ALCOHOL USE AND COVID-19: THREE-YEAR IMPACT FOR THE CZECH REPUBLIC

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SUMMARY

Objectives: The aim of the study was to describe alcohol consumption and its changes in the Czech Republic during the period of governmental restrictions related to the COVID-19 pandemic. To this goal, an overview of the governmental measures that may have affected alcohol consumption was compiled from various sources (mostly media reports).

Methods: The paper analyses three surveys where the group from Charles University, Prague, participated in design and execution: the European Study Group on Alcohol use and COVID-19 (ESAC) convenience online survey that (in Czechia) took place at the onset of the COVID-19 pandemic in Europe, in April through June 2020 (n = 1,434), a computer-assisted web interviews (CAWI) survey carried out in November 2021 (n = 790), and another CAWI survey carried out in November 2022 (n = 1,738). These are complemented by a brief overview of official data on alcohol sales between 2019 and 2021 in Czechia from two sources, Ministry of Finance of the Czech Republic and the Nielsen IQ market research company.

Results: Changes in alcohol use appeared to be distributed among the population unequally, when the pandemic influenced different population groups in a different way. In all three surveys, the majority of respondents reported no change in their drinking frequency or quantity. Decreases in alcohol use were more prevalent than increases. Most pronounced changes were detected in at-risk drinkers, who have increased their alcohol use. Official revenue data suggest a small reduction in total alcohol sales in 2019–2021.

Conclusions: Our research results do not support the hypothesis that substantial and unexpected social and economic changes caused by the COVID-19 pandemic, along with corresponding measures, acted as stressors that would have caused the majority of people in Czechia changing their behaviour related to alcohol use; however, high-risk users increased their consumption.

Key words: COVID-19, pandemic, anti-epidemic regulations, alcohol consumption, risk alcohol drinking, Czech Republic

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INTRODUCTION

The new coronavirus that appeared in China in November or December 2019, arrived in Europe in late January 2020. The first case in Europe was confirmed in Rome on 31 January 2020. Clusters of cases were later detected in Lombardy (Italy) on 21 February, and on 8 March, Lombardy became also the first region in the extensive series of long-term lockdowns and curfews in Europe (1, 2). In the Czech Republic, the first confirmed cases of COVID-19 infected persons were on 1 March 2020. Everywhere, the deadly new virus was causing fear and panic, and the world had effectively stopped. Like many other European countries, the Czech Republic was soon crippled by a series of governmental regulations that froze life in the country.

For people providing addiction services it was clear that the resulting stress and lockdowns would bring about changes in health risk behaviour in general (3), as well as changes in patterns of alcohol use. In March 2020, Rehm et al. described two possible hypotheses based on evidence from prior major crises (4). The first scenario supposed a decrease in alcohol consumption due to its impaired availability and affordability during lockdowns, closed pubs and restaurants, and times of economic difficulties, while the other scenario spoke about alcohol use increase due to higher levels of stress and forced separation from the world at home. Importantly, the authors did not assume that it was either one or the other, but that the expected truth was most likely to lie between the two mechanisms.

The ongoing emergency state during the COVID-19 pandemic did not allow for any contact research designs, and thus most surveys studying the changes in people's behaviours were conducted online through emails, web pages or social networks. The first information about changes in alcohol use in Czechia during the COVID-19 pandemic was published by Winkler et al. (5) as a part of their general mental health changes survey. They compared the results from their computer-assisted telephone interviews (CATI) and computer-assisted web interviews (CAWI) survey on a convenience sample of 3,021 adults (adjusted to be representative of the Czech general population in terms of gender, age, education, size, and region of residence) from May 2020 with the results of a similar survey from 2017 – the same eligibility criteria, but the data were collected using the pen-and-paper personal interview (PAPI) method and two-staged sampling, with a random sample of participants being selected from a random group of voting districts; the sample of 3,306 respondents was representative in terms of age, gender, education, and region of residence (6). They found that the 12-month prevalence of alcohol use disorders in 2020 was approximately the same as in 2017, while there was a significant increase in the prevalence of weekly binge drinking and a significant increase in the number of glasses per drinking session for all examined beverages.

