

# The COVID-19 pandemic and alcohol consumption among adult population in Singapore: A cross-sectional study

**Chan Hang Saing**

National University of Singapore and National University Health System

**Ruixi Lin**

National University of Singapore and National University Health System

**Sreymom Oy**

National University of Singapore and National University Health System

**Mengieng Ung**

National University of Singapore and National University Health System

**Siyan Yi** (✉ [siyan@doctor.com](mailto:siyan@doctor.com))

KHANA Center for Population Health Research

---

## Research Article

**Keywords:** COVID-19, pandemic response, mental health, substance use, Asia

**Posted Date:** December 21st, 2022

**DOI:** <https://doi.org/10.21203/rs.3.rs-2332999/v1>

**License:**   This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

---

# Abstract

## Background

The COVID-19 pandemic may either increase or reduce substance use. This study examines the impact of the pandemic on changes in alcohol consumption in the adult population in Singapore.

## Methods

We conducted this online survey between July and November 2020 among 264 adults. We employed bivariate and multivariable logistic regression to identify factors associated with the intention to decrease alcohol use during the pandemic.

## Results

The two-week pre- and post-COVID-19 prevalence of alcohol use were 53.3% and 50.2%, respectively. The Chi-square tests did not indicate any significant changes in the prevalence of alcohol use in both the total sample and across sociodemographic groups. In the multivariable logistic regression model, the odds of having no intention to decrease alcohol were significantly higher among participants holding at least a master's degree than those with high school education or lower (AOR 3.90, 95% CI 1.62–9.42). The odds of not having the intention to decrease alcohol were significantly lower among the participants aged 45+ (AOR 0.39, 95% CI 0.16–0.92) and the participants reported feeling active (AOR 0.49, 95% CI 0.26–0.91) than those aged 21–34 and those feeling less active, respectively.

## Conclusions

This study did not find significant changes in alcohol consumption before and during the COVID-19 pandemic, suggesting that the government restrictions might have had a limited impact on alcohol use. The findings highlight the need for community psychosocial support among young adults to avoid the risk of elevated alcohol use during the pandemic.

## Background

The unprecedented COVID-19 pandemic arrived in Singapore on 23 January 2020 and brought public health measures under the spotlight with a series of restriction policies implemented to reduce local transmissions [1]. As one of the forefront countries that detected COVID-19 cases outside China, Singapore took its first public health measure on 7 April 2020 to fight against the rapid surge in COVID-19 infections. The measure, known as the “Circuit Breaker,” brought about the closure of non-essential workplaces, the introduction of working from home and home-based learning, and the ban of social gatherings. Another tightening measure implemented on 14 April 2020 introduced entry restrictions in

certain public places [2]. The Circuit Breaker was gradually relaxed from May and ended in June 2020 with the extension of mask-wearing, social distancing, and restrictions on the number of social gatherings and dining [2]. The pandemic has brought enormous changes to life and increased the psychological distress of people around the globe [3–8].

The closure of bars and entertainment venues, such as nightclubs and discos that host most of the social drinking, was initiated even before the “Circuit Breaker” on 26 March 2020, as those places were identified as high risk for COVID-19 transmission. The policy of forbidding alcohol drinking after 10:30 pm in public areas has only been lifted after two years, from 29 March 2022 onwards [9, 10]. Such policies reduced social gatherings and social drinking. However, the restrictions that enervate social interaction that causes loneliness were identified as the risk factors for mental health disorders [11–13]. The persistence of the COVID-19 situation has led to fear among the general population due to the disease’s unknown and unpredictable sequelae [11]. The spreading of fake news intensified the feeling of the public [13]. On top of that, the phobia of food shortage and job loss due to economic depression significantly increased anxiety and depression [14, 15].

Anxiety and depression are strongly associated with alcohol use disorders, which could lead to chronic diseases such as hypertension, liver diseases, digestive problems, and cancers in the digestive system and breast [16–19]. Findings of the positive association between anxiety and depression and increased alcohol use during the pandemic have also been documented in recent studies [20–23]. Other potential risk factors of alcohol use during the pandemic included the deterioration in the financial situation and physical health and being furloughed [24], an increase in time spent at home or working from home [23, 25], gender [20, 26], being elder [20, 23], having children [23], and being higher educated [23].

Data from the Singapore national population health survey showed a slight increase of 0.2% (from 2–2.2%) in regular drinking among Singapore residents aged between 18 and 74 and a 0.3% increase in binge drinking (from 10.2–10.5%) between 2019 and 2020 [27, 28]. Evidence of increased alcohol use has been found in Australia’s general population [29], undergraduates in the United States [30], and the general adult population in Belgium [23]. Nevertheless, it is essential to note that there was also a decrease in alcohol use due to government restrictions in other settings, including the general population in the United States [31] and the adult population in Poland [32]. The slight increase in alcohol use in Singapore’s general population indicated the continued use of alcohol during the pandemic despite government restrictions. Nevertheless, no study has examined the association between mental disorders and alcohol use during the pandemic in the Singaporean setting. One recent study examined whether alcohol consumption was associated with anxiety disorder in Singaporean adults but did not find any statistically significant association [33]. However, it is essential to note that a pre-pandemic study showed that alcohol consumption in Singapore was associated with mental health conditions, especially in people with anxiety disorders [33, 34].

