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International review for spatial planning and sustainable developmentt A: Planning Strategies and Design Concepts, Vol 9 No.4 (2021), 31-49
ISSN: 2187-3666 (online)
DOI: http://dx.doi.org/10.14246/irspsd.9.4_31

Cooperation of ordinary citizens with urban management in the third wave of Covid-19 outbreak in Iran

Based on personal and socioeconomic characteristics of citizens

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Received*: December 2, 2020;* Accepted*: June 15, 2021*

Key words: Covid-19 Pandemic, Citizen Behavior, Citizen Cooperation, Social Distancing Restrictions, Adherence

Abstract: In response to the Covid-19 outbreak, nations worldwide imposed various restrictions on their citizens in an attempt to stem its spread. One underlying aspect of the success of these policies is people's adaptation to epidemics and their continuous cooperation with urban management to adhere to precautionary measures. Otherwise, the disease incidence and death rates in the countries will not decrease. The situation that has occurred in Iran since the beginning of September and a sudden rise has put this country at the top of the daily reported deaths of Covid-19 (in proportion to the population) in October and November. Thus, this study will focus on two important Iranian metropolises (Tehran and Karaj) to understand: 1) What is the level of citizens' cooperation in complying with Covid-19-related precautionary measures? 2) How has the level of citizens' precautionary behaviors changed compared to the early days of the outbreak? 3) Is there a correlative relationship between citizens' personal and socioeconomic characteristics and their level of cooperation in this period? This cross-sectional study is based on online surveys (completion of 667 online questionnaires by ordinary citizens living in Tehran and Karaj). Findings show the participation of 30.3% in implementing all precautionary measures, with women, high-income groups, unemployed people, and those without a history of Covid-19 infection having a higher odds ratio than others. In terms of citizens' behavior, 21% have reduced their level of cooperation in this area, which is correlated with their personal and socioeconomic characteristics (except their city of residence).

1. INTRODUCTION

Following the first reports of Covid-19 infection in December 2019 in Wuhan, China, the world has faced a new challenge that requires the cooperation of all nations and relevant international organizations, as well as the solidarity and participation of all members of society (Kluge, 2020). In this regard, the World Health Organization (WHO), as one of the most related organizations, since the beginning of the outbreak (WHO, 2020d), has published various articles on raising public awareness about the nature of the virus, its signs and symptoms (WHO, 2020f), and daily and weekly statistics of new cases and deaths in the world (WHO, 2020c, 2020i). WHO

(2020g, 2020h) has also provided specific guidelines for public use on how to take personal care of the disease, including avoiding indoors or crowded spaces, maintaining physical distance, wearing a mask in the presence of others, personal hygiene (handwashing, no hand contact with eyes and mouth, and covering mouth and nose when sneezing or coughing), disinfection of surfaces, and staying home in case of illness.

Simultaneously with this increase in public awareness, countries worldwide have taken various precautionary measures to control the epidemic since its beginning. In recent months, the severity of these measures has been increased or decreased in line with the disease's changing local epidemiology (WHO, 2020b). These measures vary from country to country and include a wide range of care, behavioral, and spatial recommendations or restrictions. However, the main factor in determining the long-term effectiveness or ineffectiveness of these policies worldwide is the extent to which they are performed by the general public (Kamenidou, Stavrianea, & Liava, 2020). The most crucial factor in overcoming this crisis is how well citizens have been able to adapt their lifestyles and individual and civic behaviors in urban areas to the epidemic conditions, challenges, and limitations. This is why, despite all the measures taken by governments, the global incidence of Coronavirus is still on the rise (WHO, 2020e). As of November 16, 2020, the global number of reported cases has reached about 54.4 million, with almost 1.3 million deaths (WHO, 2020i).

Accordingly, some researchers have looked into the extent of citizens' adherence to health recommendations and compliance with restrictions in various countries, including Australia (Murphy et al., 2020)，Brazil (de Araujo et al., 2020), China (Zhong et al., 2020), Croatia (Lauri Korajlija & Jokic‐Begic, 2020), Ecuador (Bates et al., 2020), Greece (Kamenidou, Stavrianea, & Liava, 2020), Indonesia (Indartono, Asaduddin, & Soraya, 2020), Italy (Graffigna et al., 2020), Japan (Machida et al., 2020a; Machida et al., 2020b; Muto et al., 2020), South Korea and Kuwait (Al-Hasan, Yim, & Khuntia, 2020), Taiwan (Chang et al., 2020), United Kingdom (Geldsetzer, 2020), and United States (Al-Hasan, Yim, & Khuntia, 2020; Geldsetzer, 2020). The GallupInternationalAssociation (2020) also conducted a snap poll in 28 countries (a total of 24,652 people).

These studies indicate that citizens of most countries have complied with many of the recommendations and restrictions in the first phase of the outbreak. But a limited number of them are bound to follow all of these health and care tips. Their cooperation over time and in the later phases of the outbreak has also changed because of various factors, requiring further study, especially in countries like Iran, where the incidence rate is still increasing.

