (2.06)	
Pharmacist	8.74 (2.1)	
Dentist	9.27 (2.13)	
Nurse or midwife	9.52 (2.03)	
Laboratory	8.46 (2.11)	
Other health disciplines	9.34 (2.08)	
Nonmedical	9.44 (1.93)	

SD=Standard deviation

information on the use of masks in public setting for prevention and control of COVID-19. Probably, other factors should be considered in future studies to raise general population awareness on masks for control and prevention of COVID-19.

Preventive measures are highly regarded at global scale. These strict measures included severe punishments for those who violate the rules, subsidies for all citizens to compensate for closure of private companies, and free distribution of masks and sanitary products for the poor in Hong Kong.<sup>[17]</sup>

Use of masks is one of the preventive measures during the COVID-19 pandemic. Transmission of large respiratory droplets would be minimized in case that infected people wore masks.<sup>[18]</sup> Transmission of

the disease would be reduced by 80% if health-care personnel wore masks.<sup>[17]</sup>

Unfortunately, a review of literature showed no survey on knowledge and performance of Iranian general population regarding COVID-19 control and prevention. Therefore, a similar study is discussed. The results of the present study showed that most of the participants unfortunately had poor knowledge and performance regarding mask usage, which might be due to underestimating the disease, neglecting the disease transmission, and having misconceptions about COVID-19. Another study in the United States in 2020 showed that people in the United States and the United Kingdom believed in misconceptions about COVID-19 rather than facts. They overestimated fatal rates of the disease and believed that surgical masks could protect them from COVID-19.<sup>[19]</sup> These results were consistent with the results of the present study.

More than 90% had poor to moderate knowledge about COVID-19. Although the proper use of mask and correct knowledge on the proper use of masks promote the optimal use of masks, training courses for proper use of PPE is still vague and not comprehensible by general population. One study found out that 43% of physicians were informed of proper use of masks in the college and even 8% of nurses had received training in the use of masks.<sup>[20]</sup> Many people might never use what learned before, even medical and health-care personnel.<sup>[21]</sup> Therefore, style and time of giving information on emerging disease seem to promote theoretical and practical knowledge, which should be investigated in future studies.

The results of the present study were also consistent with the results of the study by Souli *et al.*<sup>[22]</sup> who assessed knowledge, attitude, and performance of 2380 high school students regarding COVID-19. They found out that Italian high school students had suitable knowledge and attitude toward mask usage to prevent clinical symptoms, and promoted general population health principles to prevent disease, reduce transmission, and protect against viral disease. These results were not consistent with the results of the present study. The possible reason for this inconsistency may be due to the age difference between the participants in the two studies. Participants in the study by Souli *et al.* were high school students who could access internet to acquire information on COVID-19, whereas participants of the present study were the general population.

Geldsetzer in the United States (2020) found out that more than 90% of people respected preventive measures against COVID-19 including wearing masks and washing hands. They had suitable performance. These results were

**Table 3: Relationship between the sociodemographic characteristic with performance of the mask in the Iranian general population (n=1843)**

Variable	Mean (SD)	P
Sex		
Female	38.57 (7.23)	0.22
Male	38.05 (7.05)	
Marital status		
Single	38.7 (7.23)	0.39
Married	38.36 (7.18)	
Medical group		
No	37.62 (7.09)	<0.001
Yes	39.29 (7.19)	
Family history		
No	38.24 (7.11)	0.03
Yes	39.13 (7.42)	
Education		
Diploma and less	36.69 (7.26)	<0.001
Advanced diploma	36.75 (6.6)	
Bachelor	37.75 (7.01)	
Master's degree	39.21 (7.52)	
Ph.D. degree	38.63 (6.81)	
Specialist and subspecialty	39.65 (7.17)	
Province of residence		
Tehran	38.28 (6.98)	0.65
Azerbaijan	38.37 (7.39)	
Other	38.65 (7.23)	
Have enough knowledge about the mask		
No	37.24 (6.9)	<0.001
Yes	39.54 (7.27)	
Access to mask		
Rarely	38.17 (7.31)	0.78
Sometimes	38.49 (7.14)	
Most of the time	38.58 (6.81)	
Always	38.51 (7.19)	
Job		
Specialist physician	37.67 (7.25)	<0.001
General practitioner	39.24 (7.38)	
Pharmacist	37.62 (7.1)	
Dentist	37.16 (6.53)	
Nurse or midwife	39.43 (6.99)	
Laboratory	38.18 (8.34)	
Other health disciplines	37.69 (7.31)	
Nonmedical	39.26 (6.78)	

SD=Standard deviation

not consistent with the results of the present study that showed poor-to-moderate Iranian general population performance regarding masks. Although crisis managers might have warned against the COVID-19 at early phase of the disease, the warning messages probably were not understood by the general population and ambiguous messages might have misled people.<sup>[23]</sup> Iranian society does not believe in the warnings of the authorities, which is evident in their current attitudes. They do not take serious preventive measures and do not reduce their social activities.<sup>[24]</sup> Probably, these factors have reduced the use of preventive orders among the general population.

Al-Hanawi *et al.*<sup>[25]</sup> in Saudi Arabia assessed general population knowledge, attitude, and performance regarding COVID-19. The questionnaire (23 items) used in the former study only dedicated one item (People should only wear a mask if they are infected with the virus, or if they are caring for someone with suspected SARS-CoV-2 infection) to the use of mask. More than two-third of the participants answered that question correctly. However, the present study specifically assessed knowledge and performance of Iranian people regarding the use of masks in both studies, men's participation was lower than women's, which may highlight the importance of paying attention to this group. The results of the present study found no statistically significant relationship between general population knowledge and performance in terms of gender. These results were not consistent with the results of the study by Al-Hanawi *et al.* This might be due to different questionnaires used in these two studies. Al-Hanawi *et al.* assessed general population knowledge and performance regarding COVID-19, whereas the present study specifically assessed the use of masks in prevention and transmission of the disease.

The strengths of the present study were specificity of the questions about the mask, relatively high sample size, and selection of a sample from the general population that increased the generalizability of the data to the entire population. The study was also carried out in the period that the United States and the Europe were not still affected by COVID-19. This can affect general population knowledge and performance regarding the mask.

One of the limitations of the present study was an electronic questionnaire that restricted accessibility of the questionnaire to those possessing smartphones. Since this was a descriptive study, general population knowledge and performance might be under the influence of culture and education. This was resolved by widespread distribution of the questionnaire in different populations with diverse cultures in Iran. Less than 500,000 people were infected with COVID-19 worldwide at time scope of the study when the disease was more prevalent in Asian countries. However, more than 10 million people were infected with the disease worldwide as soon as the results of the study were released. Complexity, difficulty, and extent of the COVID-19 are constantly increasing. The widespread use of masks is emphasized, especially in public places. Some countries imposed severe punishments for those who do not wear masks.

### Limitation and recommendation

In this study, an online questionnaire was used to collect data; therefore, generalizing the results to the whole community can be done with caution.

Educational package about how to use the mask and its benefits, through the media and health centers is recommended.

## Conclusion

The results showed poor-to-moderate knowledge and performance of majority of Iranian general population regarding the masks. Therefore, further effective training courses and action plans are needed in Iran given the importance of masks for prevention of COVID-19, especially in public places.

## Ethical approval

The project was approved by the ethics board of Ethics Committee of the deputy of Research and Technology of Tehran University of Medical Sciences (Code: IR.TUMS.VCR.REC.1399.143).

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## Conflicts of interest

There are no conflicts of interest.

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