Another survey focusing exclusively on substance use and addictive behaviour changes was published by Mravčík and Chomynová (7). It was a CAWI study carried out in May and June 2020. The authors showed that although the general tendency of alcohol use during the lockdown period was a decrease, the most frequent users (daily or almost daily users) increased their intensity of use, while less frequent users tended to reduce it. The 2021 Czech Republic Government report on alcohol use (8) showed that people used alcohol less than before the pandemic, which was connected with limited social contacts and other opportunities to drink alcohol. However, the more risky groups of the population, who drank alcohol several times a week, reported no change in alcohol consumption. Respondents reported that, before the pandemic, they used to consume alcohol most often while spending time with friends (58%), or at parties and during holidays (54%), while drinking at home in the company of their partners, family members or roommates (57%), or drinking at private celebrations (45%) prevailed in COVID-19 times. Drinking alcohol alone at home increased (from 20% before the pandemic to 45%); this was reported more by men, older age groups, and regular consumers.

Most of the results published so far describe behaviours of people during the first year of COVID-triggered lockdowns. Data on later periods are rarely available. This article seeks to fill this gap and provide information on alcohol consumption in the Czech Republic during the entire period of anti-epidemic measures (12 March 2020 through 5 May 2022). The survey carried out by the European Study Group on Alcohol use and COVID-19 (ESAC), a collaboration of researchers from 21 European countries (9), belonged to the earliest systematic data collections on alcohol use. This was the first COVID-time survey that the Public Health Centre for Alcohol-related Harm at the First Faculty of Medicine, Charles University (hereinafter the Prague Centre) collaborated in. Thus, its Czech part is included as an integral part of this paper providing more detailed results than it was published in the all-European analysis and a comparison with results of similar not yet published surveys conducted by the Prague Centre later during the period of anti-epidemic measures. We also compare these results with the official data on alcohol sales in the Czech Republic.

Alcohol, COVID-19 and Anti-epidemic Measures in Czechia in 2020–2021

The governmental anti-epidemic measures were constantly changing, sometimes even several times a day, and even in comparison with most other European countries, they were quite extensive and very restrictive. As they are supposed to have affected alcohol use and there is no source at all providing a complete and clear list of these regulations, we include a special section with an overview of those governmental measures that might have affected alcohol consumption, i.e., restrictions on the movement of people and curfews, closing of restaurants and bars, closing of shops or limiting their opening times, bans of drinking alcohol in public places, cross-border travelling and tourism. This overview can also be useful in another research.

On 1 March 2020, first three laboratory-confirmed COVID-19 cases were reported in the Czech Republic. The number of confirmed cases was growing quite fast, when 3,257 cases were reported during March. The Government of the Czech Republic responded by a declaration of the state of emergency that was valid from 12 March till 17 May 2020. In a quick succession, it brought a series of containment measures. Due to the unknown and fearful nature of the infection, the measures were first introduced rather chaotic and frequently changed. As evidence of the virus grew, the character of the anti-epidemic measures was changing, however, quite restrictive measures were in force until the end of 2021, when the parliamentary elections were followed by the appointment of a new Czech government that stepwise repealed the anti-epidemic measures one-by-one until May 2022. During the two-year period, the measures were enforced by the police and other state authorities.

Many of the below described measures likely had an important effect on drinking habits and the amount of consumed alcohol. As the measures and their changes were coming frequently, irregularly, and often overlapped, it is impossible to separate them and study their impact individually. It was even not clear which of them would reduce or increase alcohol consumption (4). In this section we briefly refer to the measures that, in our opinion, could have had affected alcohol consumption. The overview was compiled from various sources (mostly media reports) and triangulated with the list of Czech governmental resolutions concerning COVID-19 published without details in Czech language on web pages of the Ministry of Health of the Czech Republic (10–12).