Studies on the prevalence of alcohol drinking during the COVID-19 pandemic in Singapore are scarce. A recent peer-reviewed article shows that more than half of Singaporean adults reported drinking during the

pandemic. Still, due to the sampling method, the sample did not provide a national representativeness [33]. However, reports showing that Singaporeans had used alcohol to cope with boredom and stress during the pandemic have been published in the news sharing the experience of the pandemic drinkers [35]. Furthermore, the news reports speculated that the positive association between the COVID-19 pandemic and mental health disorders might result in increased alcohol consumption and alcohol use disorders. This study aimed to explore the impact of the pandemic on alcohol use in Singaporean adults by comparing alcohol use before the pandemic with that during the pandemic. It also examined factors associated with the intention to decrease alcohol consumption during the pandemic, including anxiety and psychological distress.

## **Methods**

### **Study design and participants**

This study was part of a multi-country study on personal and family coping with the COVID-19 crisis coordinated by the International Citizen COVID-19 Project [36]. We conducted this online survey between July and November 2020 among adults from academic institutions and the public in Singapore using a convenience and snowball sampling method. We used email contacts of the participants from academic institutions and the public provided by the international relations office of the National University of Singapore to reach out to the participants, who were then asked to share the online survey within their professional and social circles through platforms, such as WhatsApp and Telegram. Eligible participants must be residing in Singapore and aged 21 years or older.

### **Data collection procedure**

We announced the study by sending it out to the potential participants through email messages and social media. A letter of information explaining the study's purposes and inviting participants was sent out along with a link to Survey Monkey. The collected information was kept on a safe server. A follow-up reminder with a new invitation was also sent out to potential participants every other week to obtain as many responses as possible. Besides demographic questions, we allowed the participants to skip questions or sections that were not of their interest.

### **Questionnaire development and measures**

This study used a structured questionnaire developed based on psychometrically validated instruments, including the Boredom Proneness Scale [37], a Scale for Measuring Loneliness, Generalized Anxiety Disorder 7-item (GAD-7) scale [38], and WHO (Five) Well-Being Index (1998 version) [39]. The questionnaire also included sociodemographic information (e.g., sex, age groups, marital status, number of children, and education level).

Our outcomes of interest included alcohol consumption frequency in the past two weeks before and during the pandemic and whether participants intended to decrease alcohol consumption during the pandemic. The frequency of alcohol consumption was measured on five scales: never, monthly or less,

2–4 times per month, 2–3 times per week, and 4 or more times per week. We dichotomized these outcomes by setting never to zero and the rest to one. For the intention to decrease alcohol consumption, the survey asked, “would you like to decrease your daily alcohol consumption during the pandemic?” and the response was measured on five scales: not at all, slightly, moderately, somewhat, moderately, and very much. We also dichotomized this outcome by setting ‘not at all’ to one and the rest, including alcohol abstinence, to zero.

## Data analyses

We used Stata version 17.0 (StataCorp LP) to perform data analyses. First, we used the Chi-square test to examine the differences in alcohol consumption in the past two weeks before and during the pandemic in sociodemographic characteristics. Second, bivariate logistic regression analyses were performed to examine the association between the outcomes (i.e., the intention to decrease alcohol consumption during the pandemic) and sociodemographic characteristics and mental health-related measures. Finally, we conducted a multivariable logistic regression analysis to identify factors associated with the intention to decrease alcohol consumption during the pandemic. We included variables significantly associated with the outcome variable at a  $p$ -value < 0.25 in the model.

## Results

### *Sociodemographic characteristics*

This study included 264 participants from academic institutions and the public in Singapore. Table 1 presents a summary of the sociodemographic characteristics of the participants. More than two-thirds (75.3%) of the total sample were women, and 59.8% were between the ages of 21 and 34. Almost half (43.4%) of the participants were either single or never married, while 7.9% were divorced or separated. Nearly a third (29.6%) of the participants had at least one child. Almost half of the participants held bachelor’s degrees (45.2%) or at least master’s degrees (37.3%). Bivariate analyses showed that being 45 or older, being married, having at least one child, and having a master’s degree or higher were significantly associated with having no intention to decrease alcohol consumption during the pandemic.

