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COVID 19 from Pandemic to Environmental Litter Pollution: Insights from Turkey

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Abstract

There has been a great challenge for many countries worldwide as to how to deal with COVID-19 pandemic crisis. Countries have adopted strict measures such as lockdown, social distancing, and use of disinfection, masks and gloves in their maneuvers to contain the pandemic. Consequently, the use of masks and gloves resulted in serious environmental problems. This paper explores the attitudes towards used facemasks and gloves during the COVID-19 pandemic. Primary data were collected through an online survey and a multinomial regression model was used to determine the factors affecting the individuals' attitudes towards used facemasks. The logistic regression estimates showed that the sex, age, the marital status, the level of monthly income of the respondents, whether the respondent reuse or not facemask, the way the respondents obtain facemasks, the average number of facemasks used per week and the respondent awareness of the challenges posed by used facemask predicted the individuals' attitudes towards used facemasks. Consequently, health sector policy and decision-makers should arise the population awareness towards the various challenges a posed by discarded used facemasks. This could prevent the COVID-19 pandemic to turn into environmental pollution pandemic and reduce the risk of the degradation of the country leisure and recreational places.

Keywords: COVID-19 pandemic, facemasks, environmental pollution, multinomial logistic regression, Turkey

1. Introduction

Early in January 2020, the World Health Organization (WHO) declared the COVID-19 pandemic as a global threat. Many countries implemented several measures to prevent or slow down the spread of the coronavirus by imposing various preventive measures such as lockdown, travel bans, social distancing, hand sanitizers, wearing facemasks, and other hygiene practices (Wilder-Smith and Freedman, 2020; Lin et al. 2020; Chintalapudi et al. 2020; Fadare and Okoffo 2020). These measures increased the consumption of single-use products and created panic buying behavior worldwide with a noticeable shift in demand for some disposable products such as; disinfections, wipes, small sanitizer bottles, hand gloves and facemasks (Kalina and Tilley, 2 020). Also, most centers for disease control and prevention recommended that everyone should wear nonmedical facemasks to slow the spread of COVID-19 pandemics. This led to excessive use of facemasks globally (Lin et al. 2020). Aragaw (2020), Fadare and Okoffo (2020) and WHO (2020a) highlighted that responding to the COVID-19 pandemic requires around 89 million facemasks per month. As a result, the increasing demand for facemasks caused an exceptional rise in global production (Fadare and Okoffo 2020).

Commonly, there are two types of facemasks (single-use and multiple-use) and the disposable facemasks are manufactured from polymeric materials (Potluri and Needham 2005). These materials are not easily biodegraded and, when not well managed or littered in public areas they move under bad weather conditions (rains and winds) to various areas such as seas, beaches, parks, streets and constitute a new source of micro plastic fibers (Fadare and Okoffo 2020). March winds and April showers bring forth May flowers: there is a good side after all for lockdown measures during the pandemic. Many authors have recently emphasized the positive impact of the COVID-19 pandemic on the environment. In this context, Saadat et al (2020) underlined that the COVID-19 lockdown measures resulted in more cleaning air and water, enriching aquatic biodiversity and that has positively affected the environment. Furthermore, the implementing measures to fight against the spread of the COVID-19 pandemic such as lockdown reduce air and terrestrial transportation. In addition, Muhammad et al. (2020) mentioned that the lockdown has resulted in less use of local transportation

and canceling regular social activities and as such, it has reduced the oil consumption in many countries and consequently affected positively air pollution. Similarly, Dutheil et al. (2020) stated that the European Space Agency (ESA) report showed that the lockdown has improved air quality in Wuhan city of China and Lin et al. (2020) mentioned that the COVID-19 pandemic would eventually save energy by decreasing the consumption of polluting fuels.