1.1 The Covid-19 outbreak in Iran

Iran’s Ministry of Health and Medical Education (MHME) reported Coronavirus's first case on February 19, 2020, in Qom (MHME, 2020d). Subsequently, the government changed the country's state from "normal" to "endangered" on February 22, 2020. Then measures such as closing schools, universities, and student dormitories across the country, prohibiting the presence and activity of infected people in the workplace or public spaces, and communication of WHO health guidelines (2020h) to high-risk businesses were done. Jobs and activities were divided into four levels based on their necessity (MHME, 2020c). Also, a national system called the Corona Disease Self-Assessment System was designed to record people's

health (MHME, 2020a). In response to an upturn in Covid-19 statistics, the government imposed the first two-week public quarantine on March 20. Only 1st level jobs (mainly including medical services, law enforcement, and uses to meet individuals' daily needs) were allowed to operate in this period. At the end of the two-week quarantine, almost all jobs returned to their regular status to prevent the country's economy from collapsing. This led to a recurrence of daily Covid-19 statistics in May and June (WHO, 2020i; Worldometers, 2020). Then by enforcing measures such as making masks mandatory, prohibiting gatherings and mass weddings or funerals, encouraging office workers to work remotely, closing shopping malls and indoor entertainment centers after 6 p.m., and setting limits and financial penalties for long-distance travel on weekends and holidays (MHME, 2020b), they kept this trend somewhat stable in July and August. But since early September, the trend has picked up again so rapidly that, as shown in *Figure 1*, the country's daily statistics raised from 3,574 new cases and 63 deaths on June 5 to 13,053 new cases and 486 deaths on November 16 (WHO, 2020i; Worldometers, 2020).

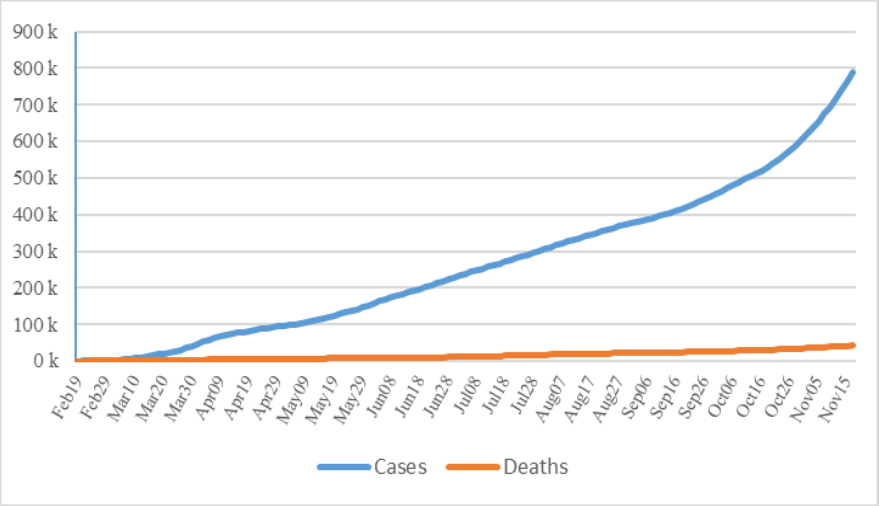

Figure 1. Frequencies of total Covid-19 cases and deaths in Iran (from February 6 to November 16) (Raw data extracted from WHO, 2020i)

This period is known as the third wave of the Covid-19 outbreak in Iran. In the weeks before its onset, it was forecast by the government as being a period in which the severity of the disease's morbidity and mortality would be significantly higher than previous waves, and the government would face more severe challenges (Raouf, 2020; Younesian, 2020). In accordance with officials, the study and comparison of citizens' behavior over the days leading up to this period shows the normalization of people's behavior towards Coronavirus and their negligence in following health protocols (Haghdoost, 2020; Hosseini et al., 2020; IRIBNewsAgency, 2020).

In this regard, the present study intends to investigate the level of citizens' cooperation in complying with government and urban management restrictions to deal with Covid-19 in the third phase of the outbreak in Iran. Two important metropolises of Iran (Tehran and Karaj), both identified as Red Zones in most weeks (MHME, 2020e), were selected as case studies. Consequently, this research aims to answer the following questions;

- What is the level of citizens' cooperation in complying with the precautionary measures related to Covid-19 in the third phase of the outbreak?

- How has the level of citizens' adherence to the government's precautionary measures changed compared to the first and second waves of the Covid-19 outbreak in Iran?

- Is there a correlative relationship between citizens' personal and socioeconomic characteristics and their level of cooperation in this period?

Since this research emphasizes the importance of citizens' participation in pandemic situations, it has significant theoretical value. Other researchers can also use it as a framework to take more specialized steps in educating citizens about cooperative behavior based on their influential individual characteristics.

