

# A global study of the escalation of substance use and its association with mental health symptoms during the early wave of the COVID-19 Pandemic

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## INTRODUCTION

- The COVID-19 pandemic and its social and economic impact were associated with widespread anxiety, depression, and psychological distress (1) which may increase addictive behaviors.
- An increase in substance use and other addictive behaviors was reported during previous disasters such as terrorist incidents, natural disasters, and the Severe Acute Respiratory Syndrome (SARS) outbreak, and then expected during COVID-19 pandemic (2-4)
- Objective.** We launched a global study to examine changes in substance use and to identify factors related to these changes as the virus spread worldwide.

## METHODS

- A cross-sectional, descriptive study was conducted using an online survey in English and eight other languages.
- March 31<sup>st</sup> to May 15<sup>th</sup>.
- The survey included measures focusing on:
  - Substance use and perceived change on substance use compared to before the pandemic
  - Psychological symptoms (Perceived social isolation, perceived social support, and perceived uncertainty using response scales ranged from 0 to 5, depression and anxiety symptoms using PHQ-4 (5))
  - Stress, and other health and psychosocial measures (Sleep quality using a response scale ranged from 0 to 5, resilience using BRS (6))

- Increase and decrease in substance use were defined as a change of  $\geq 25\%$  of consumption.

- Univariate logistic regression was used to test the associations between variables at a significance level  $\alpha = 0.05$ .

## RESULTS

- A total sample of **5123 participants** provided complete or partial responses.
- Participants were from 106 countries (39% from USA)
- Respondents ranged from 18 to 95 years of age (M= 38.4 SD=14.2); and the sample consisted of 67.6% (n = 3431) females (Table 1).

Table 1. Main socio-demographic characteristics of the study participants

	N (%)
<b>Sex (n=5079)</b>	
Male	1626 (32)
Female	3431 (67.6)
Other	22 (0.4)
<b>Marital status (n=5005)</b>	
Never married	2065 (41.3)
Married	2509 (50.1)
Married but separated	85 (1.7)
Divorced and not remarried	301 (6.0)
Widowed and not remarried	45 (0.9)
<b>Education level (n=4991)</b>	
Primary school	34 (0.7)
Secondary school	688 (13.8)
Post-secondary/Tertiary school	4269 (85.5)
<b>Current employment status (n=4976)</b>	
Employed (Full- or Part-time)	3308 (66.5)
Student	877 (17.6)
Retired	285 (5.7)
Unemployed	506 (10.2)
<b>Rural or urban nature of residence<sup>a</sup> (n= 5000)</b>	
Urban area	3292 (65.8)
Rural or urban cluster	1708 (34.2)
<b>Has a chronic health condition<sup>b</sup> (n = 5022)</b>	
	1520 (30.3)

Notes. <sup>a</sup> Urban area: Population more than 50000; Urban cluster: Population between 2500 and 50000; Rural area: Population less than 2500; <sup>b</sup> Responded 'yes' to the dichotomous item "Do you have any chronic mental or physical health conditions?".

- The mean PHQ-4 score was 4.5 (SD= 3.5) and the mean BRS score was 3.4 (SD=0.8) (Table 2).

Table 2. Description of psychological symptoms, resilience and sleep quality of study participants

	M (SD)
Perceived stress (n= 4580)	3.1 (1.5)
Perceived uncertainty (n= 4578)	2.9 (1.6)
Depression and anxiety symptoms (PHQ-4) <sup>c</sup> (n= 4383)	4.5 (3.5)
Perceived social isolation (n= 4575)	2.2 (1.7)
Perceived social support (n= 4576)	2.9 (1.4)
Resilience (BRS) <sup>d</sup> (n= 3795)	3.4 (0.8)
Sleep quality (n= 3817)	1.5 (0.9)

Notes. M= Mean; SD = standard deviation. <sup>c</sup> Depressed and anxious mood measured using PHQ-4 (4-item Patient Health Questionnaire). <sup>d</sup> Resilience measured using BRS (Brief Resilience Scale).

- Change in substance use during COVID-19 pandemic.**

- Among those who reported using nicotine (n= 801), 20% (n=158) reported significant increases in use during the pandemic (Figure 1).

