An analysis of preventive behaviour: Identifying the factors affecting voluntary self-isolation during COVID-19 pandemic

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ABSTRACT

Background: *There has been limited research in revealing the socioeconomic determinants of self-isolation during COVID-19 pandemic.*

Aim: *This study aims to identify preventive behaviours of adults in Turkey. To do this, the research examines socioeconomic factors affecting voluntary self-isolation status during COVID-19 pandemic.*

Methods: *The study exploits the virtually collected data of 933 individuals living in Turkey. The survey was conducted when the people (at 20 - 65 years of age) were not in compulsory isolation and/or compulsory curfews were not in force. A hierarchical multivariate regression design is used to identify the factors affecting voluntary self- isolation status.*

Results: *It is found that gender, marital status, region, occupation and distance working opportunity have significant impacts on voluntary self-isolation status. In contrast, age, income, education and vulnerability against pandemic (i.e., having a chronic disease, pregnancy and living with someone older than 65 years of age) do not have associations with voluntary self-isolation status.*

Conclusion: *People living in large cities are less likely to be isolated voluntarily. Hence the policies restrict outing in the large cities may be influential on controlling the spread of coronavirus. Additionally, public employees are considerably less likely to be isolated voluntarily. Given that the clear effects of distance working on voluntary self- isolation status, it is believed that distance working policies especially for public employees may influence the spread of coronavirus.*

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INTRODUCTION

On December 31, 2019, the cases of pneumonia with unknown ethology were reported in Wuhan City, Hubei Province of China (Who, 2020a; European Centre for Disease Prevention and Control, 2020a: 1; Paules et al., 2020: 708) which was named as the novel coronavirus disease 2019 (COVID-19) later on (Who, 2020b; European Center for Disease Prevention and Control, 2020a: 1). The new coronavirus disease has spread not only to other provinces of China, but also many countries all over the world (Ministry of Health, 2020a). At the time of this study, approximately 268 million cases and 5.3 million deaths are detected over the 216 countries (WHO, 2021c).

Generally, coronaviruses are a large family of viruses that can cause disease in humans or animals (Fehr & Perlman, 2015: 1; Fenner et al., 1987: 505; Dhama et al., 2014: 170; La Rosa et al., 2013: 126; Ministry of Health, 2020a). The available evidence for COVID-19 is thought to be of zoonotic origin for SARS-CoV-2 (Rothan & Byrareddy, 2020: 1; Ministry of Health, 2020b: 11). In addition, it is widely stated that the source of the disease is wild animals sold in the "Huanan Seafood Wholesale Market" (Parr, 2020: 1; Hui et al., 2020: 264; Tan et al., 2020: 62; Ministry of Health, 2020b: 11). Although the coronavirus family is thought to be transmitted from animal to human (Rohde, 2020), it is reported that direct person-to-person transmission is the primary means of transmission of coronavirus disease (McIntosh et al., 2020: 4).

Several vaccines have been developed to prevent the spread. However, avoiding the exposure still plays critical role to prevent the transmission of the virus (Centers for Disease Control and Prevention, 2020: 5). Due to this, self-isolation is suggested by the World Health Organization (Who, 2020c: 6) as one of the key actions against COVID-19 (WHO, 2020d; Hellewell et al., 2020: e492). It is widely suggested that voluntary self-isolation can reduce contact between community members and limit the transmission (WHO, 2005: 42-46; Zhang and Wang, 2015: 9751; Qualls et al., 2017: 2; European Centre for Disease Prevention and Control, 2020b: 2-3; Hellewell et al., 2020: e492-e494).

The term of “isolation” generally implies separating people with symptoms of COVID-19 from public to prevent the spread of the disease. Additionally, isolation also refers to separate people who are not infected themselves but may have been exposed to COVID-19 or to restrict activities to prevent the spread (Who, 2020d; Salathé et al., 2020: 2-3).

