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Intentions to Smoking Cessation in the Time of COVID-19: Evidence from Serbia

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ABSTRACT

In this study, we examine whether the outbreak of pandemic has given incentive to smoking cessation and which factors are associated with such intentions, emphasizing change of economic conditions and smoking habits in the time of COVID-19. Data were collected through a telephone survey among a representative sample of the Serbian adult population aged less than 65 years (N=1,002) from 11 to 19 May 2020. The current smokers reported whether the COVID-19 pandemic had changed their tobacco products consumption, disposable income and intentions to cease smoking. Among the current smokers, 26.3% reported that the COVID-19 pandemic triggered intentions to cease smoking. On the other hand, 42.4% of smokers reported a decrease in income, while 22.7% of smokers reported increased smoking during the COVID-19 pandemic. Logistic regression reveals that occasional smokers are the most likely to stop smoking (OR 4.17; CI: 2.18 - 7.99), while the majority of other factors (socio-demographic, economic, smoking habits) do not influence the odds of smoking cessation. Lack of association between intentions to cease smoking and pandemic-related worsening of economic well-being might result from low cigarette prices in Serbia. Consequently, higher taxation of tobacco products is recommended to policymakers.

Keywords: *Smoking cessation, smoking habits, COVID-19, Serbia*

JEL Classification: E20, H20, C13

INTRODUCTION

The outbreak of the COVID-19 pandemic and the follow-up containment measures have had severe outcomes on the population's mental health. A harsh impact of the epidemic on the population's mental health has been evidenced even before the outbreak of the COVID-19 pandemic in studies examining the effects of the SARS 2002-2004 epidemic (Schäfer et al. 2020). An early COVID-19 meta-analysis reveals that participants in the studies on threats posed by the pandemic frequently reported anxiety and depression (16%-28%) and stress (8%) as common psychological reactions to pandemic (Rajkumar, 2020). The latter cross-country systematic overview of the effects of the pandemic on the general population reported high rates of symptoms of anxiety (6.33%-50.9%), depression (14.6%-48.3%), post-traumatic stress disorder (7%-53.8%), psychological distress (34.43%-38%), and stress (8.1%- 81.9%) (Xiong et al. 2020). In addition to the pandemic's health-related concerns, the containment measures posed a serious threat to the population's economic well-being, following a sharp decline in economic activity. A downfall in economic activity reduced demand for working hours; for instance, estimated total working-hour losses in the second quarter of 2020 equals 495 million full-time jobs (ILO, 2020), endangering prospective long-term employment preservation. Besides, the

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estimated loss of labour income during the first three quarters of 2020 amounts to US$3.5 trillion (ILO, 2020).

Smoking cessation under the threat of COVID-19 is beneficial, as the evidence suggests that smoking cessation for four weeks or more is likely to reduce the risk of developing COVID-19 and respective severe COVID-19 complications (Eisenberg & Eisenberg, 2020). Empirical research on the impact of COVID-19 outcomes on smoking habits is still in progress; results are mixed and vary across countries:

- **France:** The number of smokers who increased tobacco consumption (27%) exceeded the number of smokers who reduced smoking (19%). The increase in consumption is associated with participants 25-34-year-old (41%) and those who work at home (37%) (Santé, 2020).

- **Italy:** Smokers reported a reduction in tobacco consumption (especially those who smoke 5-10 cigarettes per day), while 3.3% of them quit smoking (Di Renzo et al, 2020). However, this survey was not implemented on a representative sample (76.1% females), so the results' reliability is limited.

- **The Netherlands:** Stress appears to be associated with smokers who reported an increase (18.9%) and a decrease (14.1%) in tobacco consumption. Also, the number of smokers who believe that during pandemic smoking cessation has got more difficult (24.7%) considerably exceeds the number of those who believe opposite (6.4%) (Bommelé et al, 2020).

