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Face mask use among pedestrians during the COVID-19 pandemic in Northeast Iran: A survey on 223,848 pedestrians

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Abstract

Background: Despite the mass vaccination of people in countries, preventive health guidelines of coronavirus disease 2019 (COVID-19) are still one of the most critical factors for pandemic control. The objectives of this study were to assess the overall use of face masks and investigate the diverse kinds of face masks used among pedestrians in northeast Iran.

Methods: This cross-sectional study was designed in Torbat Heydariyeh, northeastern Iran, from February 19 to May 13, 2020. A total of 223 848 pedestrians were selected from 25 points of the city, using a multistage sampling method in 10 stages. Descriptive statistics were presented with frequencies and percentages. Chi-square test and Fisher exact test were used to assess the association between two categorical variables.

Results: The overall percent of face mask usage was 78.68%. Women used face masks considerably higher than men (88.32% vs. 69.02%, $P<0.001$). Among the male and female pedestrians who used the mask, 6.27% and 2.04% wore face mask incorrectly, respectively. Surgical masks (73.7%) were the most common face masks worn by pedestrians. Overall, the face mask usage was significantly lower during a.m. (88.34%) compared to p.m. (78.52%) ($P<0.001$). Also, the face mask usage was significantly higher in the center sections of the city (86.49%) compared to the outskirts (43.67%) ($P<0.001$).

Conclusion: Women use face masks significantly more than men. Using educational programs and establishing laws and regulations to prevent pandemics in cities is considered as a key factor.

Keywords: COVID-19, Pedestrians, Cross-sectional studies, Male, Female

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Introduction

Coronavirus disease 2019 (COVID-19), which is closely related to bat SARS-related coronaviruses (SARS-CoV-2) (1), is the second pandemic of the 21st century after influenza A H1N1 pandemic in 2009. Along with the epidemic surge due to globalization and international travel, the World Health Organization (WHO) declared the epidemic of the COVID-19 pandemic on March 11, 2020 (2,3). As of December 5, 2021, nearly two years since the first cases have emerged, COVID-19 has infected over 265 million people in over 200 countries and territories, of whom at least 5.2 million have died (4). Moreover, it has put the life and economy of many countries under extraordinary stress (5-7). SARS-CoV-2 transmits mainly from person to person through respiratory droplets and the route of contact (8). A person becomes infected when aerosols or droplets containing the virus created by the infected person while talking, sneezing or coughing are swallowed or come in direct contact with mucosal surfaces of a host (9-11). Asymptomatic and symptomatic people

can spread the virus. Significantly, there is an increasing sign that many COVID-19 cases are asymptomatic or pre-symptomatic persons, and they are estimated to be responsible for almost 95% of all viral transmissions (12,13). The viral load detected in the respiratory tract of such asymptomatic persons has been equivalent to that of symptomatic persons, suggesting similar potential for viral transmission (14-16). Because this group of patients can carry and spread the disease without any signs of disease, they are most important to the spread of the disease (13). Today, despite the ongoing vaccination against COVID-19 infection, lack of available vaccines in some regions, and frequent genetic changes in the virus strains make it necessary to consider non-pharmacological interventions (NPIs) such as social distancing measures, contact tracing, quarantine, lockdown, hand hygiene, and use of face masks (17-19). Some environmental factors might impact on virus transmission (16,20,21). Recent studies have demonstrated that using face masks following safe social distancing is the most effective strategy to control the spread of the virus (13).