The concept of self-isolation implies to stay home (Brooke & Jackson, 2020: 2045) when someone (i) has symptoms of an infectious disease (e.g., COVID-19) (Bodas and Peleg, 2020: 936), (ii) had a contact with someone with symptoms (Cava et al, 2005: 343; Blendon et al., 2006: 15-16), or (iii) returned from abroad (Pradana et al., 2020: 4; Alam et al. 2020: 205). Self-isolation is generally recommended for 14 days rather than a long or continuous period (Brooke & Jackson, 2020: 2045). In this context, self-isolation is widely advised for the individuals even they do not carry the aforementioned conditions to prevent to be exposed to coronavirus (COVID-19) (NHS, 2020; Thienemann et al., 2020: 5). Hence voluntary self-isolation refers to stay at home consciously to prevent the spread of the virus regardless of these conditions.

Isolation and quarantine applications are two of the major instruments in tackling with coronavirus (Shaw et al. 2020: 1). There is a great deal of research exploring the beneficial and/or detrimental effects of self-isolation or quarantine. In this context, Nussbaumer-Streit et al. (2020: 2) identify the associations between self-isolation and the reductions in mortality and morbidity rates. In addition, Anderson et al. (2020) and Patel et al. (2021) state that self-isolation decreases the disease rates through the reductions in the contact between people. Further, Dehning et al. (2020) and Anderson et al. (2020) report that the quarantine measure delays the peak point of the influenza pandemic. Therefore, it is stated that in a case of infectious diseases fundamental strategy is to minimize contact with infected and potentially infected individuals (Dehning et al. 2020; Anderson et al., 2020; Patel et al., 2021).

On the other hand, several studies in the literature draw attention to the adverse effects of the self-isolation measure. LGA and ADPH (2020) and AIHW (2021) report increased loneliness and poor mental health outcomes after isolation. Weinstein and Nguyen (2020: 8) and Mattioli et al. (2020: 853-854) state that self-isolation results in loneliness, which may cause anxiety, stress and depression. Armitage and Nellums (2020: e256) also depict worsened mental health of isolated elderlies due to the decreases in their social activity. In addition, Cacioppo et al. (2002: 411) and Gonzalez et al. (2021) express poorer sleep quality, losing emotional control and increasing hopelessness among isolated individuals. Further, Wang et al. (2020), Clair et al. (2020) and Roychowdhury (2020: 4-5) confirms the negative impacts of self-isolation on mental health, life satisfaction and well-being. Apart from mental health issues, Mattioli et al (2020: 853-854) discuss worsened physical health and increased cardiovascular risks due to unhealthy diet and the reduction of physical activity during self-isolation.

There are also several studies examining the factors affecting individuals' voluntary isolation decisions. Bezerra et al. (2020) indicate that income, education, age, and gender have impacts on self-isolation decision during COVID-19 pandemic. Lima et al. (2020) confirm the age effect on voluntary self-isolation

decision in Brazil whereas Atchimson et al. (2020) find income effects in the United Kingdom. It is stated that the individuals with low income are less likely to be isolated due to their type of work (Atchimson et al., 2020). This is in line with Bodas and Peleg (2020: 938) that explore respondents' intent to quarantine and report that 94% of the participants accept voluntary isolation applications if their wage loses are state-sponsored. Senghore et al. (2020: e884) confirm that people are happy to be isolated voluntarily in case of financial support. Additionally, Machida et al. (2020) confirm that the individuals who are unable to work remotely are less likely to isolate themselves voluntarily. Finally, Escandon-Barbosa et al. (2021) and Farooq et al. (2020) reveal that perceived severity and self-efficacy are associated with increased self-isolation intention.

To the best of our knowledge, there has been limited research in revealing the socioeconomic determinants of self-isolation during COVID-19 pandemic in Turkey. Therefore, this study aims to contribute the literature by revealing these factors. The research is important since it depicts the isolation behaviour of Turkish society purely since the data were collected before the compulsory curfews enacted in Turkey. By doing this, the research aims to enlighten public health policies in terms of responsiveness of the Turkish society to preventive measures in cases of future epidemics (or pandemics).

MATERIALS AND METHODS

This study aims to examine the preventive behaviours of adults in Turkey. To do this, the paper identifies the factors affecting voluntary self-isolation status during coronavirus pandemic. A hierarchical multivariate regression analysis is exploited to understand the factors determining the voluntary self-isolation status. The data of the study is obtained in the period between 06 -12 April. In other saying, the data has been collected after the first case of coronavirus has been observed in Turkey and before the compulsory curfews at the weekends enacted.