- **Spain:** The number of smokers, especially during the first week of lockdown, was reduced by four percentage points (from 13.9% to 9.9%). The health concern was the main reason for smokers to quit (López-Bueno et al, 2020). However, the survey was not representative (the average age of participants in the sample is lower than in the population), so the results should be interpreted carefully.

- **Poland:** Almost every second smoker reported an increase in smoking intensity after the pandemic declaration (45.2%), while 40% of them did not change smoking intensity. The results also showed the absence of the relationship between demographic characteristics and the changes in smoking intensity during pandemics (Sidor & Rzymski, 2020). Like others, this survey was not representative (95% of respondents were women).

- **United States:** Most smokers (both manufactured and electronic cigarette) reported an increase in motivation to quit smoking (35.6% and 37.6%, respectively). The main reason was health concerns. However, significantly lower numbers reported an attempt to quit (22.9% of manufactured cigarettes and 21.2% of electronic cigarette smokers). On the other hand, tobacco use changes were similar across smokers and positively correlated (30.3% of manufactured cigarette smokers and 29.1% of electronic cigarette users reported increased tobacco consumption) (Klemperer et all, 2020).

- **Pakistan:** Since COVID-19 pandemic, 14% of smokers (n=2,062) reported quitting. Among other respondents who continue to smoke, 68% reduced, while 18% increased tobacco consumption. Smokers were motivated to quit smoking more during the pandemic than before (41% of those who continue to smoke), while 21% were less motivated to quit. The survey was not representative, and it represents a longitudinal study on the same respondents covering the period before the pandemic start (September 2019, February 2020) and the period after (May 2020) (Siddiqi et al, 2020).

- **Turkey:** Results suggest that the COVID-19 outbreak effectively reduced the smoking prevalence of the patients admitted to the smoking cessation clinic; 46.2% of patients who started smoking again or never stopped smoking quitted smoking in fear of COVID-19 (Tetik et al, 2020).

Regarding the high prevalence of tobacco use in Serbia (37.9% in 2019), we recognized the need to research smoking habits during the pandemic caused by the COVID-19 virus. In this study, we examine whether an outbreak of pandemic and follow-up containment measures have given incentive to smoking cessation and which factors are associated with such intentions, with particular emphasis on change of economic conditions and smokers' smoking habits in the time of COVID-19.

METHODS

Survey

This survey is an extension of a national representative survey of tobacco products consumption in Southeastern Europe in Serbia (Lawless, 2015), which was implemented within the regional project "Accelerating Progress on Effective Tobacco Tax Policies in Low-and Middle-Income Countries" in cooperation with the University of Illinois Chicago and Bloomberg Foundation. It was motivated by the urgent need to maintain continuous records of the smoking habits under the changed health and economic circumstances posed by the pandemic, so the original questionnaire was adjusted to include several questions related to the pandemic.

We conducted a telephone survey among a representative sample of the Serbian adult population aged less than 65 years (N=1,002), including both smokers and non-smokers. The survey was conducted from 11 to 19 May 2020, 5 days since the Government of Serbia has declared an end of the state of emergency and abrogated all containment measures.

Variables

The questionnaire used in the survey collected information on:

(1) Socio-demographic variables, including gender, age, education, and settlement characteristics. Level of education is measured using official educational grading, but for research, it was categorized into three groups: primary (up to eight years of schooling), secondary (up to 12 years of schooling) and tertiary (15 or more years of schooling). Similarly, age was grouped into four categories: 18-24, 25-34, 35-44, 45-65. Variable type of settlement reflects whether the respondent's residence location is located in an urban or rural area.

(2) Economic variables, which depict the financial security of respondents. In particular, two variables are used: employment status and change of income since the outbreak of the pandemic. Employment status reflects the overall financial security. It is measured by the official ILO classification of employment status, which is reclassified for research into three categories: full-time (FT) employed, non-FT employed and unemployed. Prior expectations are that the unemployed are the most vulnerable to pandemic economic impact and, therefore, the most encouraged to quit smoking. Change of income reflects whether financial security had improved or worsened due to implemented containment measures. The three options measure it: increased, did not change and decreased; the first two options are merged, following the aim of research to test expectations that worsening of financial security, in particular, stimulate intentions to cease smoking.