As one of the critical factors for limiting the transmissibility of COVID-19, community-wide use of face masks is potentially of high value in curtailing the transmission of COVID-19 in the general public, as they may reduce the emission of coronavirus in airborne particles and respiratory droplets from individuals with subclinical or mild COVID-19 (22-24). At the beginning of the pandemic, the issue of community mass masking was controversial among authorities (25). Since January 5, 2020, the WHO expanded its recommendations for wearing masks and suggested that people wear masks in places where the virus is spreading, and it is difficult to maintain social distancing (26). Previous studies have found that using face masks in social settings reduces incidence, mortality, and hospitalization, or a combination of these effects (27). Another research shows that wearing a face mask reduces the risk of infection from 17.4% to 3.1% (28). Furthermore, studies in Denmark and Germany revealed the reduction of incidence and daily growth of COVID-19 by using a face mask (29,30). There are several types of masks available in the market, the efficacy of which is controversial. Surgical masks (also known as medical masks), respirators (also known as FFP2 or N95 masks), and non-medical masks (also known as fabric masks, homemade masks) are the most common kinds of masks (31). The use of medical masks and respirators is not recommended in public places. It is suggested for suspected subjects or confirmed cases of COVID-19, while the usage of non-medical masks in public areas is highly recommended (25). Since Iran is among the nations with the highest mortality and deaths caused by COVID-19, the law on wearing masks in public places and at work has been implemented (32,33). In recent studies, the use of masks among pedestrians has been investigated in one step. For example, in a cross-sectional survey in Ahvaz, southwest Iran, in August 2020, the use of masks was low among pedestrians (45.6%) (31). But in another observational study in Hong Kong pedestrians between 1-29 February 2020, the use of masks was reported 94.8% (34). The objectives of the present study were to assess the overall usage of face masks and investigate the diverse kinds of face masks used among pedestrians in Torbat Heydariyeh, northeast Iran.

Materials and Methods

Type of study

This population-based study was done during 83 days in 10 steps, from February 19 to May 13 2020 in Torbat Heydariyeh, northeastern Iran. A total of 223 848 pedestrians were selected from 25 points of the city. Face mask use in pedestrians was assessed via observation. Data collection was based on the visual observation of people in the street because the observation method is usually more accurate and more valid than the self-reporting approach for behavioral assessments. This study was approved by the Ethics Committee of Torbat Heydariyeh University of Medical Sciences.

Inclusion and exclusion criteria

Everyone walking in the street and passed over the target region was included in the study. Individuals who had covered their faces such that the observer could not detect whether the pedestrian wore the mask, were excluded from the study.

Study setting

Torbat Heydariyeh city is located in Razavi Khorasan province and eastern Iran. This city is the fourth populated city of Razavi Khorasan province. The city with an area of approximately 53 km^2 and with 140 019 population, according to the national census in 2016, is located (35.2798° N, 59.2161° E). Torbat Heydariyeh has a cold semi-arid climate. The mean temperature was reported 3.3–21.11°C during the study (Figure 1).

Data collection

In areas with high-resolution security cameras, these videos were used for 4 hours in the morning and 4 hours in the afternoon. The study supervisor set several training sessions to explain the principles of proper observation such as subject selection, checklist completion, and standardizing working method. To ensure the accuracy of data collection, two leading researchers continuously visited all days of the observers and checked some videos randomly. At the end of each day, data were recorded in the questionnaire online (Porsline) by observers, then, supervisors checked them and sent feedback if there was any problem. Sample points were chosen based on the urban divisions and proportional to the population size

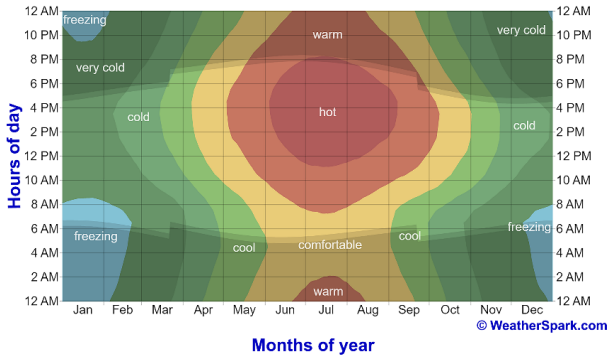

Figure 1. The heat map of the study area during months of the year and hours of the day.

living in each district. At each point, data were collected about gender, use of mask, type of face mask, correct use of face mask, time of day, and location. Insufficient face coverage, upside down or inside-out, mask-wearing was considered "incorrect" or "unacceptable" usage. The observation was usually performed during the rush hours of each area from 8.00 to 14.00 and 17.30 to 22.00.

Sample size and sampling method

To choose an appropriate sample size, the Cochran formula was used for estimating a population proportion. For this purpose, $\alpha = 0.05$, $P = 0.5$, $d = 0.05$, and a design effect equal to 1.6 were considered (31). A minimum sample size of 384 was calculated for each target point in the city; however, regarding the unequal extent of the districts and using a proportional sampling method, the final required sample size was estimated about 12000 pedestrians. In total, over 384 people from 25 urban and outskirt areas of the city were assessed in this study. The aggregated data in this research, the electronic questionnaire report number and percent of each variable, were used.