**Table 1** Sociodemographic characteristics of the participants by intention to decrease alcohol consumption ( $n=264$ )

Characteristics	Total <i>n</i> (%)	Having no intention to decrease alcohol consumption <i>n</i> (%)	OR (95% CI)	<i>p</i> - value
Sex				
Female	195 (75.3)	73 (38.0)	1.00	
Male	64 (24.7)	27 (42.2)	1.19 (0.67- 2.11)	0.55
Age group				
21-34	156 (59.8)	70 (45.2)	1.00	
35-44	53 (20.3)	18 (35.3)	0.66 (0.34- 1.27)	0.22
45+	52 (19.9)	13 (25.0)	0.40 (0.20- 0.82)	0.01
Current marital status				
Single/never married	130 (49.3)	56 (43.4)	1.00	
Married	113 (42.8)	33 (29.7)	0.55 (0.32- 0.94)	0.03
Divorced/separated	21 (7.9)	12 (57.1)	1.74 (0.68- 4.41)	0.24
Having a child				
No children	186 (70.4)	80 (43.2)	1.00	
One+ child	78 (29.6)	21 (27.6)	0.50 (0.28- 0.89)	0.02
Level of education				
High school or lower	46 (17.5)	11 (25.0)	1.00	
Bachelor	119 (45.2)	44 (36.9)	1.76 (0.81- 3.83)	0.15
Master or higher	98 (37.3)	46 (47.4)	2.70 (1.23- 5.96)	0.01

Abbreviations: CI, confidence interval; OR, odds ratio.

## *Alcohol consumption before and during the COVID-19 pandemic*

The prevalence of alcohol consumption in the past two weeks was 53.3% before and 50.0% during the COVID-19 pandemic (see Additional file 1). Panels A and B of Figure 1 present a change in the frequency of alcohol consumption in the past two weeks before and during the COVID-19 pandemic. Panel A showed no significant changes in the frequency of alcohol consumption before and during the pandemic. We observed a slight increase in drinking 2-4 times per month and at least four times per week between the two periods. Panel B showed participants' movements from one drinking habit to the other between the two periods, although the shifts were not substantial. A few participants had shifted from drinking monthly or less to either never or 4 times per month between the two periods. A few participants also shifted from drinking 2-4 times per month and 2-3 times per month to 2-3 times per week and  $\geq 4$  times per week. Nevertheless, the Chi-square test of changes in the proportion of alcohol consumption between the two periods—before and during the pandemic—did not reveal any significant differences in the total sample and across the sociodemographic characteristics (i.e., sex, age, marital status, and education) (see Table S1 in the supplementary material).

## *Mental health*

Table 2 presents the mental health-related measures of the participants during the COVID-19 pandemic. About two-thirds (67.8%) of the participants reported feeling calm at least half of the time, and 32.2% reported feeling active at least half of the time in the past two weeks during the pandemic. Around two-thirds (64%) of the participants reported feeling either nervous or anxious at least half of the time, and 46.2% reported feeling restless at least half of the time during the pandemic. More than one-third (37.5%) of the participants reported feeling trapped in the house sometimes or often, and 60.8% reported a lack of companionship sometimes or often during the pandemic. Bivariate analyses showed that feeling active was negatively associated with having no intention to decrease alcohol use during the pandemic, while feeling trapped at home was positively associated with it.

**Table 2** Mental health-related measures by intention to decrease alcohol use ( $n=264$ )

	Total n (%)	Having no intention to decrease alcohol consumption n (%)	OR (95% CI)	p- value
Feeling calm				
Less than half of the time	85 (32.2)	36 (42.8)	1.00	
At least half of the time	179 (67.8)	65 (36.9)	0.78 (0.46- 1.32)	0.36
Feeling active				
Less than half of the time	179 (67.8)	78 (44.3)	1.00	
At least half of the time	85 (32.2)	23 (27.7)	0.48 (0.27- 0.85)	0.01
Feeling fresh				
Less than half of the time	159 (60.2)	60 (38.4)	1.00	
At least half of the time	105 (39.8)	41 (39.4)	1.04 (0.62- 1.73)	0.87
Feeling nervous/anxious				
Less than half of the time	95 (36.0)	36 (37.9)	1.00	
At least half of the time	169 (64.0)	64 (39.5)	1.07 (0.63- 1.80)	0.80
Feeling restless				
Less than half of the time	142 (53.8)	52 (36.6)	1.00	
At least half of the time	122 (46.2)	49 (42.6)	1.28 (0.77- 2.12)	0.33
Sit around and do nothing				
No	204 (77.3)	74 (37.5)	1.00	
Yes	60 (22.7)	26 (44.1)	1.31 (0.72- 2.36)	0.37
Feeling trapped in a house				



Hardly ever	163 (62.5)	59 (36.4)	1.00	
Sometime	59 (22.6)	19 (32.2)	0.83 (0.44- 1.56)	0.56
Often	39 (14.9)	23 (62.1)	2.87 (1.37- 5.99)	0.005
Lack of companionship				
Hardly ever	102 (39.2)	39 (38.6)	1.00	
Sometime	114 (43.9)	46 (40.7)	1.09 (0.63- 1.89)	0.75
Often	44 (16.9)	16 (37.2)	0.94 (0.45- 1.97)	0.87

Abbreviations: CI, confidence interval; OR, odds ratio.