(3) General smoking habits, i.e., whether a person is a smoker and if so, how frequently and what type of tobacco product consumes. A variable "smoking frequency" is defined to make a distinction between frequent and occasional smokers, whereby a smoker is regarded as a regular if consumes some tobacco product every day or occasional if does not consume it on an everyday basis. It is reasonable to assume that occasional smokers are more likely to cease smoking under severe circumstances. Tobacco products used by smokers are classified into manufactured cigarettes, rolled cigarettes, and others.

The category of other tobacco products encompasses predominantly vaping products such as e-cigarettes and heated tobacco. There are no prior expectations on the impact of this variable on intentions to quit smoking. Still, the expensiveness of the manufactured cigarettes might be considered as an incentive to stop smoking.

(4) Impact of pandemic and related containment measures on current tobacco consumption and intentions to quit smoking. Accordingly, three variables are specified in respect of pandemic outbreak: change in tobacco products consumption, switch to less expensive tobacco brands/products and intention to cease smoking. The questionnaire offers three options for response to tobacco product consumption changes: smoke more, same or less. The same or fewer options are merged since we were particularly interested in testing expectations that increased level of tobacco products consumption raises health concerns and stimulates smoking cessation. To assess whether economic worsening motivated smokers to spend less money on tobacco products, participants were asked if they have switched to less expensive tobacco brands or products. Eventually, three options were available to smokers to state whether pandemic makes them think about smoking cessation: yes, no and already ceased but started again. Similarly, the last two options are merged as they both reflect respondents' unwillingness to quit smoking. The level of significance was set at p≤0.05.

Descriptive statistics were used for presenting the socio-demographic and economic characteristics and smoking habits of the survey participants who are current smokers. Differences in intentions to cease smoking (since pandemic outbreak) across different categories of smokers were assessed using the Chi-squared test. A multinomial logistic regression model was fitted to evaluate associations of smokers' characteristics and smoking habits (predictors) and their intentions to quit smoking (dependent). The logistic regression results are presented as odds ratios (OR) with 95% Confidence Intervals (CI). A p-value <0.05 indicates statistical significance. The analysis was performed using Stata version 13.0.

RESULTS

The current smokers make up 40.9% of the total sample (n=410). The share of female smokers (53%) slightly exceeds the share of male smokers. Almost half of the current smokers (47.3%) are aged 45-65 years. Most of the smokers are secondary educated (57.6%) and live in urban areas (71%). Also, smokers are predominantly full-time employed (51%). Gender, age, employment, and type of settlement structures of current smokers subsample corresponds to respective structures of the full sample, whereas education structure is slightly different – the share of smokers with primary or secondary education is somewhat higher. Most smokers consume tobacco products on an everyday basis (84.6%). Manufactured cigarettes are the most frequently consumed type of tobacco products (81.7%). Overall, 42.4% of the current smokers reported a decrease in income during the COVID-19 state of emergency. Around 23% of smokers reported an increase in the consumption of tobacco products since the pandemic outbreak. Only 5.5% of smokers switched to less expensive tobacco brands or products. Eventually, the pandemic made 26.3% of smokers think about quit smoking (Table 1).