Statistical analysis

All statistical analyses were conducted using GraphPad Prism (version 6) and SPSS version 20. If normality (Kolmogorov-Smirnov test) was not statistically significant and for categorical variables, data were presented by frequencies and percentages. The prevalence of face mask was calculated with a 95% confidence interval (95% CI). The Chi-square test was applied to analyze the association between two categorical variables. The statistical significance was considered at $P < 0.05$.

Results

A total of 223848 pedestrians (50.59% female) were included in the 10 steps of the present study. Overall, 85.76% (95% CI, 85.62–85.91) of pedestrians used face mask. The majority of the face mask type was surgical (55.41%). 70.43% of the total population used the mask correctly. The descriptive characteristics and frequency of various groups among the studied subjects are reported in Table 1.

The prevalence rates of face mask use stratified by the steps are illustrated in Figure 2A. The lowest rate of face mask usage (40% for men and 67% women) was reported in the fourth step (21 March to 1 April 2021), and the highest one (86% for men and 95% women) was reported in the first step (19-25 February 2021). The lowest amount of mask use coincides with the Nowruz's beginning, ancient celebration and New Year holiday. In addition, mean positive cases and hospitalization number increased after three weeks decreases of face mask usage (Figure 2B).

Overall, the number of women who used face masks was significantly higher than men in all of steps (67.19-95.35% women vs 39.95-86.41% men, $P < 0.001$) (Table 2). In terms of mask type, most pedestrians in the city used surgical masks ($P < 0.001$).

It was also shown that the percentage of non-surgical masks used is more common among women (14.88-32.33% women vs 7.07-22.44% men, $P < 0.001$), which can be related to the personality and innate characteristics of women (Table 3).

Among the people who used the mask (Table 4), 2.60% wore face mask incorrectly. It was reported to be significantly lower in women than men (0.71-6.05% vs. 2.43-12.01%; $P < 0.017$).

The prevalence of face mask use by subjects in the center and outskirts of the city were remarkably different, so that the highest prevalence was found in the central areas and the lowest one was observed in the outskirt (86.49% and 43.67%), respectively (Table 1). The prevalence of face mask use was also different between male and female groups. It ranged between 26.80% to 86.42% for male and 57.80 to 85.03% for female (Tables 5 and 6).

Table 1. Baseline characteristics of the study population

Variable		n	%
Total population	-	223848	100
Gender	Male	110595	49.41
	Female	113253	50.59
Face mask use	Yes	191976	85.76
	No	31872	14.24
Type of face mask[a]	Surgical	124032	55.41
	Cloth mask	44549	19.90
	No mask	31872	14.24
How to use a face mask[a]	Correctly	157663	70.43
	Incorrectly	5825	2.60
Face mask use in different areas of city[a]	Center	171001	76.39
	Outskirts	16368	7.31
Face mask use in different parts of city	Center	147898	86.49
	Outskirts	7148	43.67
Face mask use in different timelines[a]	8 am-14 pm	123785	55.30
	15-23 pm	45359	20.26

[a] Some visits were not reported.

Table 2. The association between wearing mask factor and sex among pedestrians in the study

Step	Variable		Gender		χ2	*P* value
			Male	Female		
1	Wearing mask	Yes	5585 (86.41)	7744 (95.22)	352.41	<0.0001
		No	878 (13.59)	389 (4.78)		
2	Wearing mask	Yes	14909 (84.01)	13626 (95.35)	1045.77	<0.0001
		No	2837 (15.99)	664 (4.65)		
3	Wearing mask	Yes	13115 (77.64)	18074 (92.2)	1547.22	<0.0001
		No	3776 (22.36)	1529 (7.8)		
4	Wearing mask	Yes	4742 (39.95)	2760 (67.19)	908.7	<0.0001
		No	7127 (60.05)	1348 (32.81)		
5	Wearing mask	Yes	4156 (65.66)	5168 (92.45)	1251.12	<0.0001
		No	2174 (34.34)	422 (7.55)		
6	Wearing mask	Yes	11395 (76.29)	13494 (89.26)	887.45	<0.0001
		No	3541 (23.71)	1624 (10.74)		
7	Wearing mask	Yes	14397 (59.99)	15222 (86.98)	3609.54	<0.0001
		No	9603 (40.01)	2278 (13.02)		
8	Wearing mask	Yes	8751 (65.65)	10577 (86.34)	1479.66	<0.0001
		No	4578 (34.35)	1673 (13.66)		
9	Wearing mask	Yes	8677 (65.12)	9611 (85.42)	1320	<0.0001
		No	4648 (34.88)	1641 (14.58)		
10	Wearing mask	Yes	5304 (69.6)	5022 (92.85)	1039.7	<0.0001
		No	2317 (30.4)	387 (7.15)		