#### *Factors associated with having no intention to decrease alcohol consumption*

Table 3 presents results from a multivariable logistic regression analysis exploring factors associated with having no intention to decrease alcohol use during the COVID-19 pandemic. After adjusting for potential confounders, the odds of having no intention to decrease alcohol consumption during the pandemic were significantly lower among the participants who were at least 45 years old than those between 21 and 34 (AOR 0.39, 95% CI 0.16-0.92). By contrast, the odds of having no intention to decrease alcohol consumption were significantly higher among the participants who held at least a master's degree than those who had either high school or lower education (AOR 3.90, 95% CI 1.62-9.42). Interestingly, the odds of having no intention to decrease alcohol consumption during the pandemic were significantly lower among the participants who reported feeling active at least half of the time than those who reported feeling active less than half of the time (AOR 0.49, 95% CI 0.26-0.91).

**Table 3** Factors associated with having no intention to decrease alcohol consumption during the COVID-19 pandemic ( $n=264$ )

Variables in the model	AOR (95% CI)	<i>p</i> -value
Sex		
Female	1.00	
Male	1.21 (0.64-2.28)	0.55
Age group		
21-34	1.00	
35-44	0.62 (0.29-1.33)	0.22
45+	0.39 (0.16-0.92)	0.03
Current marital status		
Single/never married	1.00	
Married	0.99 (0.47-2.11)	0.99
Divorced/separated	2.32 (0.76-7.08)	0.14
Having a child		
No children	1.00	
One+ child	0.72 (0.31-1.67)	0.45
Level of education		
High school or lower	1.00	
Bachelor	2.01 (0.86-4.72)	0.11
Master or higher	3.90 (1.62-9.42)	0.002
Feeling active		
Less than half of the time	1.00	
At least half of the time	0.49 (0.26-0.91)	0.02
Feeling trapped in a house		
Hardly ever	1.00	
Sometime	0.70 (0.35-1.40)	0.32
Often	2.04 (0.91-4.61)	0.08

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval.

## Discussion

The prevalence of alcohol consumption among adults in Singapore in this study stayed around 50% before and during the COVID-19 pandemic. We did not find significant changes in alcohol use before and during the pandemic. Nevertheless, it showed that the participants holding at least master's degrees were at a higher risk of having no intention to decrease alcohol consumption during the pandemic. The participants aged 45 or older and those who reported feeling active at least half of their time of the day were at a lower risk of having no intention to decrease alcohol use during the pandemic.

Rehm et al. [40] have introduced two scenarios with opposite predictions regarding the impact of the COVID-19 pandemic on the level and patterns of alcohol consumption based on the literature on the impacts of past public health and economic crises on alcohol consumption. The first scenario predicts increased alcohol consumption due to psychological distress and social isolation experienced during the pandemic. The second scenario predicts reduced alcohol consumption due to the decreased accessibility to alcohol, government restrictions, and financial constraints. A study in Germany showed that 14% of young adults and 17% of older adults reported an increase in alcohol consumption during the pandemic [41]. Similarly, a study in the United States revealed that approximately 60% of American adults reported increased alcohol consumption [42]. However, our study did not find significant changes in alcohol consumption owing to the pandemic, suggesting that the government restrictions on alcohol use and the lockdown measures might have a limited impact on alcohol availability and consumption. The non-significant changes in alcohol consumption could be attributed partly to a change in consumption locations from restaurants or bars to home. Stress and anxiety might have helped to facilitate this unchanged behavior despite government restrictions because 64% of the participants reported feeling nervous or anxious for at least half of their time during the pandemic. Additionally, our bivariate analyses indicated that participants who often felt trapped at home had a significantly higher probability of not having the intention to decrease alcohol consumption than those who hardly ever felt trapped at home. However, this significant positive association did not retain in multivariable logistic regression analyses ( $p=0.08$ ).

In this study, being younger (21–34) and having a higher education level (master's degree or higher) were associated with having no intention to decrease alcohol consumption during the COVID-19 pandemic. These findings are consistent with studies in Singapore before the pandemic [34, 43]. A national survey of 6,616 Singapore citizens and permanent residents between December 2009 and December 2010 showed that people aged 18-34 were much more likely to drink alcohol heavily in the past 12 months or a lifetime than those aged 35 and older [43]. A more recent national survey of 6,126 participants in 2016 also revealed similar findings indicating that heavy alcohol consumption in Singapore is primarily a condition of the young [34]. Social distancing and isolation measures during the pandemic are likely the primary mediators of increased alcohol consumption among young adults, as they tend to be more anxious and bored than older adults. Financial concerns resulting from temporary job suspension and voluntary resignation among younger adults might be another mediator because younger adults are less-skilled and -experienced than older adults. This finding suggests that community mental and financial support is crucial for younger adults to stay mentally healthy and avoid heavy alcohol consumption to relieve anxiety, stress, and boredom.