2. LITERATURE

The need for citizen cooperation is one of the strategies that has been repeatedly recommended in both the academic and executive spheres. Because this participation can increase government transparency, lead to better results at a lower cost, and contribute significantly to the government's success in advancing affairs (OECD, 2019). It also has several benefits for citizens: strengthening the senses of citizenship, usefulness, trust in the government, and equality in society (Baum, 2015). For this reason, to sustainably develop cities, governments must provide appropriate conditions to encourage citizens' participation in urban affairs (Behnamifard, F., Ahmady, & Shokri, 2021; Zanudin, Ngah, & Misnan, 2019). Citizens will also feel a sense of duty to obey the rules and a willingness to cooperate with the institution if they feel that an institution is acting following a common moral purpose (Jackson et al., 2012). The type and level of this participation are different in various geographical and cultural contexts and are influenced by the individual (Simonofski et al., 2021; Alelaimat, 2019; Dawson-Townsend, 2019; Naud et al., 2019; Tomioka, Kurumatani, & Hosoi, 2017; Baum, 2015; Jackson et al., 2012; Restall & Kaufert, 2011; Campbell, 2006), social (Baum, 2015; Restall & Kaufert, 2011; Tyler & Darley, 1999), and environmental factors (Simonofski et al., 2021; Restall & Kaufert, 2011; Tyler & Darley, 1999).

In times of crisis, citizen participation is considered an integral part of society's ability to overcome various dangers and disasters (Lee, 2017; Sitko & Massella, 2019; Tsai et al., 2021). Consequently, the need for this participation has been explored during various crises, including natural disasters (Rood, 2012; Van Krieken, Kulatunga, & Pathirage, 2017), as well as pandemic times such as the Ebola outbreak (Dewulf et al., 2020; Parker et al., 2019; IFRCRCS, 2017). Due to the outbreak of Covid-19, the current pandemic situation is not exempt from this need and can only be addressed through collective participation (Antonides & van Leeuwen, 2020; Kamenidou, Stavrianea, & Liava, 2020). Due to the severity of this pandemic, which stands out compared to previous crises, the greatest lesson we've learned is that all members of society must make an effort to get through this situation, so we cannot rely solely on government action in this regard (Antony, 2020). Studies in the Covid-19 pandemic era show that, first, citizens, in addition to their personal interests and health concerns, observe precautionary measures because of normative concerns about their social duty to society (Murphy et al., 2020). Second, various factors, including the citizen's characteristics (Bates et al., 2020; Chang et al., 2020; de Haas, Faber, & Hamersma, 2020; Kamenidou, Stavrianea, & Liava, 2020; Lauri Korajlija & Jokic - Begic, 2020; Machida et al., 2020a; Machida et al.,

2020b; Murphy et al., 2020; Muto et al., 2020; Zhong et al., 2020; Przybylowski, Stelmak, & Suchanek, 2021), knowledge and awareness (Al-Hasan, Yim, & Khuntia, 2020; Bates et al., 2020; Indartono, Asaduddin, & Soraya, 2020; Murphy et al., 2020; Zhong et al., 2020; Zarei et al., 2021), attitude (Bates et al., 2020; Zhong et al., 2020), and their trust (Al-Hasan, Yim, & Khuntia, 2020; Graffigna et al., 2020; Murphy et al., 2020; Pramiyanti et al., 2020), have influenced their participation and cooperation in this field.

Thus, a literature review shows that citizens' willingness to participate and cooperate with the government, both in ordinary and in pandemic conditions, is influenced by their personal characteristics. *Table 1* summarizes previously discovered effective personal characteristics in this field.

Table 1. Personal characteristics affecting citizens' cooperation/participation

Categories	Author(s), date	Effective personal characteristics (findings)
Studies related to citizens' cooperation/participation (in pandemic era)	Przybylowski, Stelmak, et al., 2021	Gender, age, socio-economic status, place of residence
	Bates, Moncayo, et al., 2020	Gender, age-grouping, marital status, education, occupation, residence
	Chang, Strong, et al., 2020	Gender, age, education, major disorder diagnosis
	de Haas, Faber, et al., 2020	Gender, age, main occupation, education, urban density, household composition
	Kamenidou, Stavrianea, et al., 2020	Gender, age, marital status, children (<18) in family, education, profession, area of residence, net monthly personal income
	Korajlija and Jokic-Begic, 2020	Gender, number of children, chronic health condition, old parents, living grandparents
	Machida, Nakamura, et al., 2020a, 2020b	Sex, age, marital status, working status, living arrangement, smoking status, residential area, educational attainment, household income
	Murphy, Williamson, et al., 2020	Gender, age, country of birth, educational attainment, employment, ethnicity, political affiliation, general anxiety/fear
	Muto, Yamamoto, et al., 2020	Gender, age group, marital status, education, employment status, household annual income, smoking habit, drinking habit, personality traits
	Zhong, Luo, et al., 2020	Gender, age-group, marital status, education, occupation, place of current residence
Studies related to citizens' cooperation/participation (in general)	Simonofski, Vallé, et al., 2021	Age, education, employment
	Alelaimat, 2019	Gender, age, family income, regional affiliation
	Dawson-Townsend, 2019	Gender, age, marital status, education, household income, employment, residence, health problems
	Naud, Généreux, et al., 2019	Gender, age, annual gross household income, education, employment, living situation, immigration, chronic disease
	Baum, 2015	Age, education, income, race, ethnic, personal confidence
	Campbell, 2006	Gender, age, education, household income
	Tomioka, Kurumatani, et al., 2017	Gender, age