Restrictions on mobility and assembly: On 12 March 2020, the state of emergency was declared in the Czech Republic and lasted until 17 May 2020. In this period, the free movement of people was restricted to necessary cases (e.g., travelling to work, to visit family or to make necessary shopping; later it was also allowed to stay in parks and in the outdoor areas). All sport and cultural events were cancelled. A second state of emergency was declared with similar restrictions from 5 October 2020 and lasted until 11 April 2021. Moreover, all companies were recommended to allow work from home whenever possible. On 11 February 2021, a curfew was declared in three districts (Cheb, Sokolov, Trutnov) that were hermetically closed. As COVID-19 cases and deaths

continued to increase dramatically all over the country, a curfew was declared on the whole territory of the Czech Republic on 26 February 2021. It contained a strict ban to travel between districts for any reason while going to work and/or shopping was allowed in the whole home district, and walking only in the territory of one's town/village. It lasted until 12 April 2021, although walking was allowed within the whole district from 22 March 2021. The majority of mobility restrictions were lifted in the spring and summer 2021. People were slowly returning to a normal way of living. They hoped that vaccination (that started during Christmas 2020) would allow for normal activities. However, the number of COVID-19 infections were gradually growing in October and November, and the government declared a third state of emergency on 25 November 2021 to be effective until 25 December 2021.

All these restrictions likely impacted social occasions for alcohol consumption and may therefore have impacted drinking frequency and informal social control of consumption (13). People could not play sports nor go to culture, had to stay at home with their children during the closure of schools and children's clubs, many had their work interrupted.

On-premises alcohol outlets (restaurants, bars, etc.): All restaurants (incl. fast food shops, cafes, bars) and hence on-premises alcohol sales were closed from 14 March until 25 May 2020, although takeaway sales through windows were possible (however, they were not allowed to sell alcoholic beverages). All restaurants were closed again on 13 October 2020. Only from 17 May 2021, the restaurants were allowed to open again, although with various restrictions being effective (to various extent) until 5 May 2022.

As there is a strong beer-drinking culture in the Czech Republic (48% of ethanol is consumed in beer), these closures probably caused a significant decrease in people's access to alcohol (14). The question is to what extent drinking moved from pubs, restaurants and bars to the homes. This was probably not the case in full.

Off-premises alcohol outlets (grocery shops and supermarkets): Most retail shops were closed from 14 March 2020 with exceptions containing vital services, e.g., grocery shops and supermarkets (where, however, alcoholic beverages are available without restrictions), pharmacies, pet shops, petrol stations (that also widely sell alcoholic beverages without restrictions). Retail shops were gradually reopened between 20 April and 11 May 2020. From 28 October 2020, all shops had to close at 8 p.m. on weekdays and stay closed on Sundays. Most shops (except for the most necessary shops like grocery shops and supermarkets or pharmacies) had to close from 1 March 2021, and could reopen only on 12 April 2021. In autumn 2021 and winter 2021/2022, various measures were effective limiting the number of customers. All measures have been revoked on 5 May 2022. E-shops with a delivery service were operating at all times without any restriction.

Thus, alcoholic beverages were widely available and accessible from retail and e-shops without any restrictions during the whole studied period. It is supposed that many drinkers changed their habits to buying more alcohol for home drinking with the family and friends (although there were curfews, visits to other people's homes were not effectively controlled).

Drinking alcohol in public places: A ban of drinking alcohol in public places was first announced on 13 October 2020, which was in force until 12 April 2021. After some excesses in the early days of the measure, the ban was strictly enforced by the police. Another ban of drinking alcohol in public places was effective from 25 November 2021 until 25 December 2021.

This measure had probably only minor impact on alcohol consumption, as in these periods there were no (sport, culture or other) public events allowed, as well as no on-premises alcohol sale was available.

Cross-border travel and tourism: The borders were closed immediately on 16 March 2020. Travelling was slightly relaxed on 24 April 2020, and the measures were several times changed during 2020, when there were different (mutual) regulations for each country. Thus, both active and passive cross-border tourism was significantly reduced during the whole year 2020. With vaccination starting in December 2020, similarly like in other (European) countries, the travel restrictions had been stepwise waived for persons with vaccination proof, so that holidays 2021 witnessed a cautious restart of cross-border tourism.

Czechia is a destination for strong beer tourism. The closure of the borders had thus brought a noticeable drop in the demand for alcohol by tourists and vice versa, Czech citizens did not travel for holidays abroad. Although travelling is usually associated with alcohol consumption, it is not probable that the impact of these measures would have had any significant impact on the alcohol consumption of Czech citizens.