Our study showed that participants with at least a master's degree were more likely to have no intention to decrease their alcohol consumption during the COVID-19 pandemic, which is consistent with studies from other settings [23]. Schmits and Glowacz attributed this relationship to higher socioeconomic status, positively associated with work-from-home arrangements and better access to alcohol available at home [23]. Work-from-home arrangements might have induced tension from work among the better-educated participants, thereby making them more inclined to drink to reduce their stress [25]. The readily available alcohol products via online delivery and the belief that alcohol drinking helps ease the tension induced by pandemic-related worries might have further mediated the intention of not decreasing alcohol consumption [35]. This finding suggests that community psychosocial support and relaxed work demand are critical for the better-educated participants to avoid elevated alcohol use.

This study has several limitations. First, the causal inference cannot be made from this cross-sectional study, which could not capture the temporal relationships between risk factors and the outcome of interest. Second, this study's estimated prevalence of alcohol use does not reflect the national prevalence rate because the snowball sampling method was used to recruit the participants. Third, more than two-thirds (75%) of the studied participants were female, and a similar proportion (82%) had at least a college degree. Therefore, the estimated prevalence could have been driven by these distributions. A previous study showed that female Singaporeans were less likely to binge drink [34], while higher-educated adults were more likely to drink heavily [43]. Fourth, the recall bias may also affect the estimated prevalence since the online survey was conducted between July and November 2020, and the participants were asked to recall their alcohol use experience before and during the COVID-19 pandemic, which was around the first quarter of 2020. We also acknowledge that there might be other possible unknown confounders we could not capture and adjust for in the study design and data analyses. Finally, the small sample size further limits the study's statistical power. Therefore, the results from this study should be used in tandem with studies using a larger sample size.

## **Conclusion**

This study found no significant changes in alcohol consumption before and during the COVID-19 pandemic, suggesting that the government's restrictions on alcohol might have had a limited impact on alcohol consumption. Younger adults were at a higher risk of increased alcohol use than older adults, and higher-educated participants were at a higher risk of increased alcohol consumption than those with lower education. Our results highlight the need for a multi-pronged approach, in addition to government restrictions, such as community mental and financial support among young adults to avoid the risk of elevated alcohol use. The higher-educated participants also deserve to receive psychosocial support from the community programs and relaxed demands from the workplace during the pandemic.

## **Declarations**

## **Acknowledgments**

We thank the study participants for their time participating in the online survey. We also thank Dr. Stefan Jasen, Dr. Epaphrodite Nsabimana, and the International Citizen COVID-19 Project team for initiating the study and developing the online survey.

### **Ethics approval and consent to participate**

This study was approved by the Institutional Review Board (IRB) of the National University of Singapore (NUS-IRB-2020-166). Informed consent for participation in the current study was obtained from all participants. All methods were carried out in accordance with the Declaration of Helsinki.

### **Competing interests**

The authors declare that they have no competing interests.

### **Author contributions**

MU, and SY conceptualized and designed the study. MU managed data collection and cleaning. CHS, RL, SO, and SY analyzed the data and wrote the initial draft of the manuscript. All authors have read and agreed to the submitted version of the manuscript.

### **Funding**

The study team was partly supported by the UHS-SSHSPH Integrated Research Program (R-608-000-247-750), Saw Swee Hock School of Public Health, National University of Singapore and National University Health System.

### **Availability of data and materials**

The data used in this study are available on request to the corresponding author (siyan@doctor.com).

## **References**

1. Goh T, Toh TW. Singapore confirms first case of Wuhan virus; second case likely | The Straits Times [Internet]. Straits Times. 2020 [cited 2022 May 13]. Available from: <https://www.straitstimes.com/singapore/health/singapore-confirms-first-case-of-wuhan-virus>.
2. I-Pei Chen J, Chin-Huat Yap J, Yang Hsu L, Ying Teo Y. COVID-19 and Singapore: From Early Response to Circuit Breaker. *Ann Acad Med Singapore*. 2020;49.
3. Xiong J, Lipsitz O, Nasri F, Lui LMW, Gill H, Phan L, et al. Impact of COVID-19 pandemic on mental health in the general population: A systematic review. *J. Affect. Disord*. 2020.
4. Hossain MM, Tasnim S, Sultana A, Faizah F, Mazumder H, Zou L, et al. Epidemiology of mental health problems in COVID-19: A review. *F1000Research*. 2020.
5. Knolle F, Ronan L, Murray GK. The impact of the COVID-19 pandemic on mental health in the general population: a comparison between Germany and the UK. *BMC Psychol*. 2021;9.