Table 3. The association between type of mask and sex among pedestrians in the study

Step	Variable		Gender		χ2	*P* value
			Male	Female		
1	Wearing mask	Surgical	4361 (78.08)	5119 (67.67)	173.3	<0.0001
		Non-surgical	1224 (21.92)	2446 (32.33)		
2	Wearing mask	Surgical	6340 (77.56)	7037 (66.68)	267.52	<0.0001
		Non-surgical	1834 (22.44)	3517 (33.32)		
3	Wearing mask	Surgical	10960 (85.97)	13306 (74.65)	581.93	<0.0001
		Non-surgical	1788 (14.03)	4518 (25.35)		
4	Wearing mask	Surgical	2856 (82.5)	3042 (72.02)	117.03	<0.0001
		Non-surgical	606 (17.5)	1182 (27.98)		
5	Wearing mask	Surgical	3262 (92.93)	3798 (85.12)	118.45	<0.0001
		Non-surgical	248 (7.07)	664 (14.88)		
6	Wearing mask	Surgical	8520 (83.27)	9754 (74.08)	283.9	<0.0001
		Non-surgical	1712 (16.73)	3412 (25.92)		
7	Wearing mask	Surgical	8520 (83.27)	9754 (74.08)	283.9	<0.0001
		Non-surgical	1712 (16.73)	3412 (25.92)		
8	Wearing mask	Surgical	5984 (83.18)	6750 (73.32)	226.13	<0.0001
		Non-surgical	1210 (16.82)	2456 (26.68)		
9	Wearing mask	Surgical	6260 (87.92)	6326 (76.77)	320.86	<0.0001
		Non-surgical	860 (12.08)	1914 (23.23)		
10	Wearing mask	Surgical	3393 (84.3)	3605 (74.84)	118.86	<0.0001
		Non-surgical	632 (15.7)	1212 (25.16)		

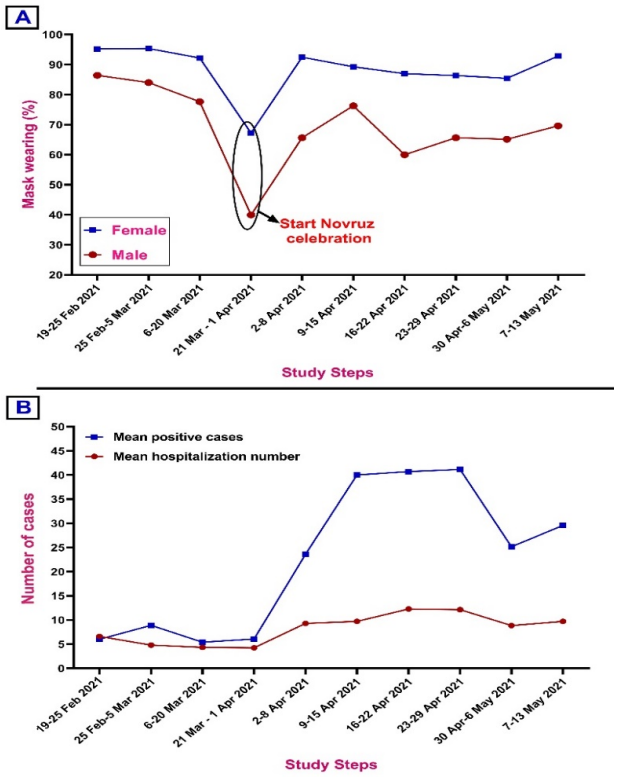

Figure 2. A) Changes in the distribution of people's wearing mask during the study; B) 7-day average of positive cases and hospitalization number of COVID-19 in the city.