MATERIALS AND METHODS

The paper analyses four data sources, a convenience online survey that took place at the onset of the COVID-19 pandemic in Europe (ESAC survey); a CAWI survey carried out in the Czech National Panel one and a half year later, in November 2021 (2021 survey); an (independent) CAWI survey carried out in collaboration with PAQ Research in November 2022 (2022 survey); and official data on alcohol sales in the Czech Republic from two sources, the Ministry of Finance of the Czech Republic (data series covering the period 2004–2021) and the market research company Nielsen IQ (2019–2021).

European Early Study, April through June 2020

We employed data from ESAC, an online survey targeted at adults aged 18 years or older. It captured changes in alcohol consumption during the first months of the COVID-19 pandemic (9). The survey was originally developed in English and then translated into 20 languages including Czech and disseminated in 21 European countries during the first four months of the COVID-19 pandemic in Europe. The survey was distributed in a decentralized manner, using non-probabilistic convenience sampling. In Czechia, the website and Facebook pages of the Prague Centre were used and, next to that, authors' social contacts and the snowball method were employed to reach different respondent groups (15). Prerequisites for participation were a minimum age of 18 years and prior consent. Participation in the survey was voluntary and anonymous, and the survey was approved by the Data Protection Office of the Technical University Dresden, Germany, with regards to the EU General Data Protection Regulation 2016/679.

In Czechia, data collection took place between 24 April and 30 June 2020, when 1,555 participants residing in the country

provided data. Out of them, 1,434 could be included in the analysis of this study (records provided by non-drinkers were excluded). Respondents were asked – in line with the Alcohol Use Disorder Identification Test – Consumption (AUDIT C) (16) whether their frequency of drinking occasions, quantity of alcohol consumed per occasion, or frequency of heavy episodic drinking (HED) had changed during the past month, i.e., 'drinking much less (often)' (−2), 'drinking slightly less (often)' (−1), 'no change' (0), 'drinking slightly more (often)' (+1), 'drinking much more (often)' (+2). Negative values indicated a decrease, and positive values indicated an increase in consumption over the past month. The consumption change score, that is the sum of the values of the three alcohol-use change items, was treated as a continuous variable with values from the interval (−6; 6). To adjust the sample to the respective population distributions of the country, data were weighted by sex (women, men), age group (18–34, 35–54, ≥55 years), and educational attainment (primary, secondary, higher education). Methodological details are presented in the work of Kilian et al. (9) or Manthey et al. (17); the data set is publicly available (18).

November 2021 Survey

The next dataset was collected in a survey carried out as an internet collection (CAWI) in November 2021. The survey of the Prague Centre was conducted by the Nielsen Admosphere public opinion research agency and respondents (aged 18+) were recruited from the Czech National Panel. The panel has more than 60 thousand participants in the Czech Republic and covers all population segments. The inclusion of participants was controlled, so that the sample is representative for the Czech population with regard to (individually) gender, age, education, region, and community size. The quotas were controlled in the first screening question, and participants were refused if the quotas were exceeded. The final dataset contained 809 participants, who were asked to answer a large series of questions about their drinking habits including the impact of the COVID-19 pandemic. Out of them, 19 left blank at least one question important for this analysis (some AUDIT field or a question asking change in drinking frequency or quantity during the COVID-19 pandemic); thus, the final number of valid answers was 790. The research in the Czech Republic was agreed by the Ethics Committee of the National Monitoring Centre for Drugs and Addiction No. EKNMS-5/2021, and was executed fully in line with the Farmington Consensus (19).

Respondents were asked (similarly to the AUDIT C tool) whether their frequency of drinking occasions and quantity of alcohol consumed per occasion had changed during the pandemic months (March 2020 through November 2021) as compared to the state before the pandemic. The evaluation was on the scale from −2 to +2 in the same way as in the ESAC survey described above. The respondents were asked only about the frequency and quantity of drinking, not about the frequency of HED. Thus, the scores for the frequency of drinking occasions and quantity of alcohol consumed per occasion, both from the interval (−2; 2), were analysed individually. Again, these scores were treated as continuous variables. Next to that, the respondents were asked about changes in the pattern or circumstances (Table 2) of alcohol consumption during the COVID-19 anti-epidemic measures.