All procedures were in accordance with ethical standards of the institution and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The data used contains 933 adults living in Turkey. The survey was applied online according to snowball sampling methodology. The questionnaire is formed by three sections in total. First section examines the socioeconomic and sociodemographic characteristics of adults. Second section collects the information about their health and isolation status. The last section applies altruistic behaviour scale that is constructed and validated by Ersanlı and Doğru Çabuker (2015)[1] in Turkey. The scale bears 20 questions and its values vary from (-10) to 70 where higher scores of the scale imply better altruistic behaviour.

The questionnaire also bears a pseudo question to eliminate unreliable responses. Accordingly, the individuals were asked to leave blank the pseudo question. As a result, 70 individuals who replied to the pseudo question instead of leaving blank are excluded from the research. Therefore, the analyses are conducted using the data of 933 individuals.

Ordinary least squares estimations have been performed to detect the factors affecting voluntary self-isolation status of the individuals. Five hierarchical models have been regressed in total to identify the effects of interest. First model contains socioeconomic and sociodemographic characteristics of individuals like age, gender, marital status, income and education levels. In addition to these, regional variables have been included in the second model. Vulnerability indicators against pandemic (e.g., having a chronic disease, living with someone pregnant or baby etc.) have been added into the third model. Additionally, occupational variables have been counted in the fourth model. Finally, the last model bears an additional continuous variable indicating the altruistic behaviour scores of the individuals. The models can also be illustrated via the formulas presented below:

Model 1:

$$VSI_i = \sum x_1\, Age_i + x_2 Gender_i + x_3 Mar.Stat.Vars_i + x_k Inc.Vars_{i,k} + x_l Edu.Vars_{i,l} + \varepsilon_i$$

which can be shortened as:

$$VSI_i = \sum A + \varepsilon_i$$

Model 2:

$$VSI_i = \sum A + x_m Reg.Vars_{i,m} + \varepsilon_i$$

[1] The Cronbach Alpha was found as 0,76 implying that the scale is validated and reliable among Turkish population.

Model 3:

$$VSI_i = \sum A + x_m Reg.Vars_{i,m} + x_n Vul.Vars_{i,n} + \varepsilon_i$$

Model 4:

$$VSI_i = \sum A + x_m Reg.Vars_{i,m} + x_n Vul.Vars_{i,n} + x_o Occ.Vars_{i,o} + \varepsilon_i$$

Model 5:

$$VSI_i = \sum A + x_m Reg.Vars_{i,m} + x_n Vul.Vars_{i,n} + x_o Occ.Vars_{i,o} + x_p Alt.Beh.Var_{i,p} + \varepsilon_i$$

where VSI implies voluntary self-isolation status of the individuals, $x_1$to x_p demonstrates the effects of regressors exploited in the models, A is a bunch of weighted regressors used in the first Model, and finally ε_i is the error term.

Voluntary self-isolation status has been measured by a binary variable indicating whether the individuals isolated themselves voluntarily or not. Age and altruistic behaviour are measured by continuous variables. Income variable indicates familial monthly income which is measured by five categories varying from the lowest to the highest monthly income level. Educational status is also measured by five categories where the lowest category bears the individuals whose educational level are below than high school; and the highest category includes the individuals hold master's degree or above. The region is measured by (i) whether the individual live in a large city (or not); and (ii) whether the individual living in urban, suburban, and rural area. The vulnerability is measured (i) whether the individual has a chronic disease, (ii) whether the individual live with someone with a chronic disease, (iii) whether the individual live with someone at or above 65 years of age, and (iv) whether the individual live with baby or someone pregnant. Occupational status is measured by (i) four categories depicting the situations whether the individual is unemployed or retired or working in private or public sector and (ii) whether the individual has an opportunity to work remotely. The summary statistics of the variables used in the models can be seen in Table 1 below.