3. METHODOLOGY

3.1 Sampling and data collection

This cross-sectional study was conducted by distributing an online questionnaire to citizens of Tehran and Karaj. First, a detailed questionnaire was designed based on the "coronary restrictions" set by the Government of Iran (MHME, 2020b, 2020c) and the "advice for the public" provided by the WHO (2020h). Other studies have also used WHO-recommended advice for personal care to develop their questionnaire (Kamenidou, Stavrianea, & Liava, 2020; Machida et al., 2020a; Machida et al., 2020b). The designed questionnaire was tested by a pilot sample (50 people) and prepared for distribution in the statistical community by some minor changes. The questionnaire's public link was provided to the citizens via email and social network apps widely used in Iran (WhatsApp, Telegram, Instagram, and Twitter). It was active for five days (from October 27 to November 1). At the end of the fifth day, 803 questionnaires were completed. Fifty-nine of which were excluded due to missing data. Twenty-six questionnaires were completed by citizens living in other cities (except Tehran and Karaj), also excluded from the study. Fifty-one questionnaires were completed by health care workers or medical graduates and students, which were also excluded from the study due to the focus of the present research on ordinary citizens' behavior. Finally, 667 questionnaires remained for further review.

3.2 Measures

First, individual variables (personal characteristics) were selected based on previous research (presented in *Table 1*). A questionnaire of 23 questions was then designed in three sections. In the first section, the respondents expressed their eight individual and socioeconomic characteristics, including gender, age, marital status, city of residence, history of Covid-19 infection, education, work status, and household income level.

In the second section, the level of people's cooperation in adherence to three types of precautionary measures was examined, which were: Personal hygiene (wearing a mask when in public, handwashing, covering mouse while sneezing or coughing, and avoid touching eyes, nose, and mouth), Social distancing (avoid closed public spaces, compliance with physical distancing, and avoid closed public spaces), Self-isolation (staying home in case of sickness, avoid unnecessary traveling, and compliance with remote working or lockdown situation), and Getting informed (by reliable sources). People were asked about the frequency of implementation during the last two months and responded using a five-point Likert scale (1=Never, 2=Rarely, 3=Sometimes, 4=Most of the time, and 5=Always). Various authors in previous studies have used this scale in their questionnaires (Al-Hasan, Yim, & Khuntia, 2020; GallupInternationalAssociation, 2020; Graffigna et al., 2020; Lauri Korajlija & Jokic - Begic, 2020; Muto et al., 2020). Regarding the issue of "staying home in case of sickness", people were asked, "In the last two months, how much have you been confined to staying home and not leaving when you had the disease or suspected symptoms?" And the options included six items (0=These conditions did not occur to me, 1=Never, 2=Rarely, 3=Sometimes, 4=Most of the time, and 5=Always). To measure the extent to which citizens avoided unnecessary travel, they were asked, "How many times in the past two months have you

gone on recreational or unnecessary travel?" And the answers were selectable from five options: (1=More than three times, 2=Three times, 3=Twice, 4=Once, and 5=Not at all). Regarding the "compliance with remote working or lockdown situation", the extent of compliance with this restriction was asked of citizens, whose options were six items (0=I am not employed/Restrictions do not include my job, 1=Very low, 2=Low, 3=Medium, 4=High, and 5=Very high).

In the third section, citizens were first asked, "In your opinion, how has the level of your adherence to the precautionary measures changed compared to the early months of the corona outbreak in Iran?" And the answers were selectable in a five-point Likert scale (1=Decreased a lot, 2=Decreased somewhat, 3=Not changed, 4=Increased somewhat, and 5=Increased a lot). Citizens were then asked an open-ended question to type the reasons for this behavior change if they wished. Then they were asked about their level of satisfaction with government actions against the Covid-19 and responded using a five-point Likert scale (1=Very low, 2=Low, 3=Medium, 4=High, and 5=Very high). At last, in an open question, citizens were asked, "What are your suggestions for improving the situation?".

3.3 Data analysis

Data were analyzed using the IBM SPSS ver.26. First, the percentages, frequencies, mean scores, and standard deviations were extracted (in response to the first and second research questions). Then to examine the correlation between personal and socioeconomic factors with the level of citizens' cooperation in complying with precautionary measures, as in some previous studies (Bates et al., 2020; Graffigna et al., 2020; Machida et al., 2020a; Machida et al., 2020b; Muto et al., 2020). Multivariate logistic regression analysis was used (in response to the third research question). To implement it, first of all, "Implementation of all precautionary measures" (No/Yes) was considered as a dependent variable. In this regard, for participants who chose 5 (=Always) or 4 (=Most of the time) for all items of precautionary measures, it was determined that all of the precautionary measures were implemented. Secondly, for a better interpretation of the odds ratios, the independent variables (personal and socioeconomic factors) entered the regression model as qualitative (binary) variables, including gender (male/female), age (persons <35 or +35), marital status (single/ married), city of residence (Tehran/Karaj), education (without university degree/university graduate or above), work status (unemployed/employed), household income level (≤ 6 million tomans or > 6 million tomans), and history of Covid-19 infection (yes/no).