November 2022 Survey

Third, another CAWI survey was carried out in collaboration with the PAQ Research sociological institute one year later, in autumn 2022. Its objectives were very different; however, the questionnaire contained a few questions concerning respondents' experience from the period of anti-epidemic measures. As it was nearly half a year since the last restrictions had been waived, the responses reflect rather a retrospective assessment of the measures that might be subject to reporting and memory biases. However, it will provide an idea of how respondents see their behaviour and the impact of the measures taken after several months. Data was collected through online panels (CAWI) on a sample of 1,738 young adults aged 18–26 years. To adjust the sample to the respective population distributions of the country (within the age range 18–26), data were weighted by sex (women, men), age group (18–20, 21–23, 24–26), educational attainment (primary, secondary, higher education), region (14 administrative regions), size of place of residence (4 categories), working status (student, working, other), long-term unemployment, unemployment subsidy beneficiary, household income (below/above 50% of nation median), and the combinations of sex-age group and sex-educational attainment. PAQ Research guaranteed the sampling and based these calculations on their extensive sociological data and their standard processes.

Sales of Alcoholic Beverages

Fourth, the above-described data from self-reported surveys were compared with official data on alcoholic beverage sales provided by the Ministry of Finance of the Czech Republic and Nielsen IQ, who regularly collect data on alcohol sales at the Czech market. Both datasets differ significantly.

In the Czech Republic, all individuals and legal entities must declare and pay excise tax on alcohol with the release of products for free circulation in the market (20). This means that the data are not collected when the alcohol is sold to the customer, but when it is taxed and stored. The data obtained this way are available from the Ministry of Finance of the Czech Republic. They have a full coverage of the legal, i.e., recorded domestic alcohol sales (off-premises and on-premises). The data are reported in litres of liquid in the following categories: ethanol, fruit distillates, beer, still wine, sparkling wine, and intermediate products. Nielsen IQ records data when the alcohol is sold in all kinds of off-premises shops except petrol stations and e-commerce. They are reported in litres of liquid; however, not all categories of alcohol are covered in all kinds of shops. Beer and distillates were covered in all kinds of shops, sparkling and still wines only in hypermarkets and supermarkets. The data from Nielsen IQ were only available from 2019 to 2021, while data from the Ministry of Finance were available from 2004 to 2021 (2022 data are not available due to a change of methodology). Nielsen IQ provided us with monthly data, while we obtained quarterly aggregated data from the Ministry of Finance. For the purposes of our analysis, we also aggregated Nielsen IQ data on a quarterly basis.

Due to the fact that the data were provided in litres of liquid we had to perform recalculations to obtain volumes of pure alcohol. For the conversion, we used the following usual estimates of pure alcohol content in one litre of liquid: beer 4%, spirits 38%, still wine 12%, sparkling wine 12%. The Ministry of Finance provided

their data on ethanol and fruit distillates in litres of pure alcohol, and we did not perform any recalculations for these categories. We conducted descriptive data analysis, showing the amount of litres of pure alcohol sold in Czechia. The data are shown in charts.

Calculations and Statistical Analysis

Data in the three population surveys were collected, cleared (incomplete data was excluded), and in the case of the ESAC survey (from 2020) and the 2022 survey weighted as described above to better fit the national demography. Statistical analyses were performed using IBM SPSS version 28 and R studio. We calculated descriptive statistics, including absolute or relative frequencies. Confidence intervals were calculated using T distribution (2021 survey) or bootstrapping (ECAS survey). In the 2021 survey, we compared the resulting scores for low-risk drinkers (AUDIT 0–7) and risky drinkers (AUDIT 8+) by T-tests. The statistical tests were evaluated at the significance level of 0.05.