Table 1. Summary Statistics

Variable		Number of Observation	Mean	Min	Max
Name	**Description**				
Outcome Variable					
ISOLATION	Voluntary Isolation Status	933	0.817	0	1
Demographic Variables					
AGE	Age of Respondent	933	26.625	18	65
FEMALE	Gender of Respondent = Female	933	0.723	0	1
MARRIED	Marital Status of Respondent = Married	933	0.307	0	1
Income Variables					
INCOME1	Lowest Income Category (Reference Category) Monthly Income = 0 – 2324 TL	933	0.204	0	1
INCOME2	Lower Income Category Monthly Income = 2325 – 4000 TL	933	0.239	0	1
INCOME3	Middle Income Category Monthly Income = 4001 – 6001 TL	933	0.186	0	1
INCOME4	Higher Income Category Monthly Income = 6001 – 8500 TL	933	0.091	0	1
INCOME5	Highest Income Category Monthly Income = 8501+ TL	933	0.127	0	1
Educational Variables					
EDUCATION1	Lowest Education Category (Reference Category) – Lower than High School	933	0.059	0	1
EDUCATION2	Lower Education Category – High School	933	0.353	0	1
EDUCATION3	Middle Education Category – Associate Degree	933	0.214	0	1
EDUCATION4	Higher Education Category – Bachelor's Degree	933	0.248	0	1
EDUCATION5	Highest Education Category – Master's Degree and above	933	0.124	0	1
Regional Variables					
LARGECITY	Living in a Large City	933	0.795	0	1
URBAN	Living in Urban (Reference Category)	933	0.472	0	1
SUBURBAN	Living in Suburb	933	0.422	0	1
RURAL	Living in Rural	933	0.105	0	1
Vulnerability Variables					
CHRONIC	Having a Chronic Disease	933	0.110	0	1
CHRONIC2	Living With Someone With a Chronic Disease	933	0.413	0	1
ELDERLY	Living With Someone at 65 years of age (or older)	933	0.169	0	1
PREGNANT	Living With Someone Pregnant or Baby	933	0.169	0	1
Occupational Variables					
UNEMPLOYED	Being Unemployed (Reference Category)	933	0.668	0	1
PUBLIC	Working in Public Sector	933	0.159	0	1
PRIVATE	Working in Private Sector	933	0.153	0	1
RETIRED	Being Retired	933	0.018	0	1
DISWORK	Having Distance Working Opportunity	487	0.383	0	1
Altruistic Behaviour Variable					
ALTRUISTIC	Altruistic Behaviour Score	933	55.246	22	70

RESULTS

It seems that voluntary self-isolation is remarkably high among Turkish population at the beginning of the pandemic since over 80% of the participants were isolated themselves voluntarily before the compulsory curfews enacted in Turkey. This is consistent with existing literature as it is reported that %74 (Machida et al., 2020) and 76% (Datafolha, 2020) of the individuals are self-isolated voluntarily in Japan and Brazil respectively.

The results of the estimations performed are presented in Table 2 below. Accordingly, it seems that gender, marital status, region, occupation and distance working opportunity have significant impacts on voluntary self-isolation status.

It seems that women are approximately 12% more likely to be isolated voluntarily. In addition, married individuals are about 10% less likely to isolate themselves on average compared to their non-married counterparts. It is important to note that the marital status indicator loses statistical significance after the occupational variables have been added into the models. It is believed that may be the case if most of the married individuals are employed, in other saying, if the variations in marital status are vanished after the occupational variables included into the models.

For the regional impacts, on the one hand the people living in large cities are almost 10% less likely to be isolated voluntarily. On the other hand, rural and suburban individuals are less likely to be isolated in comparison with the urban ones (who are the reference category in the models). There seems a considerable effect that rural people are almost 20% less likely to be self-isolated voluntarily than their urban counterparts. This may because lower risk of spread in rural areas as rural people have broader spaces for living.

As for the occupational impacts, it is identified that public employees are almost 25% less likely to be voluntarily isolated compared to unemployed. Further, the people with distance working opportunities are 15% more likely to be isolated. The findings provide clear intuitions of the effects of obligation to go to work for living purposes.