To investigate the correlation between personal and socioeconomic factors with the level of citizens' behavioral change in implementing precautionary measures compared to the early months of the outbreak in Iran, following other studies (Graffigna et al., 2020; Kamenidou, Stavrianea, & Liava, 2020). Chi-square test was used (in response to the second research question).

4. RESULTS

4.1 Characteristics of participants

Table 2 shows the descriptive statistics of the participants, which out of 667, more than 72% are women, and 43% were young people aged 25 to 34 years. While the participants <18 and +55 were underrepresented. Also, married people and residents of Karaj made up about 51% and 58% of the participants, respectively. Their education level was often high, and only 15.5% did not have a university degree. Private sector employment dominated among participants (33.4%) or students (25.5%), and the household income of 70.4% of the respondents were < 6 million tomans. Also, a significant percentage of participants (42.7%) had a history of Covid-19 infection since the beginning of the outbreak.

Table 2. Characteristics of participants

	Categories	Frequencies (n)	Percentages (%)
Gender	Male	185	27.7
	Female	482	72.3
Age	< 18	10	1.5
	18-24	162	24.3
	25-34	284	42.6
	35-44	121	18.1
	45-54	73	10.9
	55+	17	2.5
Marital status	Single	327	49.0
	Married	340	51.0
City of residence	Tehran	283	42.4
	Karaj	384	57.6
Education	High school or below	24	3.6
	Diploma	80	11.9
	BA., BSC	302	45.3
	MA., MSC.	207	31.0
	Ph.D.	54	8.1
Work status	Without job	149	22.3
	Student	170	25.5
	Retired	25	3.7
	Employed in private sector	223	33.4
	Employed in public sector	100	15.0
Household income level	< 3 million	229	34.3
	3.01 – 6 million	241	36.1
	6.01 – 9 million	150	22.5
	+ 9 million	47	7.0
History of Covid-19 infection	Yes	285	42.7
	No	382	57.3

4.2 Descriptive statistics on the implementation of precautionary measures

Table 3 provides descriptive statistics related to the level of implementation of each of the precautionary measures. The highest levels of implementation were related to "wearing a mask when in public" (MS = 4.74), "handwashing" (MS = 4.51), and " covering mouse while sneezing or coughing " (MS = 4.43), respectively. The lowest levels of implementation were related to "getting information from reliable sources" (MS = 3.75), "compliance with remote working or lockdown situation" (MS = 3.79), and "compliance with physical distancing" (MS = 3.81). Concerning "staying home in case of sickness", participants who chose (0 = these conditions did

not occur to me) and also in the case of the item "compliance with remote working or lockdown situation", those who selected (0 = I am not employed/Restrictions do not include my job) were excluded.

Table 3. Percentages and frequencies of citizens' compliance with each of precautionary measures against Covid-19, their satisfaction with the government's actions, and their change of behavior

	Measures	N	1 n (%)	2 n (%)	3 n (%)	4 n (%)	5 n (%)	Mean (SD)
Personal hygiene	Wearing a mask when in public	667	2 (.3)	7 (1.0)	18 (2.7)	110 (16.5)	530 (79.5)	4.74 (.589)
	Hand washing	667	5 (.7)	7 (1.0)	39 (5.8)	211 (31.6)	405 (60.7)	4.51 (.722)
	Covering mouse while sneezing or coughing	667	6 (.9)	35 (5.2)	41 (6.1)	168 (25.2)	417 (62.5)	4.43 (.890)
	Avoid touching eyes, nose, and mouth	667	5 (.7)	35 (5.2)	109 (16.3)	286 (42.9)	232 (34.8)	4.06 (.887)
Social distancing	Avoid closed public spaces	667	4 (.6)	23 (3.4)	95 (14.2)	349 (52.3)	196 (29.4)	4.06 (.791)
	Compliance with physical distancing	667	6 (.9)	56 (8.4)	135 (20.2)	331 (49.6)	139 (20.8)	3.81 (.891)
	Avoid crowded public spaces	667	3 (.4)	23 (3.4)	78 (11.7)	275 (41.2)	288 (43.2)	4.23 (.821)
Self-isolation	Staying home in case of sickness	381	3 (.8)	1 (.3)	43 (11.3)	124 (32.5)	210 (55.1)	4.41 (.761)
	Avoid unnecessary traveling	667	25 (3.7)	23 (3.4)	51 (7.6)	131 (19.6)	437 (65.5)	4.40 (1.025)
	Compliance with remote working or lockdown situation	423	33 (7.8)	39 (9.2)	68 (16.1)	127 (30.0)	156 (36.9)	3.79 (1.249)
Getting information from reliable sources		667	45 (6.7)	46 (6.9)	136 (20.4)	247 (37.0)	193 (28.9)	3.75 (3.75)
Satisfaction with government's actions		667	379(56.8)	156 (23.4)	117 (17.5)	12 (1.8)	3 (.4)	1.66 (.860)
Changes in the precautionary behaviors		667	54 (8.1)	86 (12.9)	377 (56.5)	83 (12.4)	67 (10.0)	3.03 (.990)