Discussion

Currently, the COVID-19 pandemic in different countries has become a sinusoidal pattern that is controlled by implementing different strategies in different time periods. Despite vaccines and the provision of significantly effective treatments, personal hygiene, for example the use of face mask and social distancing, is still one of the most important strategies in all societies to prevent the spread of the disease (35). Several studies have considered social gatherings and public mobility due to various events such as celebrations, religious ceremonies, and elections, as one of the distinctive reasons for the outbreak of COVID-19 (36-39). For example, a study conducted in Bangladesh to analyze the transmission rate of COVID-19 during one of the largest festivals, showed that public mobility due to Eid-ul-Adha Festival led to an increase in the number of new COVID-19 cases during the next 2 weeks (36). In the present study, the fourth peak of the disease coincides with the Nowruz holidays (one of the Iranian national holidays), which increased visibility and reduced compliance with the health instructions. The findings of this study were supported by the results of another study conducted in Iran (40,41), which shows that the rate of infection has increased in a daily manner after the holidays; Nowruz worse the COVID-19 crisis in Iran. The findings of this study showed that the proportion of face mask usage

Table 4. The association between the status of wearing masks and sex among pedestrians in the study

Step	Variable		Sex		χ2	*P* value
			Male	Female		
1	Wearing mask	Correctly	4892 (95.27)	7237 (98.45)	110.17	<0.0001
		Incorrectly	243 (4.73)	114 (1.55)		
2	Wearing mask	Correctly	10985 (97.58)	8406 (99.29)	85.75	<0.0001
		Incorrectly	273 (2.42)	60 (0.71)		
3	Wearing mask	Correctly	12748 (93.28)	17824 (98.16)	490.93	<0.0001
		Incorrectly	918 (6.72)	334 (1.84)		
4	Wearing mask	Correctly	1494 (87.99)	870 (93.95)	23.9	<0.0001
		Incorrectly	204 (12.01)	56 (6.05)		
5	Wearing mask	Correctly	3510 (95.23)	4269 (98.93)	101.36	<0.0001
		Incorrectly	176 (4.77)	46 (1.07)		
6	Wearing mask	Correctly	10232 (92.87)	13166 (98.2)	426.01	<0.0001
		Incorrectly	786 (7.13)	242 (1.8)		
7	Wearing mask	Correctly	10232 (92.87)	13166 (98.2)	426.01	<0.0001
		Incorrectly	786 (7.13)	242 (1.8)		
8	Wearing mask	Correctly	7194 (94.06)	9206 (98.1)	192.43	<0.0001
		Incorrectly	454 (5.94)	178 (1.9)		
9	Wearing mask	Correctly	7120 (93.54)	8240 (98.78)	304.96	<0.0001
		Incorrectly	492 (6.46)	102 (1.22)		
10	Wearing mask	Correctly	4025 (94.88)	4817 (97.59)	47.32	<0.0001
		Incorrectly	217 (5.12)	119 (2.41)		

Table 5. The association between wearing mask and sex (female) in different places among pedestrians in the study

Step	Variable		Mask		χ2	*P* value
			Yes	No		
1	Wearing mask	Center	7676 (95.39)	371 (4.61)	49.76	<0.0001
		Outskirts	68 (79.07)	18 (20.93)		
2	Wearing mask	Center	13558 (95.38)	656 (4.62)	50.66	<0.0001
		Outskirts	68 (79.07)	18 (20.93)		
3	Wearing mask	Center	17824 (92.31)	1485 (7.69)	21.31	<0.0001
		Outskirts	250 (85.03)	44 (14.97)		
4	Wearing mask	Center	1887 (92.00)	164 (8.00)	106.31	<0.0001
		Outskirts	873 (79.29)	228 (20.71)		
5	Wearing mask	Center	4724 (86.71)	724 (13.29)	59.33	<0.0001
		Outskirts	91 (64.08)	51 (35.92)		
6	Wearing mask	Center	13210 (89.36)	1573 (10.64)	12.56	0.0003
		Outskirts	284 (84.78)	51 (15.22)		
7	Wearing mask	Center	14349 (92.92)	1094 (7.08)	259.47	<0.0001
		Outskirts	873 (79.29)	228 (20.71)		
8	Wearing mask	Center	9377 (94.77)	518 (5.23)	2278.49	<0.0001
		Outskirts	1200 (57.80)	876 (42.20)		
9	Wearing mask	Center	8411 (94.54)	486 (5.46)	2089.24	<0.0001
		Outskirts	1200 (57.80)	876 (42.20)		
10	Wearing mask	Center	4817 (93.26)	348 (6.74)	29.98	<0.0001
		Outskirts	205 (84.02)	39 (15.98)		