Table 1. Characteristics of Serbian smokers (n=410)

Variables		n (%)*
Socio-demographic		
Gender	female	217 (52.9)
	male	193 (47.1)
Age	18-24	45 (10.9)
	25-34	81 (19.8)
	35-44	90 (22)
	45-65	194 (47.3)
Education	primary	18 (4.4)
	secondary	236 (57.6)
	tertiary	156 (38.1)
Type of settlement	rural	119 (29)
	urban	291 (71)
Economic		
Employment status	FT employed	205 (50.9)
	non-FT employed	43 (10.7)
	unemployed	155 (38.5)
Income change since COVID-19 pandemic	higher or same	235 (57.6)
	lower	173 (42.4)
Smoking habits		
Smoking frequency	regular	347 (84.6)
	occasional	63 (15.4)
Tobacco product consumed	cigarettes	335 (81.7)
	tobacco (cut)	57 (13.9)
	other	18 (4.4)
The intensity of smoking since the COVID-19 pandemic	less than before	48 (11.7)
	same than before	268 (65.5)
	more than before	93 (22.7)
Switch to less expensive tobacco brands/products	no	361 (94.5)
	yes	21 (5.5)
Intention to cease smoking	no	302 (73.7)
	yes	108 (26.3)

Missing values not counted.

The Chi-squared analysis shows no significant difference between those smokers who have started to think about quit smoking during the pandemic and those who have not, concerning variables expected to have predictive power: socio-demographic and economic characteristics and smoking habits. The only two exemptions are associations of intentions to cease smoking with gender and smoking frequency, as indicated by the significance of the Chi-squared test at the 5% level (Table 2).

Table 2. Association between smokers' characteristics and smoking habits with intentions to cease smoking.

Variables		Intention to cease		
		No	Yes	Chi-sq
Socio-demographic				
Gender	female	43.9	9.0	20.51*
	male	29.8	17.3	(0.00)
Age	18-24	8.5	2.4	
	25-34	13.7	6.1	3.52
	35-44	17.6	4.4	(0.32)
	45-65	33.9	13.4	

Variables		Intention to cease		
		No	Yes	Chi-sq
Education	primary	3.7	0.7	4.23 (0.12)
	secondary	40.2	17.3	
	tertiary	29.8	8.3	
Type of settlement	rural (ref)	20.5	8.5	0.81 (0.37)
	urban	53.2	17.8	
Economic				
Employment status	FT employed	37.7	13.2	0.35 (0.84)
	non-FT employed	7.4	3.2	
	unemployed	28.3	10.2	
Income change since COVID-19 pandemic	higher or same	42.9	14.7	0.25 (0.62)
	lower	30.6	11.8	
Smoking habits				
Smoking frequency	regular	65.6	19.0	17.37* (0.00)
	occasional	8.1	7.3	
Tobacco product consumed	cigarettes	59.5	22.2	1.08 (0.58)
	tobacco (cut)	10.5	3.4	
	other	3.7	0.7	
The intensity of smoking since the COVID-19 pandemic	less or same than before	58.1	19.3	1.45 (0.23)
	more than before	15.6	7.1	

$p<0.05$

Multinomial logistic regression analysis confirms the results of Chi-squared test results that intentions to cease smoking during the pandemic have been associated only with gender and smoking frequency. Regression results show that male smokers have three-time higher probability to start thinking about quit smoking relative to female smokers (OR=3.10; 95% CI: 1.91 - 5.04, $p<0.001$). The smokers who reported occasional consumption of tobacco products are even more likely to stop smoking during the pandemic (OR=4.17; 95% CI: 2.18 - 7.99, $p<0.001$) compared with regular smokers (Table 3).

Table 3. Results of logistic regression

Variables	Indicator	OR (95% CI)
Socio-demographic		
Gender	female (ref)	
	male	3.10* (1.91 - 5.04)
Age	18-24 (ref)	
	25-34	1.39 (0.55 -3.51)
	35-44	0.96 (0.36 - 2.58)
	45-65	1.45 (0.59 - 3.53)
Education	primary (ref)	
	secondary	1.88 (0.54 - 6.57)
	tertiary	1.09 (0.30 - 3.97)
Type of settlement	rural (ref)	
	urban	0.91 (0.55 - 1.50)
Economic		
Employment status	FT employed (ref)	
	non-FT employed	1.35 (0.59 - 3.08)
	unemployed	1.04 (0.61 - 1.78)
Income change since COVID-19 pandemic	higher or same (ref)	
	lower	1.12 (0.68 - 1.84)
Smoking habits		