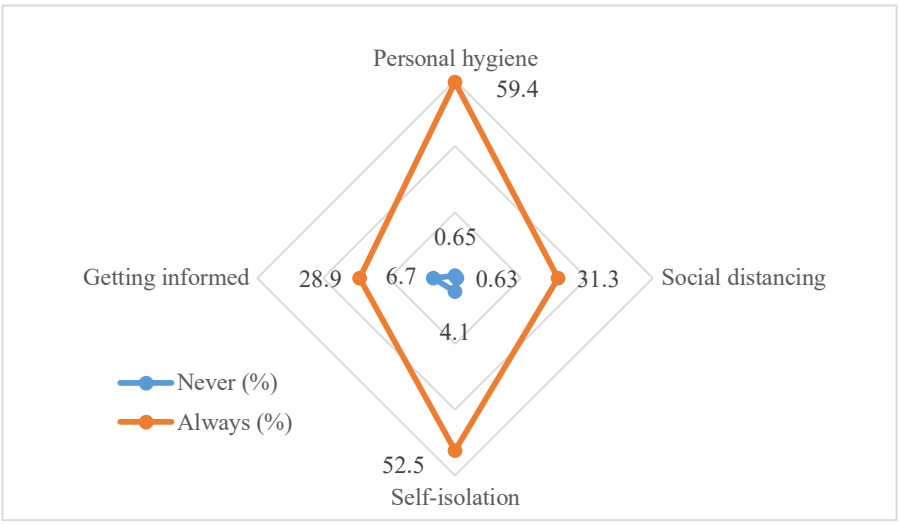

Figure 2. Percentage of citizens' cooperation in compliance with precautionary measures (those who have chosen options 1="Never" or 5="Always").

Figure 2 also shows the percentage of "Always" or "Never" performance of each category of precautionary measures. The highest rate of "Always" performance is related to personal hygiene (59.4%).

4.3 Association between each personal/socioeconomic characteristic and implementing all precautionary measures

Regarding the implementation of all precautionary measures, as mentioned before, for participants who chose 5 (= Always) or 4 (= Most of the time) for all items, it was determined that all of the precautionary measures were implemented. Results showed that the number of these people reached 202 (30.3% of participants). *Table 4* shows the results of the multivariate logistic regression analysis of the association between each personal/socioeconomic characteristic and implementing all precautionary measures. The odds ratio of implementing all precautionary measures in women, unemployed people, high-income groups, and those with a history of Covid-19 infection were significantly higher than other groups.

Table 4. Association between each personal/socioeconomic characteristics and implementing all precautionary measures

Measures	B	S.E.	Odds ratio	95% Confidence Interval	*p*-value
Gender (Female)	.817	.245	2.264	1.399-3.663	.001
Age (+35)	.325	.223	1.385	.894-2.144	.145
Marital status (Married)	.247	.213	1.281	.844-1.943	.245
City of residence (Tehran)	-.019	.192	.982	.674-1.430	.923
Education (University graduate or above)	.311	.276	1.365	.795-2.345	.259
Work status (Unemployed)	.667	.208	1.949	1.296-2.932	.001
Household income level (> 6 million)	1.520	.195	4.573	3.123-6.697	.000
History of Covid-19 infection (No)	.705	.198	2.023	1.372-2.983	.000

Multivariate logistic regression analysis was performed. The dependent variable was implementing all precautionary measures (no/yes). The independent variables were gender (male/female), age (persons <35 or +35), marital status (single/married), city of residence (Tehran/Karaj), education (without university degree/ university graduate or above), work status (unemployed/ employed), household income level (≤ 6 million tomans or > 6 million tomans), and history of Covid-19 infection (yes/no).

4.4 Association between each personal/socioeconomic characteristic and citizens' behavioral change compared to previous phases of the outbreak

At the lowest rows of *Table 3*, the descriptive statistics of the question asked of citizens about how and to what extent their level of cooperation has changed compared to the first months of the outbreak showed 56.5 % of the participants believed their level of cooperation has not changed. And 22.4% of them believed that their collaboration was increased. However, 21% thought they had been more cooperative in the early months, and their adherence had decreased over time. *Table 5* shows a correlation between citizens' behavioral change and personal and socioeconomic characteristics (except for their city of residence).

Table 5. Association between personal/socioeconomic factors and the level of changes in citizens' precautionary behaviors compared to the early days of the outbreak

Measures	Pearson χ^2	df	*p*-value
Gender	10.505	4	.033
Age	146.279	20	.000
Marital status	28.552	4	.000
City of residence	5.361	4	.252
Education	45.874	16	.000
Work status	66.510	16	.000
Household income level	30.909	12	.002
History of Covid-19 infection	14.709	4	.005

Chi-square (χ^2) test was performed. The dependent variable was the level of changes in citizens' precautionary behaviors compared to the early stages of the outbreak (1 = Decreased a lot, to 5 = Increased a lot). The independent variables were gender, age, marital status, city of residence, education, work status, household income level, and history of Covid-19 infection. The categories of the independent variables are based on the categories in *Table 2*.