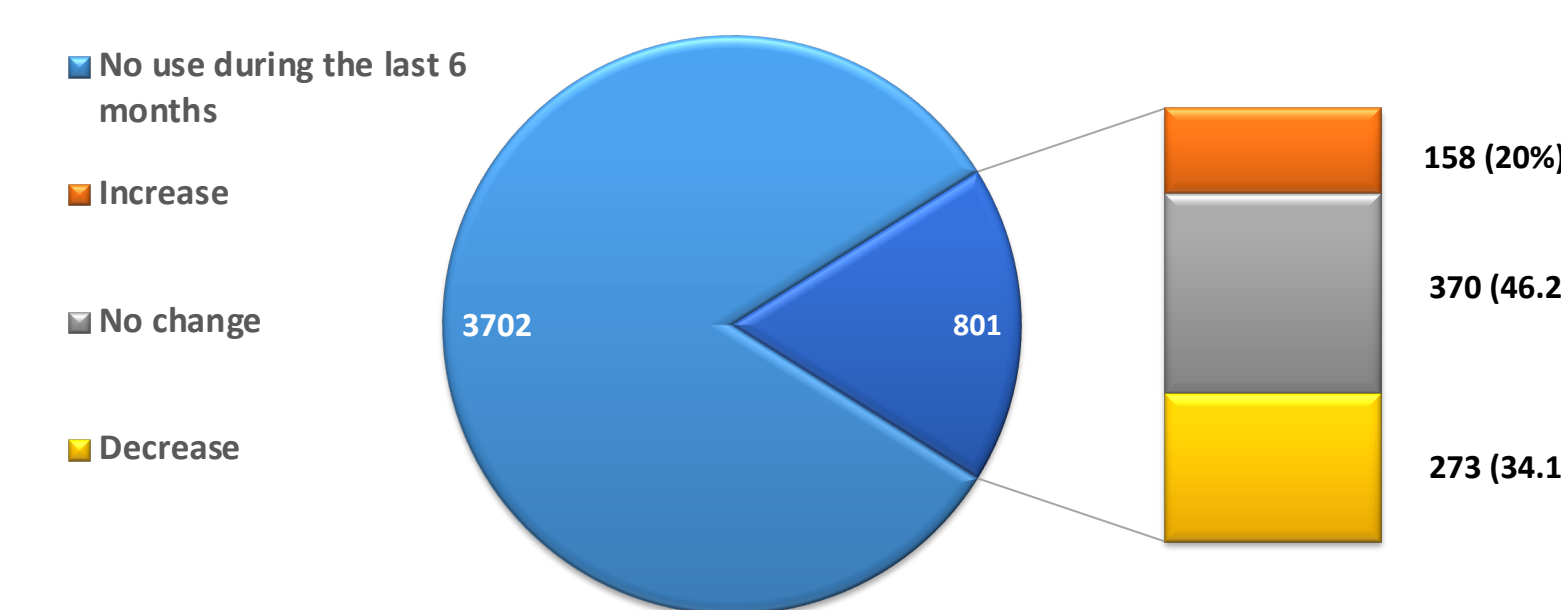


Figure 1. Change in Nicotine use during COVID-19 pandemic (n= 4503)

- Among those who reported using alcohol (n= 2516), 20% (n= 502) reported an increase during the pandemic (Figure 2.)