RESULTS

ECAS Survey, April through June 2020

Table 1 shows the main indicators of change for the Czech Republic. The summary indicator of net alcohol use change is taken from the work of Manthey et al. (17). The proportion decreasing their use was subtracted from the proportion increasing their use. Using this "crude" indicator, positive figures denote an overall tendency to increase alcohol use, while negative figures denote an overall tendency to decrease alcohol use. The corresponding confidence intervals were bootstrapped from 10,000 random estimates sampled around each point estimate based on the weighted standard error. It is straightforward that the frequency and the quantity stayed the same or decreased insignificantly (i.e., the confidence intervals include zero), while the frequency of HED decreased significantly.

While the total results did not seem to indicate any major problem, a more detailed analysis showed that the drinkers with the highest pre-pandemic consumption levels increased their consumption during the first pandemic months significantly. In the paper by Rossow et al. (21) we showed that the COVID-19 pandemic has affected those drinking at high levels differently to other drinkers, with an overall increase in alcohol consumption among the heavier drinkers and a very small change (in either direction) in alcohol consumption among the remainder. The drinkers above the 90th percentile according to the amount (measured in standard units of alcohol per week) increased their consumption by 41%. This observed polarization of alcohol consumption may be a phenomenon associated with a specific (COVID-induced) type of public health challenges (21).

2021 Survey

The average change in drinking frequency, measured by a score with values from the interval (−2; 2), was −0.330 (95% CI: −0.332, −0.328) and in drinking quantity −0.358 (95% CI: −0.360, −0.356), indicating statistically significant decreases in both drinking frequency and quantity during the COVID-19 pandemic as compared with the situation before. We also tried to compare these figures for low-risk drinkers (AUDIT 0−7) and risky drinkers (AUDIT 8+). For the drinking frequency, it was −0.367 and −0.219, respectively, for drinking quantity it was −0.362 and −0.237, respectively. In both cases, the T-test showed statistically insignificant differences with p=0.052 and 0.103, respectively. Table 2 shows how many respondents indicated a positive answer to the question about changing their drinking in selected situations.

2022 Survey

This survey was only focused on young people aged 18–26 (Table 3). The results confirmed the conclusions of the June 2020 survey that the number of those who admitted to have increased alcohol consumption during the pandemic was increasing with the

Table 2. *Respondents changing their drinking in selected situations (N = 790)*

Situation	Number of respondents who agreed[a] (n)
I drink alcohol alone more often	68
I drink alcohol before noon more often	11
I now prefer drinks with a higher alcohol content	26
I now prefer drinks with a lower alcohol content	74
Other changes in alcohol consumption	21
Nothing of the above	614

Source: November 2021 survey
[a]Multiple answers allowed

Table 1. *Self-reported changes in alcohol drinking in Czechia (N = 1,434)*

Self-reported change	Change in frequency % (95% CI)	Change in quantity % (95% CI)	Change in HED % (95% CI)
Much more (+2)	7.3 (−0.7, 15.3)	3.8 (−4.2, 11.9)	4.4 (−4.8, 13.6)
Slightly more (+1)	19.6 (11.6, 27.5)	14.9 (5.9, 23.9)	12.4 (2.7, 22.0)
No change (0)	43.5 (36.0, 50.9)	56.6 (50.2, 63.0)	53.8 (47.4, 60.3)
Slightly less (−1)	15.1 (6.0, 24.2)	12.4 (3.8, 21.0)	10.0 (1.3, 18.6)
Much less (−2)	14.6 (6.1, 23.0)	12.2 (4.0, 20.4)	19.4 (11.1, 27.8)
Summary indicator of change	−2.9 (−13.4, 8.0)	−5.8 (−17.4, 5.5)	−12.6 (−24.7, −0.8)

Source: European early study, April through June 2020
CI – confidence interval; HED – heavy episodic drinking
Summary indicator is the balance between percentages of those drinking more and those drinking less.

Table 3. *Respondents' use of alcohol during COVID-19 anti-epidemic measures according to their score in AUDIT (N = 1,738)*

	All respondents[a]	AUDIT 8+	AUDIT 16+	AUDIT 20+
Number of respondents (n)	1,738	515	134	66
Frequency decreased (%)	36.9	33.0	29.8	26.2
Frequency did not change (%)	46.3	37.3	33.2	20.1
Frequency increased (%)	16.8	19.7	37	53.7
Quantity decreased (%)	23.4	27.9	26.3	14.1
Quantity did not change (%)	63.1	48.9	42.4	40.7
Quantity increased (%)	13.5	23.2	31.3	45.2

Source: November 2022 survey
[a]Respondents aged 18–26 years

severity of their AUDIT score, the cut-off points are chosen in line with Babor et al. (22). All respondents were asked to answer the questions concerning selected drinking situations which provided us with the results expressed as shares of all respondents (Table 4).