Table 6. The association between wearing mask and sex (male) in different places among pedestrians in the study

Step	Variable		Mask		χ2	*P* value
			Yes	No		
1	Wearing mask	Center	5401 (86.42)	849 (13.58)	0.0002	0.9999
		Outskirts	184 (86.38)	29 (13.62)		
2	Wearing mask	Center	14725 (88.65)	1886 (11.35)	1.0659	0.31
		Outskirts	184 (86.38)	29 (13.62)		
3	Wearing mask	Center	12748 (78.49)	3493 (21.51)	174.76	<0.0001
		Outskirts	367 (56.46)	283 (43.54)		
4	Wearing mask	Center	5518 (65.54)	2901 (34.46)	292.78	<0.0001
		Outskirts	1841 (84.49)	338 (15.51)		
5	Wearing mask	Center	4000 (69.59)	1748 (30.41)	429.04	<0.0001
		Outskirts	156 (26.8)	426 (73.2)		
6	Wearing mask	Center	10756 (78.47)	2952 (21.53)	435.25	<0.0001
		Outskirts	639 (52.04)	589 (47.96)		
7	Wearing mask	Center	11496 (80.34)	2814 (19.66)	616.29	<0.0001
		Outskirts	5518 (65.54)	2901 (34.46)		
8	Wearing mask	Center	7356 (82.67)	1542 (17.33)	491.25	<0.0001
		Outskirts	2583 (64.93)	1395 (35.07)		
9	Wearing mask	Center	7282 (81.88)	1612 (18.12)	440.73	<0.0001
		Outskirts	2584 (64.93)	1396 (35.07)		
10	Wearing mask	Center	4025 (80.07)	1002 (19.93)	703.95	<0.0001
		Outskirts	1315 (50.69)	1279 (49.31)		

among pedestrians in the streets of Torbat Heydariyeh was high (85%). This finding is consistent with the findings of studies done in Pakistani and USA, which shows that the use of face masks is 85.8% and 85.5% respectively (42,43). However, it is higher than the rate reported in several studies conducted in Iran, 45.6% (31), South Korea, 63.2% (44), Nigeria, 46.4% (45), the USA, 41% (46), Ethiopia, 54.68% (47), and Poland, 60.4% (48). On the other hand, the mean proportion of face mask in the present study is lower than that reported in studies conducted in Hong Kong, 96.6% (49), Malaysia, 96.9% (50), China, 99.7% (51), and Ugandans 95.2% (52). The differences in the rate of face mask use can be attributed to the method of data collection, study period, the outbreak rate of the disease, the cultural characteristics related to adherence to health practices, the financial status of families in providing masks, policy of the governments about mass masking, or even the normalization of the disease in community (31,47,53). The results of the present study also showed that reducing the use of masks at levels less than 80% was associated with the increased incidence and outbreak of the disease. The decreasing trend in the use of masks by pedestrians in Torbat Heydariyeh during the period, which indicates a behavioral change, might be attributed to a decreased public concerns about the pandemic over time (54-56). In addition, less strict supervision, and inappropriate/impractical enforcement rules may also be involved in the rapid reduction of compliance rates (18,57-59). Significantly, the results of this study indicated that women use face mask more often than men, which is consistent with the results of previous studies (31,46,60,61). This can be due to a variety of reasons. Women consider the COVID-19 pandemic more than men as a serious health problem. Accordingly, women compared to men show better adherence to preventive measures such as mask wearing (62). On the other hand, women handle most of caregiving within families, so it is more likely to protect themselves, family members and others around them by the use of face mask (46).