Many previous studies highlighted the positive environmental impacts of the COVID 19 pandemic, whilst only a few studies focused on its negative impacts (Kalina and Tilley 2020). Singh et al (2020) highlighted that inappropriate management of infected wastes related to COVID-19 facilitates the transmission of the virus to the health employees and waste recycling workers. For instance, in Brazil, Pakistan, Iran, India and Greece the contaminated wastes were a source of viral infection for wastes collectors (Singh et al., 2020)

The increased wearing and production of facemasks all over the world represents an additional environmental threat to the existing abundant plastic and its particles challenge (Fadare and Okoffo, 2020). For example, Hong Kong was one of the first countries where the presence of facemasks has been highlighted as a critical environmental issue. This due to the huge amount of facemasks wastes which have been thrown out along the countryside or the sea. The founder of the environmental group Oceans Asia, Gary Stokes stated that about 70 used facemasks could be seen on 100 meters along the beach. Consequently, some groups interested in environmental conservations started a new initiative to clean up the beaches and tackle the wastes (Fadare and Okoffo 2020). This showed worldwide evidence that the use of facemasks to fight against the COVID-19 pandemic became a new environmental terrestrial and aquatic challenge. Accordingly, Aragaw (2020) mentioned that the invasion of coastal areas and beaches by plastics and their particles reduces their aesthetic and leisure values and may affect human social and mental stability. On the other hand, Reid et al. (2019), Shen et al. (2020) and Aragaw (2020) emphasized that the existence of plastic contributes significantly to the risk of global warming and therefore it increases carbon emission and causes climate change.

Worldwide Turkey was amongst the first countries where wearing facemask was strongly recommended by the government to slow down the spread of the COVID-19 pandemic. Wearing facemasks and using hand gloves were encouraged by the ministry of health and gradually became mandatory. Hence, on 14 May 2020, Turkish authorities obliged people to wear facemask in 10 provinces in public areas such as shopping malls, bazaars, and public transport. Then, on 18 June 2020, wearing facemasks became an obligation in 47 provinces and on 22 June 2020, the government started to implement a penalty of 900TL ($140) for anyone who does not comply with this measure. Finally, on 08 September 2020 wearing facemasks becomes mandatory for all people in all public areas in all the country (WHO 2020b). As a measure to fight against COVID-19, the Turkey government adopted an initiative to distribute free facemasks through the E-Devlet system and fixed the price of single-use facemask at one Turkish Lira (1TRY Lira). In this context, it should be noted that the consumption of protective equipment such as facemasks and hand gloves might increase and pose a great environmental challenge.

Despite the existence of a public waste collection system in all the provinces of Turkey, it can be noticed a new environmental challenge results from the increasing quantity of used facemasks and hand gloves thrown on the streets and public areas such as shopping malls, parks, metro bus stations (Picture 1).

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Picture 1. Discarded used facemasks and hand gloves in various places in Turkey (The authors 2020)

This would be an agent for a new cycle of contamination, especially for waste collectors. Furthermore, the COVID-19 protective equipment, particularly facemasks and gloves have been among the most important topics during the pandemic. Previously in Turkey, the studies about the COVID-19 pandemic have been mostly focused on; medical use of protective equipment (Azap and Erdinç 2020), facemasks as one of pandemic control measures in the community (GÜNER et al. 2020), management of medical waste in COVID-19 pandemic outbreak (Kargar et al., 2020) and the positive environmental impacts of COVID-19 pandemic (Aydın et al. 2020). Therefore, the purpose of this study is to fill the gap of knowledge related to the negative environmental impacts of the COVID-19 pandemic. It seeks particularly to (1) explore the individuals' attitudes towards used facemasks and hand gloves, (2) explore the individuals' behavior towards facemasks and hand gloves waste (3) evaluate individuals' awareness of negative effect of used facemasks, (4) predict the factors affecting the individuals' attitudes towards used facemasks and therefore to (5) provide useful recommendations to health sector policymakers about the long-run litter environmental pollution that may arise from used facemasks.