5. DISCUSSION

The purpose of this study was to investigate how much Iranian citizens cooperate with urban management in adhering to the restrictions set to cope with the epidemic of Covid-19. The first part of the results showed that only 30.3% of citizens were bound to comply with all precautionary items. In a similar study in Japan, this figure was obtained for about 34.7% of participants (Machida et al., 2020a). On the other hand, statistics showed that the highest level of implementation was related to personal hygiene items, such as Wearing a mask when in public, handwashing, and covering mouse while sneezing or coughing, which is contrary to the results of other countries such as Greece (Kamenidou, Stavrianea, & Liava, 2020) or Japan (Machida et al., 2020a; Machida et al., 2020b) and can be attributed to existing cultural differences. Because in the Islamic Republic of Iran, personal health education and the need to observe it have been emphasized from the most elementary courses based on teachings of Islam and have affected Iranians' health customs (Adams & Manenti, 2012).

In the present study, one of the significant outcomes was the lower level of adherence to the physical distance (one of the items of social distancing. While only in research conducted by Zhong et al. (2020) a similar result was reported, and in other studies (Kamenidou, Stavrianea, & Liava, 2020; Machida et al., 2020a; Machida et al., 2020b; Muto et al., 2020) participants have had a significant level of adherence to social distancing and its items. Several factors may account for the low level of implementation of this item

in Tehran and Karaj, including the fact that a significant number of Karaj residents commute to Tehran daily by subway. The capacity of the subway lines, under normal circumstances, does not suffice the user population. However, the government has significantly increased the number of people using the metro by restricting the movement of private cars within the city during the outbreak (EghtesadOnline, 2020). This is a complete contrast to how public transportation use has been affected in other countries, such as Poland (Przybylowski, Stelmak, & Suchanek, 2021). Due to this, social distance should be taken more seriously by the government since previous findings indicate that adherence to social distance is a vital factor in overcoming the current crisis (Gan et al., 2020) and can reduce the risk of contracting the virus by up to 92% (Prem et al., 2020).

A further result of the study was the higher likelihood of unemployed individuals taking all precautionary measures. Because day-to-day employees have an urgent need to be present in city spaces and interact directly with others, it is more difficult for them to implement all of the precautionary items. In line with other studies (Hosseini et al., 2020; Lauri Korajlija & Jokic - Begic, 2020), women were more likely to implement the measures than men. This can be attributed to the greater sensitivity of Iranian women in observing the principles of personal hygiene compared to men, which has been proven in the findings of previous studies (Ansari et al., 2016; Sadinejad et al., 2014; Banihashemi et al., 2007). On the other hand, in line with the findings of Al-Hasan, Yim, and Khuntia (2020), Less adherence is observed in low-income groups compared to high-income groups. Muto et al. (2020) have claimed otherwise. The findings also showed that people who had been infected with Covid-19 so far were less likely to implement the precautionary measures than those who had not. This is mainly due to their sense of immunity to re-infection, which, of course, is still being investigated by the WHO (2020a) and, given that it has not yet been definitively confirmed or rejected, cannot be proof of their immunity.

Another important finding of the present study is the dissatisfaction with government actions and public distrust in the government's news related to Coronavirus. More than 80% of participants are dissatisfied with the government's efforts related to the outbreak, which according to the findings of Al-Hasan, Yim, and Khuntia (2020), leads to a decrease in public confidence in the effectiveness of government actions and thus reduces the level of citizens' cooperation with the city administration in this regard. Besides, the lowest level of citizens' compliance with precautionary measures was obtained about "Getting information from reliable sources". It has been suggested that this problem could be related to people's fear of hearing news about Coronavirus (Hosseini et al., 2020). Therefore, it is recommended that governments refrain from providing all the information to ordinary citizens in order to prevent increased stress and anxiety in society. Rather, they provide some information that can assist them in better advancing this situation (Al-Hasan, Yim, & Khuntia, 2020).

On the other hand, citizens' reluctance to get information from government sources can be due to distrust of the government and its statisticians, as has also been confirmed by other studies in Iran (Zarei et al., 2021) and Japan (Muto et al., 2020). However, to combat the disease, it is important to raise public awareness and keep them well informed about the epidemic situation. Ultimately, this will lead to an increase in cooperation on the part of the public (Al-Hasan, Yim, & Khuntia, 2020; Bates et al., 2020; Indartono, Asaduddin, & Soraya, 2020; Zhong et al., 2020; Zarei et al., 2021). The government should thus control misleading statistics and provide

users with accurate and encouraging information through social media platforms that citizens widely use.