In the present study, the majority of pedestrian were using surgical face masks, followed by cloth face masks and N95 face masks (rarely), which is consistent with the results of other studies in Iran (31), Hong Kong (63), Malaysia (50) and China (51). Conversely, Natnael et al (47) and Ganczak et al (18) reported that the majority of the participants were wearing cloth mask. The possible reasons for the higher proportion of medical masks in the present study area might be due to the relatively low cost of medical masks as well as the availability of this type of mask in the city. Notably, the use of cloth mask was significantly higher in women. This could be due to the fact that women normally are more concerned about their appearance, thus, they tend to buy items that look attractive. Cloth masks are more attractive options for women than surgical masks due to their variety of signs or symbols, motifs and colors. In the other words, women consider masks not only as a tool to support health as the main factor but also as a tool that must have a fashion function (64). Restricting the spread of the SARS-CoV-2 is not just by wearing a mask, but also wearing it correctly is important in controlling and preventing the COVID-19 pandemic (65). In this study, it was shown that wearing mask correctly in women was significantly higher than that in men (97.96% vs 93.76%). The findings of the present study are consistent with the results of studies in Iran (31), Japan (66), and Bangladesh (67), where the percentage of women who wear face mask correctly was higher than men. Gender gaps in correct mask practices may be due to more strict consideration of health procedures by female (31). Hence, educational plans are necessary to adopt preventive strategies for COVID-19 among the male population (68). In this respect, health information can be provided for women (i.e., wives, sisters, and mothers) who live with men, and this may influence men's practices (69).

The results of this study showed that the use of face masks had higher rates during morning in comparison to afternoon, which is consistent with the results of previous studies (31,49,67). It is evident that the approach to mask wearing in public places depends on the recommendation of health authorities (51). In Iran, the use of face mask in public places, governmental/organizational offices and banks is mandatory (31), and due to the fact that most government offices and banks provide services in the morning (8 am to 15 am), it can be the reason for high compliance to face mask usage throughout the morning. It should be mentioned that, during the SARS epidemic in 2003, researchers found that moderate levels of anxiety could be associated with an increased likelihood of the adoption of precautionary measures (69). In other words, negative feelings are associated with protective behaviors and may help keep general public safe during the SARS-CoV-2 pandemic (70). Hence, because the city is busier in the morning, people may be more afraid of getting COVID-19, so they wear more masks. Climatic conditions, especially warm and hot weather, is another factor that can lead to less use of the mask among pedestrians (31). Some previous studies showed high amounts of air pollution elements during lockdown (71,72). Torbat Heydariyeh also has several warm hours in noon and afternoon (Figure 1), which could be the reason for not being able to wear masks throughout the day at the time of the study. People in the suburban areas wearing masks significantly less than those in the city center. Previous studies have also shown similar results (31,45,67). However, a study conducted in the USA among shoppers reported that mask wearing habits are similar in urban and suburban areas (46). The differences in mask use between urban and suburban areas that were observed in the present study could be somehow associated with the socio-economic status and cultural characteristics in

suburban residents versus urban ones, such as low literacy levels, low purchasing power, inaccessibility of mask, and lack of fear regarding COVID-19 transmission (31,67). The promotion of the use of masks was greater in the urban areas of the city. People living in urban areas have usually greater health literacy and stronger consciousness of protection, and generally, adopt those health habits that are related to their health such as wearing mask. On the other hand, there is more traffic in the central areas of the city, in which people travel outside more frequently, so they prefer to use a face mask more (73).

Conclusion

According to the results of the present study, the overall rate of face mask usage in the center of city was fairly higher especially in women. Women use face masks significantly more than men. Furthermore, the incorrect use of masks in male pedestrians was remarkably higher than that in female ones. The use of educational programs and establishing laws and regulations governing to prevent pandemic in cities are considered as key factors.

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Ethical issues

As the data collection method was observation and there were no human participants in the present study, obtaining informed consent was deemed unnecessary according to the regulations. The protocols of the present study were approved by the Ethics Committee of Torbat Heydariyeh University of Medical Sciences (Ethics code: IR.THUMS.REC.1399.007).

Competing interests

The authors declare that they have no conflict of interests.

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