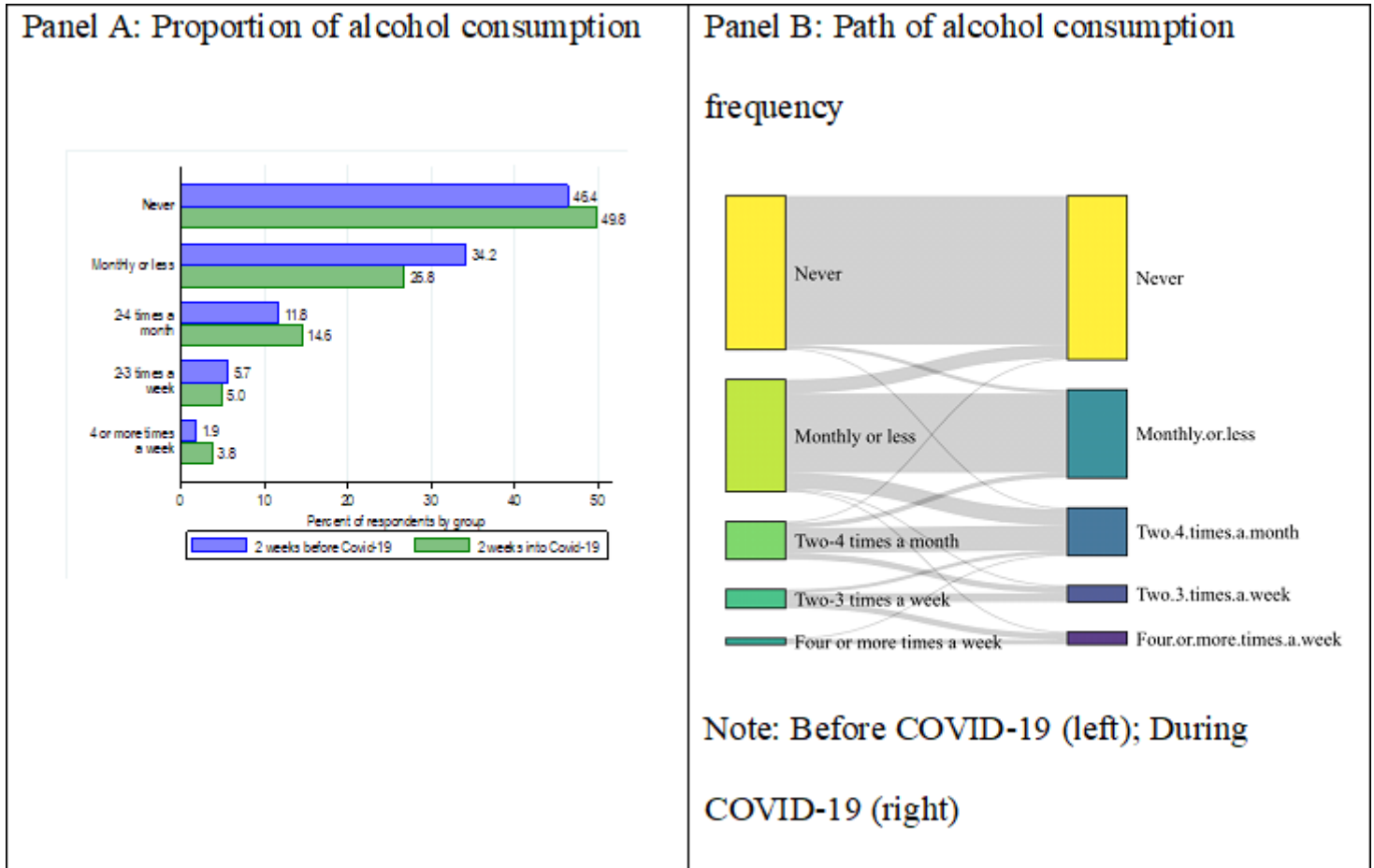
6. Duan H, Yan L, Ding X, Gan Y, Kohn N, Wu J. Impact of the COVID-19 pandemic on mental health in the general Chinese population: Changes, predictors and psychosocial correlates. *Psychiatry Res.* 2020;293.
7. Das R, Hasan MR, Daria S, Islam MR. Impact of COVID-19 pandemic on mental health among general Bangladeshi population: A cross-sectional study. *BMJ Open.* 2021;11.
8. Rossi R, Socci V, Talevi D, Mensi S, Niolu C, Pacitti F, et al. COVID-19 Pandemic and Lockdown Measures Impact on Mental Health Among the General Population in Italy. *Front Psychiatry.* 2020;11.
9. Ministry of Health. FURTHER EASING OF COMMUNITY AND BORDER MEASURES [Internet]. 2022 [cited 2022 Jun 3]. Available from: <https://www.moh.gov.sg/news-highlights/details/further-easing-of-community-and-border-measures>.
10. Ministry of Health. Tighter Measures to Minimise Further Spread of COVID-19 [Internet]. 2020 [cited 2022 Jun 3]. Available from: <https://www.moh.gov.sg/news-highlights/details/tighter-measures-to-minimise-further-spread-of-covid-19>.
11. Shatla MM, Khafagy AA, Bulki AA, Aljahdali IA. Public concerns and mental health changes related to the COVID-19 pandemic lockdown in Saudi Arabia. *Clin Lab.* 2020;6.
12. Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, Greenberg N, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *The Lancet.* 2020.
13. Blix I, Birkeland MS, Thoresen S. Worry and mental health in the Covid-19 pandemic: vulnerability factors in the general Norwegian population. *BMC Public Health.* BioMed Central Ltd; 2021;21.
14. Nie P, Ding L, Chen Z, Liu S, Zhang Q, Shi Z, et al. Income-related health inequality among Chinese adults during the COVID-19 pandemic: evidence based on an online survey. *Int J Equity Health.* BioMed Central Ltd; 2021;20.
15. Mahmood-ul-Hassan AH, Sannan A, Nooz N, Ramay A, Huzaifa M, Zaidi SMJ, et al. Prevalence of insomnia and anxiety in university students during the COVID-19 lockdown: A cross-sectional study. *J Fatima Jinnah Med Univ Fatima Jinnah Medical University.* 2021;15:9–12.
16. Alcohol Rehab Guide. Alcohol And Depression [Internet]. Alcohol Rehab Guide. 2022 [cited 2022 Jun 3]. Available from: <https://www.alcoholrehabguide.org/resources/dual-diagnosis/alcohol-and-depression/>.
17. Alcohol Rehab Guide. Alcohol And Anxiety [Internet]. Alcohol Rehab Guide. 2022 [cited 2022 Jun 3]. Available from: <https://www.alcoholrehabguide.org/resources/dual-diagnosis/alcohol-and-anxiety/>.
18. CDC. Drinking too much alcohol can harm your health. Learn the facts [Internet]. 2022 [cited 2022 Jun 3]. Available from: <https://www.cdc.gov/alcohol/fact-sheets/alcohol-use.htm>.
19. Rehm J, Anderson P, Manthey J, Shield KD, Struzzo P, Wojnar M, et al. Alcohol Use Disorders in Primary Health Care: What Do We Know and Where Do We Go? *Alcohol Alcohol* [Internet]. 2016 [cited 2022 Jun 3];51:422–7. Available from: <https://academic.oup.com/alcalc/article-lookup/doi/10.1093/alcalc/agg127>.
20. Brandt L, Evens R, Reiche S, Marek RM, Moon DU, Groß E, et al. Predictors of Alcohol Consumption Among Younger Adults During the First Phase of the COVID-19 Pandemic. *Front Psychiatry* [Internet].