Surprisingly, age, income and education do not have associations with voluntary self-isolation status. Besides, no significant impacts of vulnerability (e.g., having a chronic disease, pregnancy etc.) against pandemic are observed in the estimations. These may because the higher isolation rate among the society. In other saying, since more than 80% of the population were in self-isolation voluntarily no variations are observed according to age, income, education and vulnerability.

Finally, even though the statistically significant impact of altruistic behaviour is observed on the voluntary self-isolation status, the effect can be negligible.

Table 2. Results

VARIABLES	MODELS				
	1	2	3	4	5
Demographic Variables					
AGE	-0.002	-0.002	-0.002	-0.004	-0.004
FEMALE	**0.136*** **	**0.129*** **	**0.127*** **	**0.108*** **	**0.101*** **
MARRIED	**-0.101** **	**-0.107*** **	**-0.120*** **	-0.076	-0.076
Income Variables					
INCOME2	0.019	0.008	0.005	-0.022	-0.022
INCOME3	0.023	-0.004	-0.005	-0.029	-0.028
INCOME4	**0.098** **	**0.073* **	**0.073* **	0.056	0.055
INCOME5	0.067	0.046	0.046	0.050	0.047
Educational Variables					
EDUCATION2	-0.006	-0.014	-0.019	0.041	0.040
EDUCATION3	-0.012	-0.006	-0.012	0.010	0.010
EDUCATION4	0.051	0.042	0.036	0.131	0.137
EDUCATION5	0.013	-0.009	-0.017	0.054	0.066
Regional Variables					
LARGECITY		**-0.056* **	**-0.058** **	**-0.083* **	**-0.082* **
SUBURBAN		**-0.047* **	**-0.051** **	**-0.024**	**-0.028**
RURAL		**-0.198*** **	**-0.197*** **	**-0.176** **	**-0.172** **
Vulnerability Variables					
CHRONIC			0.042	0.058	0.049
CHRONIC2			0.001	-0.059	-0.053
ELDERLY			-0.046	-0.004	-0.007
PREGNANT			0.011	-0.023	-0.028
Occupational Variables					
PUBLIC				**-0.224*** **	**-0.230*** **
PRIVATE				-0.073	-0.074
RETIRED				-0.001	-0.010
DISWORK				**0.153*** **	**0.151*** **
Altruistic Behaviour Variable					
ALTRUISTIC					**0.003* **
CONSTANT	0.780***	0.902***	0.910***	0.935***	0.763***
OBS	933	933	933	487	487
R^2	0.06	0.08	0.08	0.17	0.17

*p<0.01=***, p<0.05=**, p<0.1=**

CONCLUSIONS

This paper examines preventive behaviour during coronavirus pandemic in Turkey with the aim of understanding public reaction to preventive measures. By doing this, the research aims to enlighten future policies tackling with the spread in case of epidemic (or pandemic). In this context, the paper identifies the factors affecting voluntary self-isolation status of the individuals. The effects obtained depicts the effects on preventive behaviour purely since the data used were collected after the first case of coronavirus was observed in Turkey and before the compulsory curfews at the weekends enacted.

Using the data of 933 individuals, the study performs OLS estimations in a hierarchical multivariate regression design to understand the effects on voluntary self-isolation status in Turkey.

The study identifies significant impacts of gender, marital status, region, occupation and distance working opportunity on voluntary self-isolation status. As a result, the paper concludes with two concrete outcomes. The first is about occupational issues. Accordingly, having a distance working opportunity is associated with the increases in self-isolation voluntarily. In addition, working in public sector is associated with the reductions in voluntary self-isolation. Therefore, it is obvious that providing a distance working opportunity to public employees will

lead to increases in voluntary self-isolation which may also play a role in preventing the spread.

The second is about regional issues. Accordingly, rural individuals are less likely to isolate themselves voluntarily. This may relate to (i) broader spaces for living in rural areas and/or (ii) higher risk of spread in urban areas. However, the individuals living in large cities are less likely to isolate themselves voluntarily. Hence, the policy restricted outing in large cities at the weekends might have important effects on the course of spread. Therefore, the studies particularly investigating the effects of compulsory curfews in the large cities on the course of the spread in Turkey may have important contributions to the literature. Acknowledgments: There is no a thank you explanation.

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