## RESULTS

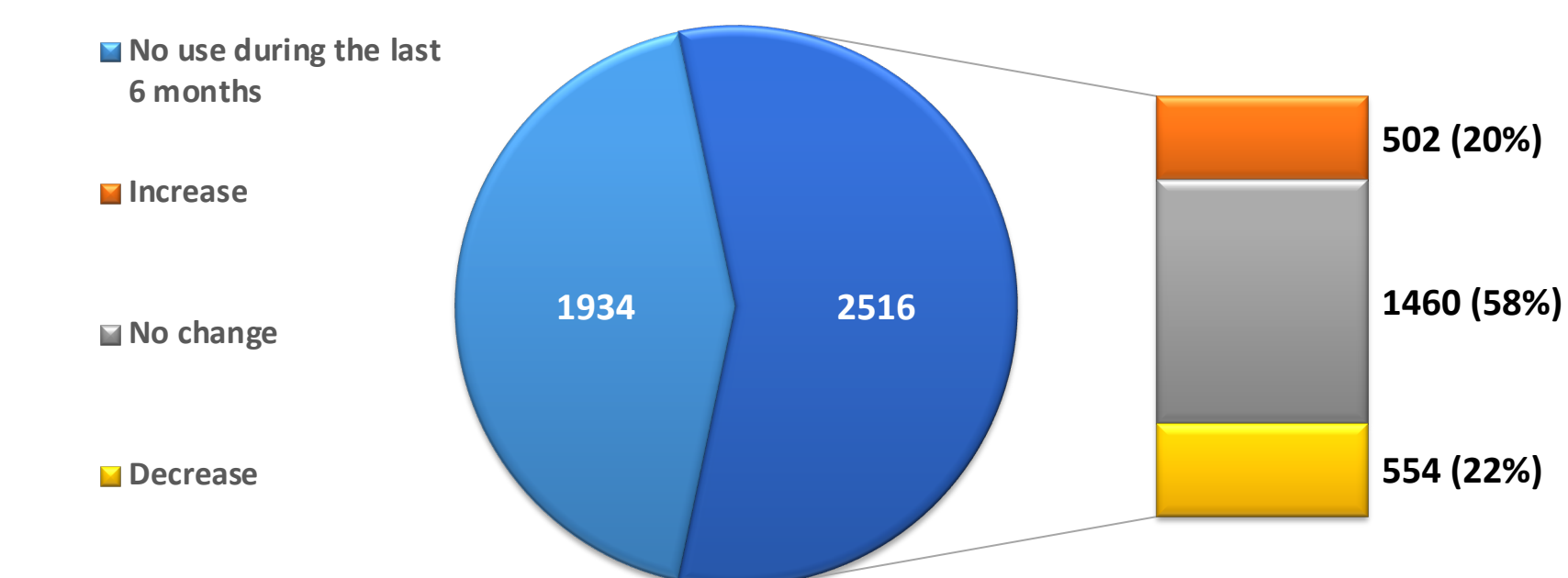


Figure 2. Change in Alcohol use during COVID-19 pandemic (n=4450)

- Among those who reported using cannabis (n=447), 28.6% (n= 128) reported significant increases in their cannabis use during the pandemic (Figure 3).

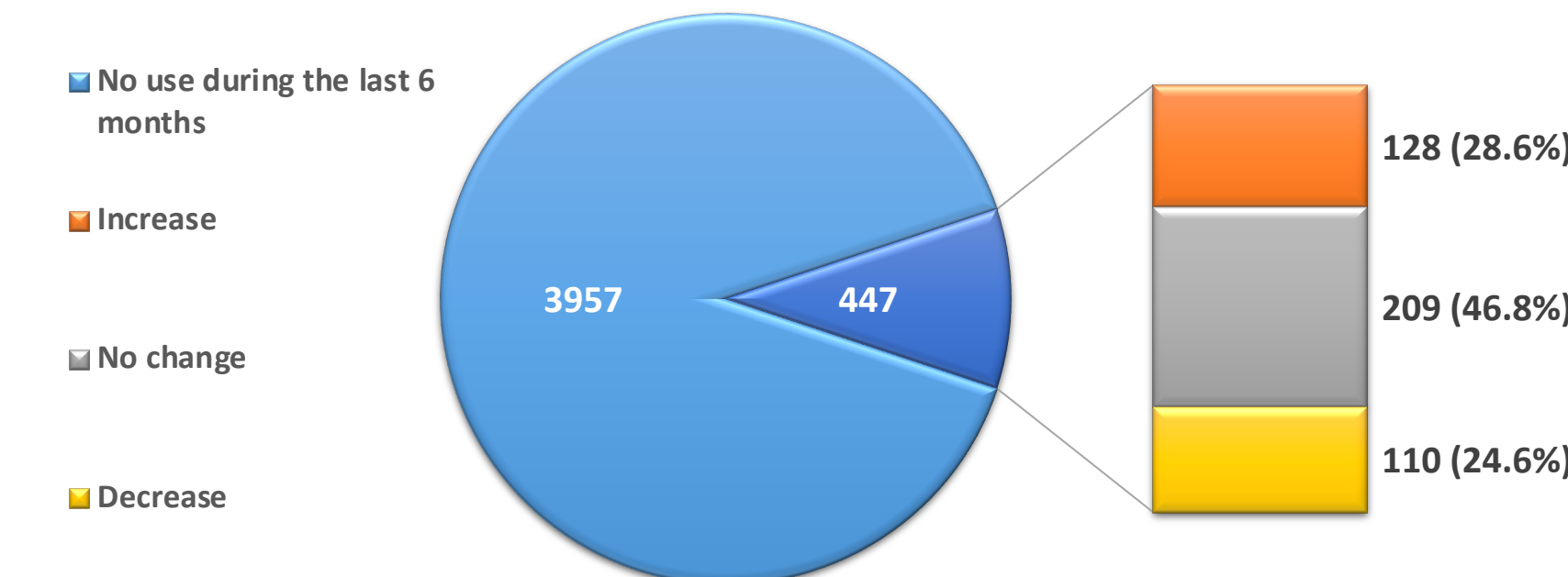


Figure 3. Change in Cannabis use during COVID-19 pandemic (n=4404)

- Factors associated to increase in substance during the pandemic (Table 3):**

- Higher levels of depression, stress, social isolation, uncertainty, and poor sleep quality during the pandemic were associated with increases in nicotine use and in alcohol use.
- Increased cannabis use was associated with higher levels of depression, anxiety, and stress during the pandemic.
- Lower levels of resilience and social support during the pandemic were associated with increased alcohol use.