- 2021 [cited 2022 Jun 21];12. Available from:  
<https://www.frontiersin.org/article/10.3389/fpsy.2021.748158>.
21. Eastman MR, Finlay JM, Kobayashi LC. Alcohol use and mental health among older american adults during the early months of the covid-19 pandemic. *Int J Environ Res Public Health*. MDPI AG; 2021;18.
  22. Lechner WV, Laurene KR, Patel S, Anderson M, Grega C, Kenne DR. Changes in alcohol use as a function of psychological distress and social support following COVID-19 related University closings. *Addict Behav*. Elsevier Ltd; 2020. p. 110.
  23. Schmits E, Glowacz F. Changes in Alcohol Use During the COVID-19 Pandemic: Impact of the Lockdown Conditions and Mental Health Factors. *Int J Ment Health Addict Springer*. 2022;20:1147–58.
  24. Oldham M, Garnett C, Brown J, Kale D, Shahab L, Herbec A. Characterising the patterns of and factors associated with increased alcohol consumption since COVID-19 in a UK sample. *Drug Alcohol Rev* [Internet]. 2021 [cited 2022 Jun 21];10.1111/dar.13256. Available from:  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8014505/>.
  25. Weerakoon SM, Jetelina KK, Knell G. Longer time spent at home during COVID-19 pandemic is associated with binge drinking among US adults. *Am J Drug Alcohol Abuse* [Internet]. Taylor & Francis; 2021 [cited 2022 Jun 21];47:98–106. Available from:  
<https://doi.org/10.1080/00952990.2020.1832508>.
  26. Levy I, Cohen-Louck K, Bonny-Noach H. Gender, employment, and continuous pandemic as predictors of alcohol and drug consumption during the COVID-19. *Drug Alcohol Depend* [Internet]. 2021 [cited 2022 Jun 21];228:109029. Available from:  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8411591/>.
  27. Ministry of Health. COPYRIGHT NOTICE NATIONAL POPULATION HEALTH SURVEY. 2020 - Google Search [Internet]. 2020 [cited 2022 Jun 3]. Available from:  
<https://www.moh.gov.sg/docs/librariesprovider5/default-document-library/nphs-2020-survey-report.pdf>.
  28. Ministry of Health. COPYRIGHT NOTICE NATIONAL POPULATION HEALTH SURVEY 2019 [Internet]. 2019 [cited 2022 Jun 3]. Available from: <https://www.hpb.gov.sg/docs/default-source/default-document-library/national-population-health-survey-2019.pdf>.
  29. Neill E, Meyer D, Toh WL, van Rheenen TE, Phillipou A, Tan EJ, et al. Alcohol use in Australia during the early days of the COVID-19 pandemic: Initial results from the COLLATE project. *Psychiatry Clin Neurosci* Blackwell Publishing. 2020;74:542–9.
  30. Buckner JD, Lewis EM, Abarno CN, Morris PE, Glover NI, Zvolensky MJ. Difficulties with emotion regulation and drinking during the COVID-19 pandemic among undergraduates: the serial mediation of COVID-related distress and drinking to cope with the pandemic. *Cogn Behav Ther* Routledge. 2021;50:261–75.