2. Methodology

2.1 Questionnaire design

The questionnaire was written in English and translated to Turkish langue to increase the sample size and the rate of participation. Additionally, the participation was voluntary and the questionnaire was anonymous and targets the participants living in Turkey. It was structured into four sections; the first section includes socio-demographic characteristics of the respondents (e.g. gender, age, marital status, educational level), the second section includes individuals use of facemasks and hand gloves, the third section includes the population management of used facemasks and hand gloves, and awareness of used facemasks concerns. The questionnaire sections aim to explore the population use of facemasks and hand gloves, their management of used facemasks and hand gloves, and awareness of used facemasks concerns and the factors predicting the individuals' behavior towards used facemasks. Therefore, the study suggests some recommendations to policymakers to prevent the COVID-19 pandemic to turn into environmental pollution pandemic in Turkey. This questionnaire remained online for two months and about 440 respondents were collected amongst which 30 questionnaires were excluded due to their incompleteness so that only 410 valid questionnaires were retained for data analysis.

2.2 Data analysis

2.2.1 Descriptive statistics

Descriptive statistics such as frequency and percentage were used to explore the socio-demographic characteristics of the respondents, their use of facemasks and hand gloves during the COVID 19 pandemic and their attitudes towards used facemasks and hand gloves.

2.2.2 Multinomial logistic regression

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A multinomial logistic model was used to the factors predicting individuals' attitudes towards used facemasks. A multinomial logistic regression model is an extended form of the binary logistic regression model, which is used when the model-dependent variable contains more than two levels or categories and has continuous, categorical, or both continuous and categorical independent variables. It is a generalized linear model of a binary logistic regression model that is commonly used when the dependent variable includes more than two categories or levels and the explanatory variables are either continuous, categorical, or both. Hosmer and Lemeshow (2000) indicated that the multinomial logistic regression model would be more comprehensible if the dependent variable includes only three (3) levels. Agresti (2007) defined a baseline-category of logit model with predictor x as followed:

$$\text{Log}\left(\frac{\pi j}{\pi j}\right) = \alpha j + \beta j\, x$$

Where αj are the intercepts of the J–1 equation with separate parameters for each equation. In this study, the respondent behavior towards used facemasks (A) was considered as a response variable (Y). It included three different groups; disposing of used facemasks in public garbage bins (A1), in household garbage bins (A2), and disposing of used facemasks out of any garbage bins (A3). Furthermore, the independent variables include the respondents' sociodemographic and economic characteristics, the reuse of facemasks, the type of facemasks, the average number of facemasks used per week, the way the respondents obtain facemasks, the respondents' awareness of environmental concerns of used facemasks and gloves, the habit of the respondents of following any programs related to used facemasks challenges. Each category of the dependent variable is compared to the baseline one and the effects of the parameters in the two separate equations do vary to the kind of category paired with the baseline. Hence, the individuals' attitudes towards used facemasks were considered as dependent (y) variable of the model. It is a categorical variable and refers where they dispose of used facemasks. It ranges from 1 to 3 and "1" indicates the used facemask are disposed in public garbage bins, "2" indicates that the used facemasks are disposed in household garbage bins, "3" indicates the used facemasks are disposed out of any garbage bins.

Some selected variables of survey questionnaire were used as explanatory variables (x). These explanatory variables were X1 a categorical variables and indicates the gender of the respondents that takes the values "1" if male and ''2" if female, X2 is a categorical variable, which states for the range of the age of the respondents; "1" if the respondent has between ''18-21 years old", "2" if he/she has between ''22-35 years old", "3" if he/she has between ''26-29 years", "4" if he/she has between ''30-35 years" and "5" if he/she has "more than 35 years old". Other independent variables include a categorical variable X3, which states for the marital status of the respondents and takes "1" if "single", "2" if "married", "3" if divorced" and "4" if "widow". X4 is a categorical variable, which indicates the education level of the respondents and takes the values of "1" "for high school education level", "2" for "undergraduate education level" and "3" for master or doctorate education level". In addition, X5 is a categorical variable that indicates the respondents' monthly income and takes the values of ''1" if the monthly income is between "1000-2000 TRY Lira", "2" if between ''2001-3000 TRY lira", "3" if between "3001-4000 TRY Lira" and "5" if this monthly income is "more than 4000 TRY Lira". X6 is a categorical variable and indicates either the respondents reuse facemasks or not. It ranges from 1 to 3 and take "1" if the respondent reuse facemasks, "2" if the respondents do not reuse facemasks and "3" if the respondent use rarely facemasks, X7 a categorical variable ranging from 1 to 2 and takes the values of "1" if the respondent uses single use facemasks and "2" if the respondents use multiple use facemasks, X8 a categorical variable that states for weekly average number of facemasks used by the respondents. It takes "1" if the respondent uses about "1-5 facemasks per week", "2" if he/she uses about "6-10 facemasks per week" and "3" if he/she uses more than 10 facemasks per week.