Examining the changes in citizens' precautionary behavior compared to the first and second phases of the outbreak in Iran also showed that 21% of citizens spend less care than in the first months. Investigations and announcements by government officials also confirm this issue (Haghdoost, 2020; Hassanzadeh, 2020; IRIBNewsAgency, 2020). Those who have made unnecessary and recreational trips more than others attributed their travels to fatigue due to the quarantine situation. The reason that can be considered selfish (Al-Hasan, Yim, & Khuntia, 2020; Hosseini et al., 2020). Others cited the lack of sufficient local spaces or poor quality as the reason for their recreational trips and unnecessary trips to other cities. In this regard, the findings of Kordshakeri and Fazeli (2020) also shows that the existence of local spaces for walking and safe physical activity in a space close to home is essential to reduce stress and anxiety and the survival of citizens during the epidemic. Their assessment of Tehran's situation spaces (Kordshakeri & Fazeli, 2020), as Habibi and Behnamifard (2016, 2017); Behnamifard, Faezeh and Habibi (2018) well as assessment of Karaj's situation, indicates the very insufficient number and quality of such spaces in these cities.

Among the participants, 236 answered the open-ended question, which was asked to make suggestions for improving the current situation. The proposals mainly included announcing a general quarantine and complete closure of the Red Cities, increasing the quality of medical services for the treatment of coronary patients, government funding for families affected by the lockdown economic conditions, and increasing financial restrictions fines for non-compliance. In a study that examined Iranian citizens' expectations about the government during the outbreak, similar points were made (Zarei et al., 2021). Another study conducted in South Korea showed that unlike citizens of the United States or Kuwait, who believed in greater freedom and the reduction of government restrictions, to improve the situation, South Korean citizens tend to tighten government restrictions and monitor them more closely (Al-Hasan, Yim, & Khuntia, 2020).

6. LIMITATIONS

As Al-Hasan, Yim, and Khuntia (2020) has stated, perhaps the most important limitation of cross-sectional studies such as ours is the constant change in citizens' behavior over time and the need for re-collection and continuous updating of data. Another limitation of the present study was the challenge of sampling and data collection. Due to the pandemic conditions, it was not possible to distribute the questionnaires in person and face-to-face. The online distribution of questionnaires also has its problems. One of these problems is that the number of older adult participants (+ 55 years old) does not reach the ideal level in most cases. Because this age group often does not have enough knowledge to use technological tools (Pheeraphuttharangkoon, 2015; Gudmundsson, 2017). Even if they have adequate knowledge, they are mostly inactive in social networks or have limited activity (Hartnett et al., 2013; Vyas, 2013; Pheeraphuttharangkoon, 2015). Besides, when the research focuses on a specific study area, the questionnaire's online distribution makes it difficult to reach the residents of those areas and bring samples to the ideal number. Because people's activity in online networks is not based on their residential location and the number of groups, pages, or channels related to specific cities is very limited. Another limitation that the

present study faced emphasized citizens' socioeconomic (especially economic) characteristics, making it somewhat challenging to advance the research and complete the questionnaires. Because the experience of some researchers in Iran (Azakia & Darban, 2006; Habibi & Behnamifard, 2016; Hafeznia, 2009) shows that people are most reluctant to answer economic questions, and if these questions are in the questionnaire, it is possible that they either give up completing it or enter false information (Azakia & Darban, 2006).

7. CONCLUSION

Covid-19 has been affecting people worldwide for some time now, and its consequences have been felt widely. Increased fear, concern, anxiety, and hopelessness in society are among the most significant of these consequences (Hosseini et al., 2020; Malesza & Kaczmarek, 2021; Shahabi et al., 2020; Xia et al., 2020), which have happened mainly due to the sudden and unintended changes in people's lifestyles and their sense of control over the situation (Graffigna et al., 2020). In the case of Iran, however, citizens are not only worried about their own health and their families' health but also are under social, economic, and political pressures and stresses that have impacted their behavior during this time (Shahabi et al., 2020; Zarei et al., 2021), and indeed, the more vulnerable and concerned people become, the less their trust in government officials and urban management, and consequently their cooperation will be (Al-Hasan, Yim, & Khuntia, 2020; Graffigna et al., 2020). Furthermore, Covid-19 is still with us, and until the worldwide manufacture of vaccines is finalized, the death or life of individuals depends on adapting their lifestyles to current restrictions and cooperation with government and city management.

Therefore, it seems that the government can play an essential role in gaining people's trust and improving the current situation. As a result, it is imperative that the authorities pay attention to people's needs and concerns and to provide support to low-income families experiencing difficulties in the lockdown situation. Secondly, the strengthening of health facilities, both at the specialized level (hospitalization and treatment of patients in the hospitals) and at the general level (adequate distribution of health items such as masks and alcohol in the community), should be listed. Thirdly, there is a need to increase citizens' awareness, provide more educational content in personal care, and encourage and reassure content and talks from health professionals and officials through the widely used media in society. Finally, as can be seen in the suggestions of citizens, in a situation where some people give priority to themselves and believe that the cooperation of others is sufficient to comply with these restrictions and do not see the need for their cooperation (Al-Hasan, Yim, & Khuntia, 2020), there is a need for accurate monitoring and more severe treatment of people who risk their lives and the lives of others.

Generally, we hope that the research results can help provide a clearer picture of citizens' cooperation and concern for the government authorities and policymakers on the one hand. On the other hand, it may influence their decisions as well.

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