Table 4. *Respondents changing their drinking in selected situations (N = 1,783)*

Situation	Respondents[a] who agreed[b] (%)
I drank alcohol alone more often	22.9
I drank alcohol before noon more often	9.7
I preferred drinks with a higher alcohol content	21.7
I preferred drinks with a lower alcohol content	52.0

Source: November 2022 survey
[a]Respondents aged 18–26 years, [b]multiple answers allowed

Sales of Alcoholic Beverages

Figure 1 and Table 5 show the volumes of alcohol sales in litres of pure alcohol. Figure 1 shows the time series of litres of pure alcohol sold in the Czech Republic between January 2019 and July 2022. The time slots when data in the three surveys were collected are indicated (by dotted vertical lines), as well as the periods when the main types of restrictive measures were in place (coloured bars below the chart). The data of the Ministry of Finance show a clear decrease of the alcohol sold in 2020 compared to 2019, indicating an overall decline in alcohol sales. The year 2021 brought a small increase. The Nielson IQ data of beer and distillates sold in off-premises shops except petrol stations and e-commerce show an increase in 2020 and then stabilization in 2021.

The results presented in this section only have an illustrative purpose to complement the results of the three surveys. Further research is underway to examine this complex issue in depth.

DISCUSSION

The present study examined changes in alcohol use in Czechia during the pandemic of COVID-19 (when the last sub-study was retrospectively carried out about half a year after the anti-epidemic measures were finally waived), and shows that the sub-studies approach may be well used for documentation of changes in alcohol use, even if their focus and scope was variable and the results were not presented in a fully comparable way. In line with numerous studies, we found that alcohol use during the pandemic was associated with previous drinking patterns. According to the literature, the population that was mostly affected by negative