31. Prestigiacomo CJ, Liu MA, Plawecki MH, Cyders MA. Early Impact of the U.S. COVID-19 Pandemic on Drinking Motives and Alcohol Use. *Subst. Use Misuse*. Taylor and Francis Ltd.; 2021. pp. 1383–6.
32. Chodkiewicz J, Talarowska M, Miniszewska J, Nawrocka N, Bilinski P. Alcohol consumption reported during the COVID-19 pandemic: The initial stage. *Int J Environ Res Public Health MDPI AG*. 2020;17:1–11.
33. Ung M, Wan KYY, Liu SY, Choo YJ, Liew NSW, Shang ZA, et al. Alcohol Consumption, Loneliness, Quality of Life, Social Media Usage and General Anxiety before and during the COVID-19 Pandemic in Singapore. *Int J Environ Res Public Health [Internet]*. Multidisciplinary Digital Publishing Institute; 2022 [cited 2022 Jul 25];19:5636. Available from: <https://www.mdpi.com/1660-4601/19/9/5636>.
34. Lee YY, Wang P, Abdin E, Chang S, Shafie S, Sambasivam R, et al. Prevalence of binge drinking and its association with mental health conditions and quality of life in Singapore. *Addict Behav Pergamon*. 2020;100:106114.
35. Choo D, Elangovan N. The Big Read: As ‘pandemic drinking’ hits globally, some Singaporeans turn to alcohol to cope with COVID-19 boredom, stress - CNA [Internet]. 2021 [cited 2022 Jun 3]. Available from: <https://www.channelnewsasia.com/singapore/big-read-covid-19-pandemic-drinking-alcohol-singaporeans-cope-boredom-stress-2264946>.
36. International Citizen Project Covid-19. International citizen project to assess adherence to public health measures and their impact on the COVID-19 outbreak [Internet]. 2021. Available from: <https://www.icpcovid.com/en>.
37. Farmer R, Sundberg ND. Boredom proneness—the development and correlates of a new scale. *J Pers Assess Taylor & Francis*. 1986;50:4–17.
38. Spitzer RL, Kroenke K, Williams JBW, Löwe B. A Brief Measure for Assessing Generalized Anxiety Disorder: The GAD-7. *Arch Intern Med [Internet]*. 2006 [cited 2022 Aug 5];166:1092–7. Available from: <https://doi.org/10.1001/archinte.166.10.1092>.
39. Topp CW, Østergaard SD, Søndergaard S, Bech P. The WHO-5 Well-Being Index: A Systematic Review of the Literature. *Psychother Psychosom [Internet]*. Karger Publishers; 2015 [cited 2022 Aug 5];84:167–76. Available from: <https://www.karger.com/Article/FullText/376585>.
40. Rehm J, Kilian C, Ferreira-Borges C, Jernigan D, Monteiro M, Parry CDH, et al. Alcohol use in times of the COVID 19: Implications for monitoring and policy. *Drug Alcohol Rev*. 2020;39:301–4.
41. Steffen J, Schlichtiger J, Huber BC, Brunner S. Altered alcohol consumption during COVID-19 pandemic lockdown. *Nutr J*. 2021;20:44.
42. Grossman ER, Benjamin-Neelon SE, Sonnenschein S. Alcohol Consumption during the COVID-19 Pandemic: A Cross-Sectional Survey of US Adults. *Int J Environ Res Public Health*. 2020;17:9189.
43. Lim W-Y, Subramaniam M, Abdin E, He VY, Vaingankar J, Chong SA. Lifetime and twelve-month prevalence of heavy-drinking in Singapore: Results from a representative cross-sectional study. *BMC Public Health [Internet]*. 2013 [cited 2022 Jul 13];13:992. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4028979/>.



# Figures



**Figure 1**

Changes in alcohol consumption behavior before and during the COVID-19 pandemic ( $n=264$ )

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Supplementaryfile1.docx](#)