Variables	Indicator	OR (95% CI)
Smoking frequency	regular (ref)	
	occasional	4.17* (2.18 - 7.99)
Tobacco product consumed	cigarettes (ref)	
	tobacco (cut)	0.74 (0.37 - 1.47)
	other	0.37 (0.08 - 1.57)
The intensity of smoking since the COVID-19 pandemic	less or same than before (ref)	
	more than before	1.15 (0.66 – 1.99)

Note: Dependent variable is: Intention to cease smoking since the pandemic outbreak.

* p<0.05

DISCUSSION

Theoretical expectations about the impact of pandemic outcomes on smoking habits depend on which dimension is considered: stress or economic well-being. A strong positive association between level of stress and nicotine withdrawal (Lawless et al, 2015; Kassel et al, 2003; Stubbs et al, 2017; Siegel et al 2017) or PTSD and smoking (Lande, 2018) has been observed, while depressed smokers reported greater difficulty in quitting tobacco consumption (Siegel et al, 2017; Ho et al, 2019). Consequently, issues with stress posed by the pandemic can be considered an incentive for smokers to increase smoking levels. On the side of economic well-being, loss of jobs and reduced incomes should work in the opposite direction toward a decline in smoking prevalence since the positive association between smoking and income is well documented in numerous studies on tobacco products' income elasticity (John, 2005; Peng & Ross, 2009; Yürekli et al, 2010; Tarantilis et al, 2013; Zubović et al, 2018; Jovanović et al, 2018, Gjika et al, 2020). However, loss of income and uncertainty about future financial well-being is also a stress booster that can outrun financial incentives to decrease or quit smoking if the population perceives the loss of income as a temporary and short-term outcome of containment measures.

The overview of the previous studies on the changes in smoking preferences and motivation to cease smoking since the COVID-19 pandemic outbreak shows mixed findings across countries. For instance, smokers in countries heavily affected by the fast-spreading of COVID disease, especially at the beginning of the pandemic, reported a reduction in smoking prevalence, like in Italy (Di Renzo et al, 2020) and Spain (López-Bueno et al, 2020), or increased motivation to quit smoking like in United States (Klemperer et al, 2020) and Turkey (Tetik et al, 2020). Additionally, in such countries, COVID-related health concerns appear as an important factor in reducing smoking prevalence (López-Bueno et al, 2020; Klemperer et al, 2020). The opposite case is Poland, where containment measures successfully suppressed the initial spreading of disease, so the reported increase in smoking is likely the effect of quarantine-related stress (Sidor & Rzymski, 2020).

Most of the existing studies about the effects of the COVID-19 pandemic on smoking habits examined associations with standard socio-demographic characteristics, health-related concerns, and individuals' motives. Nevertheless, such studies neglect that smoking prevalence is not driven only by health concerns but also by economic concerns. The present study relies on our previous research on tobacco control policies in Serbia, which indicates the association of smoking prevalence with smokers' income (Vladisavljević et al, 2019). Serbia was among the countries wherein very harsh containment measures with full lockdowns were applied after the pandemic outbreak. The measures effectively preserved public health (low number of diseases and deaths) but at a high price in lost income. Indeed, 42.4% of smokers reported a decrease in income during the pandemic. The fear of pandemic outcomes also posed stress to individuals, being a likely cause of increased smoking, as reported by almost a quarter of current smokers (22.7%).