On the other hand, X9 is a categorical and indicates how the respondent obtain the facemasks; "1" if the respondent purchase facemasks from shops and pharmacy and "2" if the respondents get facemasks for free from his/her work area or municipality, X10 is a categorical variables, which indicates the respondents awareness of various challenges that might arise from wrong management of used facemasks and X11 is a

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categorical that indicates the respondent habit to follow any programs related to the challenges related to used facemasks.

3. Results

3.1 Respondents sociodemographic characteristics

Table 1 showed that most respondents (79.27%) were female, 48.05% of them was aged more than 35 years old and 48.78% of them was married. In addition, 53.9% of the respondents had undergraduate education and most of them (52.68%) had a monthly income greater than 4000 TRY-Lira.

Table 1. Respondents sociodemographic characteristics

Variables		Frequency (n)	Percentage (%)
Gender	Male	85	20.73
	Female	325	79.27
Age	18-21	32	7.8
	22-25	45	10.98
	26-30	45	10.98
	30-35	91	22.2
	More than 35	197	48.05
Marital status	Single	190	46.34
	Married	200	48.78
	Divorced	12	2.93
	Widow	8	1.95
Education level	High school	33	8.05
	Undergraduate	221	53.9
	Master or doctorate	156	38.05
Monthly income	1000-2000 TRY-Lira	85	20.73
	2001-3000 TRY-Lira	48	11.71
	3001-4000 TRY-Lira	61	14.88
	More than 4000 TRY-Lira	216	52.68

3.2 Respondents attitudes towards using facemasks and hand gloves

Table 2 showed that most respondents (42.68%) reused facemasks, 65.85% of them used single use facemasks and 64.63% of the respondents consumed averagely about 1-5 facemasks per week. Additionally, most respondents (93.66%) did not use hand glove, 91.95% of the respondents using hand glove did not reuse them whilst 56.1% of the respondents using hand glove consumed averagely about 6-10 hand gloves per week. Furthermore, most respondents (93.41%) purchase their facemasks and hand glove from shops and pharmacy and most of them (90.73%) consider facemasks and hand glove as effective tool to protect themselves from COVID-19 pandemic.

Table 2. Respondents attitudes towards using facemasks and hand gloves (n=410)

Variables		Frequency (n)	Percentage (%)
Reuse of facemasks	Yes	175	42.68
	No	97	23.66
	Rarely	138	33.66
Types of facemasks	Single use facemasks	270	65.85
	Multiple use facemasks	140	34.15
Average number of facemasks consumed by respondent per week	1-5 facemasks	265	64.63
	6-10 facemasks	103	25.12
	More than 10 facemasks	42	10.24
Use of hand gloves	Yes	26	6.34
	No	384	93.66

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Reuse of hand gloves	Yes	21	5.12
	No	377	91.95
	Not applicable	12	2.93
Average number of hand gloves consumed by respondent per week	1-5 hand gloves	176	42.93
	6-10 hand gloves	230	56.1
	More than 10 hand gloves	4	0.98
Type of hand gloves	Single use	196	47.8
	Multiple use	15	3.66
	Not applicable	199	48.54
Procurement of facemask	Purchasing	383	93.41
	Free	27	6.59
Facemasks and hand glove protect against the coronavirus	Yes	372	90.73
	No	38	9.27

3.3 Respondents behavior towards facemasks and hand gloves waste

Table 3 showed that the respondents behavior towards facemasks and hand gloves waste. It showed that most respondents (61.46%) dispose of used facemasks in household garbage bins whilst 46.34% of them dispose of used hand gloves in household garbage bins. Besides, most respondents (86.1%) used to see discarded facemasks and hand gloves thrown out of garbage bins in their living areas. Besides, 62.44% of the respondents indicate they used to see the most facemasks & hand gloves thrown on the streets and most respondents (89.02%) avoided to walk closely to thrown facemasks.