Table 3. Factors associated to increase increase in substance use: results of the univariate logistic regression analysis

	Nicotine use		Alcohol use		Cannabis use	
	OR (95%CI)	p-value	OR (95%CI)	p-value	OR (95%CI)	p-value
Age	0.99 (0.97; 1.00)	0.05	0.98 (0.97; 0.98)	<0.001	0.97 (0.96; 0.99)	0.006
Sex (Male vs Female)	0.70 (0.51; 1.03)	0.07	0.85 (0.67; 1.07)	0.16	0.98 (0.64; 1.51)	0.93
Marital status <sup>a</sup>	0.74 (0.52; 1.06)	0.10	0.92 (0.75; 1.12)	0.40	0.58 (0.36; 0.95)	0.03
Education level	0.97 (0.66; 1.44)	0.90	1.24 (0.91; 1.70)	0.18	1.10 (0.67; 1.81)	0.67
Employment status <sup>b</sup>	1.5 (1.02; 2.21)	0.04	1.2 (0.96; 1.48)	0.11	1.01 (0.66; 1.53)	0.97
Nature of residence <sup>c</sup>	0.95 (0.66; 1.36)	0.76	0.84 (0.69; 1.03)	0.10	1.33 (0.84; 2.10)	0.22
Chronic disease	1.37 (0.97; 2.01)	0.07			1.4 (0.92; 2.12)	0.11
Perceived stress	1.22 (1.08; 1.38)	0.001	1.24 (1.15; 1.33)	<0.001	1.18 (1.02; 1.36)	0.03
Perceived uncertainty	1.20 (1.08; 1.34)	0.001	1.27 (1.19; 1.36)	<0.001	1.05 (0.92; 1.20)	0.45
Perceived social isolation	1.18 (1.07; 1.31)	0.001	1.16 (1.10; 1.24)	<0.001	1.13 (0.99; 1.28)	0.06
Perceived social support	0.96 (0.85; 1.08)	0.49	0.92 (0.85; 0.98)	0.02	0.96 (0.83; 1.12)	0.64
Depression and anxious symptoms	1.10 (1.05; 1.16)	<0.001	1.1 (1.07; 1.13)	<0.001	1.07 (1.01; 1.13)	0.04
Resilience	0.85 (0.65; 1.09)	0.20	0.87 (0.77; 0.99)	0.04	0.86 (0.64; 1.14)	0.29
Sleep quality	0.72 (0.58; 0.90)	0.004	0.80 (0.71; 0.90)	<0.001	1.01 (0.79; 1.29)	0.92
Increase in Nicotine use	-	-	3.21 (1.93; 5.35)	<0.001	2.8 (1.41; 5.54)	0.003
Increase in Alcohol use	3.21 (1.93; 5.35)	<0.001	-	-	2.96 (1.87; 4.71)	<0.001
Increase in Cannabis use	2.80 (1.41; 5.54)	0.003	2.97 (1.87; 4.71)	<0.001	-	-

Notes. OR = crude Odds Ratio. 95%CI = 95% Confidence Interval. <sup>a</sup> Married vs ( not married, married but separated, widowed and not remarried, or divorced and not remarried); <sup>b</sup> Employed vs (unemployed, student or retired); <sup>c</sup> urban area vs rural or urban clusters

## CONCLUSIONS

- These results demonstrate significant burdens associated with the pandemic and point to potential long-term consequences of the pandemic on substance use.
- Increase in substance use was reported during diverse disasters and public health crisis as a way of coping with resulted stress or emotions (2-4).
- Results highlight the relationship between mental health, stress, and increase in substance use, which may help to identify individuals at-risk for developing substance use disorders and tailoring interventions to better help individual cope with stress, uncertainty and isolation related to the pandemic.
- Recovery efforts post-pandemic must consider the need to build global efforts to address substance use and related mental health effects of COVID-19.

## REFERENCES

- Vindegard N, Benros ME. COVID-19 pandemic and mental health consequences: Systematic review of the current evidence. *Brain Behav Immun.* 2020 Oct;89:531-542.
- Vlahov D, Galea Sandro, Ahern Jennifer, Resnick Heidi, and Kilpatrick Dean. 2004. "Sustained Increased Consumption of Cigarettes, Alcohol, and Marijuana among Manhattan Residents after September 11, 2001." *American Journal of Public Health* 94 (2): 253-54.
- DiMaggio C, Galea S, Li G. Substance use and misuse in the aftermath of terrorism. A Bayesian meta-analysis. *Addiction.* 2009; 104: 894-904
- Lee JY, Kim SW, Kang HJ, et al. Relationship between problematic internet use and post-traumatic stress disorder symptoms among students following the Sewol ferry disaster in South Korea. *Psychiat Invest.* 2017;14:871-875.
- Kroenke K, Spitzer RL, Williams JB, Löwe B. An ultra-brief screening scale for anxiety and depression: the PHQ-4. *Psychosomatics.* 2009;50(6):613-21.
- Smith BW, Dalen J, Wiggins K, Tooley E, Christopher P, Bernard J. The brief resilience scale: assessing the ability to bounce back. *Int J Behav Med.* 2008;15(3):194-200.

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