The cross-country differences in findings on impact that pandemic has had on smoking prevalence are likely subjected to the cross-country differences in severity of pandemic effects

(number of COVID-19 decease and death cases), whereas mixed results on reactions of individual smokers to pandemic within a single country make identification of predictors more challenging. The survey results reveal that the COVID-19 pandemic has motivated smokers in Serbia to stop smoking. Among the current smokers, 26.3% reported that the pandemic outbreak triggered intentions to cease smoking. Opposite to our prior beliefs, logistic regression analysis did not confirm the association of intentions to cease smoking with a change in income (a proxy for financial well-being; OR=1.12; 95% CI: 0.68 - 1.84; p=0.638) or change in intensity of smoking (a proxy for individual exposure to stress; OR=1.15; 95% CI: 0.66 – 1.99; p=0.602).

Furthermore, logistic regression analysis reveals that occasional smokers are the most likely to stop smoking (OR 4.17; CI: 2.18 - 7.99; p<0.001), while most socio-demographic factors (apart from gender) do not influence the probability of smoking cessation. This is expected since occasional smokers are less addicted to nicotine and typically smoke on occasions of social gatherings that were banned during the lockdown. Gender is the only socio-demographic predictor found to be significant, as male smokers appeared to be more motivated to quit smoking (OR=3.10; 95% CI: 1.91 - 5.04, p<0.001), which is in line with findings from previous empirical research on smoking cessation (Lawless et al, 2015; Siegel et al, 2017). Lack of predictive power of socio-demographic characteristics in explaining variations of smoking habits during the pandemic is also observed in Poland (Sydor & Rzymski, 2020), wherein the epidemic situation was like in Serbia.

The lack of association between intentions to cease smoking and stress-related increase in smoking is intriguing but not surprising as the previous research also shows that stress posed by the COVID-19 pandemic has a mixed effect on motivation to quit smoking (Bommelé et al, 2020). Lack of association between intentions to cease smoking and worsening of financial well-being might be the consequence of the fact that prices of tobacco products are among the lowest in Europe: the average weighted price in Serbia in 2018 stood at €2.05 per pack, compared with the EU-28 average of €4.8. (Vladisavljević et al, 2020). As reads in Table 1, only 5.5% of smokers switched to less expensive tobacco brands and products, although 42.4% of smokers reported a fall in income. Such results impose important policy recommendations that Serbia's tobacco products need to be more heavily taxed, regardless of the pandemic. This is particularly important, as an increase in tobacco products' price in 2020 was among the lowest in the last 20 years (Zubović et al, 2020).

The survey's timing is a research limitation since the survey was conducted a couple of days after the termination of harsh containment measures when most of the population perceived that the pandemic is about to over and everything will get back to normal. Bearing in mind that a new wave of the pandemic in Europe has emerged since autumn 2020, we plan to conduct a new round of the survey after pandemic stabilization.

CONCLUSION

COVID-19 pandemic and respective containment measures severely affected public health and economic well-being and boosted current smokers' intentions to cease smoking. Lower nicotine dependence appears as the most significant factor of the intentions to quit smoking during a pandemic. Female smokers are less likely to quit smoking, in line with general findings that smoking cessation is gender sensitive.

Research results suggest that as much as 26.3% of all smokers showed intentions to quit smoking as result of pandemic outbreak. This is not a result of reduced income and increased stress, but rather of other factors, like health awareness. More prone to quitting are occasional smokers, mostly due to lower exposure to addiction. Lack of association between intentions to cease smoking and pandemic-related worsening of economic well-being might result from low cigarette prices in Serbia.

Using different non-price measures, policymakers can inform smokers and non-smokers about harmful effects of all tobacco products. Special attention should be dedicated to heated tobacco products and narghiles. Policymakers in Serbia should strengthen the control the implementation of Law on Tobacco during the time of the pandemic. Increased intention of smokers to quit should be used as a signal that there is a need to promote tobacco control measures. Consequently, higher taxation of tobacco products is recommended to policymakers as a tool that has been proven as most effective single control measure (Vladisavljević et al, 2020; Zubović et al, 2020). Policy of higher taxation and subsequent drop in affordability of tobacco products will most likely restore expected significance of relationship between variations in income and smoking cessation preferences of individuals.

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