Table 3. Respondents behavior towards facemasks and hand gloves waste (n=410)

Variables		Frequency (n)	Percentage (%)
Dispose of used facemasks	In public garbage bins	71	17.32
	Household garbage bins	252	61.46
	Out of any garbage bins	87	21.22
Dispose of hand gloves	In public garbage bins	49	11.95
	Household garbage bins	190	46.34
	Out of any garbage bins	6	1.46
	Not applicable	165	40.24
Seeing discarded facemasks and hand gloves in the living areas	Yes	353	86.1
	No	57	13.9
The areas discarded facemask and hand gloves are seeing the most	Anywhere	120	29.27
	On the streets	256	62.44
	Bus (metro) station	34	8.29
Respondents behaviors towards thrown facemasks on the living area	Avoiding work closely	365	89.02
	Taking pictures and sharing on social media	45	10.98
Reason people are facemasks litterers	Lack of awareness	150	36.59
	Carelessness	188	45.85
	They fed up	72	17.56

3.4 Respondents awareness of negative effect of used facemasks

Table 4 showed that most respondents (91.71%) were aware of challenges posed by discarded face masks and gloves, 54.15% of the respondents indicate that discarded facemasks could arise environmental pollution, 35.12% of them indicate that discarded facemasks could give bad image of the place. Additionally, most respondents (57.32%) did not follow any programs related to challenges posed by discarded facemasks whilst only 33.41% of them followed some programs related to challenges posed by discarded facemasks through TV and Radio.

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Table 4. Respondents awareness of negative effect of used facemasks (n=410)

Variables		Frequency (n)	Percentage (%)
Awareness of challenges posed by discarded face masks and gloves	Aware	376	91.71
	Not aware	34	8.29
Types of challenges posed by discarded face masks and gloves	Environmental pollution	222	54.15
	Health concerns	44	10.73
	Bad image of the place	144	35.12
Following any program related challenges posed by discarded facemasks and gloves	Yes	175	42.68
	No	235	57.32
The channels through with the challenges posed by discarded facemasks are discussed	TV and radio	137	33.41
	Social media (Facebook, WhatsApp etc, Twitter)	95	23.17
	Not applicable	178	43.41

3.5 Factors predicting the respondents' attitudes towards used facemasks

Table 6 presents summarized results of the significantly factors predicting the respondents' attitudes towards used facemasks. It showed the coefficients, the significance level (z value) and the odds ratio (relative risk ratio) for each parameter. In this model, disposing of used facemasks in household garbage bins was considered as a reference category and each of the other independent variable categories was paired with the reference category. Accordingly, two equations were obtained from the model fit: (*Equation 1*) disposing of used facemasks in public garbage bins paired with disposing of used facemasks in household garbage bins (reference category) and (*Equation 2*) disposing of used facemasks out of any garbage bins paired with the reference category. The model LR $\chi 2(42) = 168.40$ at $p<0.000$ for the Likelihood Ratio (LR) Chi-Square test for both Equation (1) and equation (2), which indicates that the used factors contribute significantly to the model and at least one of the coefficients of the model is not equal to zero. In addition, the relative risk (RR) of the factors predicting the individuals' attitude toward used facemasks was determined. This relative risk expresses how many times more (or less) likely a given factor would predict the individuals' attitude toward used facemasks while all other factors of the model are held constant. RR is a term, which is closer to odds ratio but with different application. It can RR>1 (an increase in risk), RR=1(no difference in risk) and RR<1 (decrease in risk) (Sedgwick, 2014).

Table 5 showed that the sex, age, the marital status, the level of monthly income, whether the respondent reuse or not facemask, the way the respondent procures of facemasks, the average number of facemasks consumed by respondent per week and the respondent awareness of the challenges posed by used facemask were significant factors in predicting the respondents' attitudes towards used facemasks. Accordingly, the relative probability of disposing of used facemasks in public garbage rather than disposing of used facemasks in household garbage bins (reference category) is 5.29 times more likely or 429 % higher if the respondent is divorced rather than if he/she is single, married or widow with the same characteristics X1, X3, X4, X5, X6, X7, X8, X9, X10 and X11. In addition, the relative probability of disposing of used facemasks in public garbage bins rather than disposing of used facemasks in household garbage bins (reference category) is 0.171 times less likely or 82.9% lower if the respondent does not reuse facemasks rather than if he/she reuse facemasks or rarely reuse facemask them with the same characteristics X1, X2, X3, X4, X5 X7, X8, X9, X10 and X11. Likewise, the relative probability of disposing of used facemasks in public garbage bins rather than disposing of used facemasks in household garbage bins (reference category) is by 6.07 times more likely or 507% higher if the respondent purchases facemasks from shops or pharmacy rather than if he/she obtain facemasks free of cost from work area or from the municipality with the same characteristics X1, X2, X3, X4, X5, X6, X7, X8, X10 and X11. Then, the relative probability of disposing of used facemasks in public garbage bins rather than disposing of used facemasks in household garbage bins (reference category) is by 0.022 times less likely or 97.8% lower if the respondent is not awareness rather than if he/she is aware of challenges posed by used

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Received 05 March 2021; Accepted 01 April 2021

facemask with the same characteristics X1, X2, X3, X4, X5, X6, X7, X8, X10 and X11.

On the other hand, the relative probability of disposing of used facemasks out of any garbage bins rather than disposing of used facemasks in household garbage bins (reference category) is 0.464 times less likely or 53.6 % lower if the respondent is female rather than if he/she is male with the same characteristics X2, X3, X4, X5, X6, X7, X8, X9, X10 and X11. The relative probabilities of disposing of used facemasks out of any garbage bins rather than disposing of used facemasks in household garbage bins (reference category) are 0.245 time less likely or 75.5% lower and, 0.198 time less likely or 80.2% lower respectively if the age of the respondents ranges between 30-35 years and, more than 35 years respectively rather than if his/her age ranges between 18-21 years and 22-25 years respectively with the same characteristics X1, X3, X4, X5, X6, X7, X8, X9, X10 and X11. Besides, the relative probability of disposing of used facemasks out of any garbage bins rather than disposing of used facemasks in household garbage bins (reference category) would be 4.84 times more likely or 384 % higher if the respondent is married rather than if he/she is single, divorced or widow with the same characteristics X1, X3, X4, X5, X6, X7, X8, X9, X10 and X11.

Likewise, the relative probabilities of disposing of used facemasks out of any garbage bins than disposing of used facemasks in household garbage bins (reference category) would be 6.31 time more likely or 531% higher and, by 7.33 time more likely or 633% higher if the level of monthly income of the respondent ranges between 3001-4000 TRY-Lira and more than 4000 TRY-Lira respectively, rather than if this monthly income level ranges between 1000-2000 TRY-Lira and 2001-3000 TRY-Lira with the same characteristics X1, X2, X3, X4, X6, X7, X8, X9, X10 and X11. Moreover, the relative probabilities of disposing of used facemasks out of any garbage bins rather than disposing of used facemasks in household garbage bins (reference category) would be 6.19 times more likely or 519% higher and, 497 time less likely or 50.3% lower respectively if the respondent do not reuse, and reuse rarely facemask with the same characteristics X1, X2, X3, X4, X5, X7, X8, X9, X10 and X11. Then, the relative probability of disposing of used facemasks out of any garbage bins rather than disposing them in household garbage bins (reference category) would be 0.0488 times less likely or 95.12 % lower if the respondent consumes more than 10 facemasks per week rather than if he/she consumes between 1-5 facemasks and 6-10 facemasks per week with the same characteristics X1, X2, X3, X4, X5, X6, X7, X9, X10 and X11. Accordingly, Table 5 showed the summarize of the significant factors predicting the respondents' attitudes towards used facemasks.

Table 5. Significant factors predicting the respondents' attitudes' towards used facemasks (n=410)

Variables	Coef.	Std. Err.	z	P>z	Odd ratio (RRR)
Disposing of used facemasks in household garbage bins (Reference category)					
Disposing of used facemasks in public garbage bins (Equation 1)					
Marital status (Ref: Single)					
Married	0.4366165	0.515022	0.85	0.397	1.547463
Divorced	1.665896	0.8531871	1.95	***0.051******	5.29041
Widow	20.50506	3981.724	0.01	0.996	8.04e+08
Reuse of facemasks (Ref: Yes)					
No	-1.764473	0.6325636	-2.79	***0.005****	0.171277
Rarely	-0.3693753	0.4038468	-0.91	0.36	0.6911659
Obtaining facemasks (Ref: purchase from shops and pharmacy)					
Obtaining facemasks free of cost	1.803087	0.5405633	3.34	***0.001****	6.068351
Aware of challenges posed by used facemask (Ref: aware)					
Not aware	-1.505099	0.8582309	-1.75	***0.079*****	0.2219953
Intercept	-2.558619	1.113798	-2.3	0.022	0.0774116
Disposing of used facemasks out of any garbage bins (Equation 2)					
Sex (ref male)					

Annals of R.S.C.B., ISSN: 1583-6258, Vol. 25, Issue 4, 2021, Pages. 18562-18573
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Female	-0.7675837	0.3928605	-1.95	0.051*	0.4641332
Age (Ref: 18-21 years old)					
22-25 years	0.9917636	0.7035019	1.41	0.159	2.695985
26-29 years	-1.204719	0.7679941	-1.57	0.117	0.2997762
30-35 years	-1.404998	0.7227161	-1.94	***0.052******	0.2453676
More than 35 years	-1.617819	0.8219031	-1.97	***0.049****	0.1983309
Marital status (Ref: Single)					
Married	1.577381	0.4841562	3.26	***0.001****	4.842258
Divorced	-14.26742	1384.689	-0.01	0.992	6.36e-07
Widow	5.279752	7859.798	0	0.999	196.3211
Level of monthly income (ref: 1000-2000) TRY-Lira					
2001-3000 TRY-Lira	1.024465	0.7342776	1.4	0.163	2.785604
3001-4000 TRY-Lira	1.84342	0.6570263	2.81	***0.005****	6.318111
More than 4000 TRY-Lira	1.992378	0.5838483	3.41	***0.001****	7.332953
Reuse of facemasks (Ref: Yes)					
No	1.82261	0.4958244	3.68	***0.000****	6.187985
Rarely	-.6985119	0.4194478	-1.67	***0.096*****	0.4973248
Weekly average number of used facemasks (1-5 facemasks)					
6-10 facemasks per week	0.001557	0.3754496	0	0.997	1.001558
More than 10 facemasks per week	-3.020075	0.9583594	-3.15	***0.002****	0.0487976
Intercept	-2.297772	0.9074232	-2.53	0.011	0.1004825

The symbols *, ** and *** refer to 1%, 5% and 10% significance levels respectively

4. Discussion

Table 1 showed that most respondents were female, married, elder than 35 years old and had undergraduate education level and a monthly income greater than 4000 TRY-Lira. ın addition, Table 2 showed that most respondents used single use facemasks, reused facemasks and consumed averagely about 1-5 facemasks per week. The use of disposable facemasks could arise in serious waste management challenges and similarly Roberts et al. (2020) noted that although wearing masks becomes obligatory in public areas, the facemasks litter the environment and might affect biodiversity over time. In addition, Table 2 showed that most respondents did not use hand glove whilst most of the respondents using hand glove consume averagely about 6-10 hand gloves per week. This result is aligned with Prata et al. (2019), Silva et al. (2020) and Vanapalli et al. (2020) mentioned that the COVID-19 pandemic contributes to increasing use of disposable protective equipment that continues to litter recreational places and streets.

Most respondents purchased the facemasks and hand gloves from shops and pharmacy and most of them considered facemasks and hand glove effective tools to protect themselves against the corona virus. This perception of use of facemasks and hand gloves as a protective tool against the coronavirus could be due to the early campaign and penal restriction towards individuals refusing to wear facemasks in public areas initiated by Turkey Ministry of health. These results are consistent with Singh (2020) who mentioned that facemasks and hand gloves became widely used as an essential tool to protect the individual against COVID-19.

Table 3 showed that most respondents disposed of used facemasks, and hand gloves in the household garbage bins, and most of them had habit to see used facemasks and hand gloves thrown out in their living areas and avoided to walk closely to thrown facemasks. These results come in line with Schnurr et al. (2018) and Mincer (2020) who highlighted the COVID-19 pandemic led to a rapid accumulation of potentially infectious personal protective equipment in-home solid wastes compared to the pre-pandemic period when they were commonly used in the hospitals. Besides, the single-use polymeric materials are a substantial source of plastics and plastic particles so that they pollute the environment because they are lightweight that can be easily moved by winds and rainfalls if discarded in open landfills and to neighboring natural environments. In this perspective, Shammi and Tareq (2020) clarified that disposable facemasks and hand gloves could be a source of micro plastic

pollution with absolute damage on flora and fauna.

On the other hand, a multinomial regression logistic analysis revealed that the sex, age, the marital status and the level of monthly income of the respondents, whether the respondent reuse or not facemask, the way the respondents obtain facemasks, the weekly average number of used facemasks and the respondent awareness of the challenges posed by used facemask were significant factors in predicting the individuals' attitudes towards used facemasks. In fact, used facemasks are assumed to lead to pose serious environmental pollution challenges if they are disposed out of any garbage bin. Accordingly, Table 5 showed that the gender, age, marital status and the level of the monthly income, the average number of used facemasks per week and whether the facemasks are reused or not predicted the respondents' attitudes of disposing of used facemasks out of any garbage bins. Therefore, the relative probability of disposing of used facemasks out of any garbage bins (household and public ones) rather than disposing of used facemasks in household garbage bins (reference category) is lower if the respondent is female rather than if he is male (Ceteris Paribus). Accordingly, females were less likely to be actors of environmental pollution due to the use of facemasks in COVId-19 pandemic than males. Previously, Tan et al. (2021) noted that gender factor affects mask-wearing behaviors and Zhong (2020) and Al-Hanawi et al. (2020) indicated that females higher positive attitudes toward COVID-19 issues such hand hygiene, personal protective equipment. Accordingly, Mainieri et al. (1997) stressed that females are more ecofriendly.

A multinomial regression analysis showed that the relative probability of disposing of used facemasks out of any garbage bins (household and public ones is lower with an increasing age of the respondent increases (Ceteris Paribus). The elder the respondent, the lower the relative risk of polluting the environment with used facemasks. Moreover, it revealed that the non-reuse of the facemasks and the monthly income level are significant factors predicting more likely the risk of environmental pollution with used facemasks.

5. Conclusion and recommendation

This study explores the attitudes towards used facemasks during the COVID-19 pandemic in Turkey. It showed that most respondents considered the use of facemask and hand gloves as a tool to protect themselves against coronavirus. The results showed that most respondents used to see used facemasks and hand gloves thrown out in their living areas. A multinomial logistic regression analysis showed that individual with high income level were more likely to pollute environment with used facemasks whilst the elders were less likely to pollute the environment. In addition, the study findings showed that females were less likely to pollute the environment with used facemask than males. Most respondents indicated they saw discarded used facemasks in their living area while only few respondents followed programs related to various challenges posed by discarded used facemasks. Accordingly, the health and environment sectors policy and decision-makers should arise the population awareness towards the various challenges a posed by discarded used facemasks. This could prevent the COVID-19 pandemic to turn into environmental pollution pandemic and reduce the risk of the degradation of leisure and recreational places.

6. Competing interests

The authors declare that they have no conflict of interest.

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