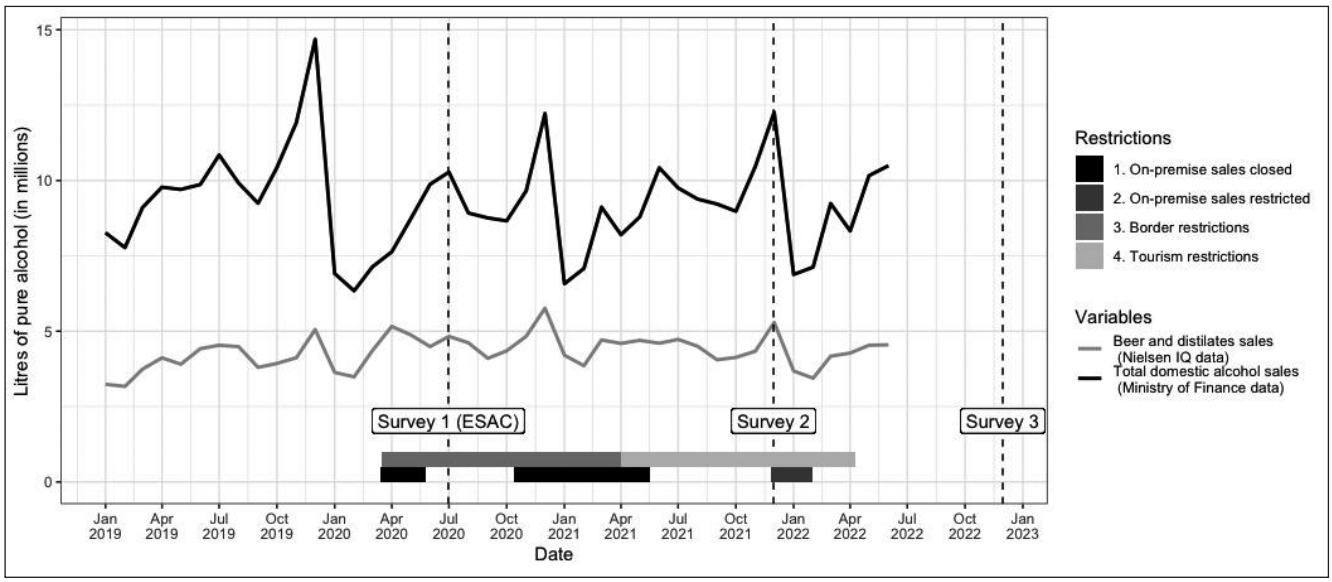

Fig. 1. *Litres of pure alcohol sold in the Czech Republic between January 2019 and July 2022.*

Table 5. *Volume of sold pure alcohol in the Czech Republic in 2019–2021*

	2019 (L)	2020 (L)	2021 (L)	Change between 2019 and 2020 (%)	Change between 2020 and 2021 (%)
Taxed alcohol[a]	121,695,401	104,480,012	110,034,689	−14.1	5.3
Beer and distillates[b]	48,526,151	54,491,709	53,700,955	12.3	−1.5

L – litre

[a]The Ministry of Finance has a full coverage of the legal, i.e. recorded domestic alcohol sales (off-premises and on-premises). The data are reported in litres of liquid and are collected when the alcohol is taxed and stored, not when it is sold to the customer.

[b]Nielsen IQ records data when the alcohol is sold in all kinds of off-premises shops except petrol stations and e-commerce, however, not all categories of alcohol are covered in all kinds of shops (sparkling and still wines are recorded only in hypermarkets and supermarkets).

changes in alcohol use were young adults (23–27), which our November 2022 survey seems to confirm. The largest change in both drinking frequency and quantity of alcohol use was reported by respondents in the April–June 2020 survey in comparison to the later ones. In all three surveys, large parts of the respondents reported no change in frequency or quantity (Fig. 2 and 3). Decreases were more prevalently reported than increases. Thus, we conclude that the overall general use of alcohol did not change considerably, as a large number of people reported either decreases or no change in their consumption. However, a minor part of the samples reported an increase in the frequency and/or quantity of drinking. The results further reveal that the changes in alcohol use were not distributed equally across the population and that the pandemic influenced different population groups in different ways. Overall, it appears that young adults and heavy drinkers show the greatest changes in their consumption of alcohol. While young adults showed both positive and negative changes, reflecting their increased sensitivity to the high variability of the anti-epidemic measures (23–25), heavy drinkers were found to report a deterioration in their alcohol-related behaviour, i.e., increased consumption (26, 28, 29).

Our results show consistency with other research. A research by Bramness et al. (30) showed that the most frequently reported reasons for drinking less pertained to fewer social occasions and limited on-premises drinking. Given that the availability of alcohol was high in the Czech Republic during the pandemic (despite the closure of on-premises venues), a significant reason in the reduction of use in the Czech Republic was likely to be

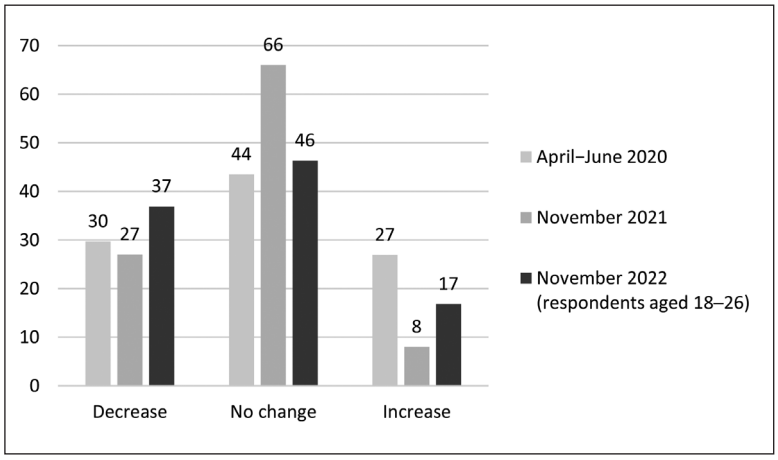

Fig. 2. *Comparison of changes in drinking frequency as reported in individual surveys.*

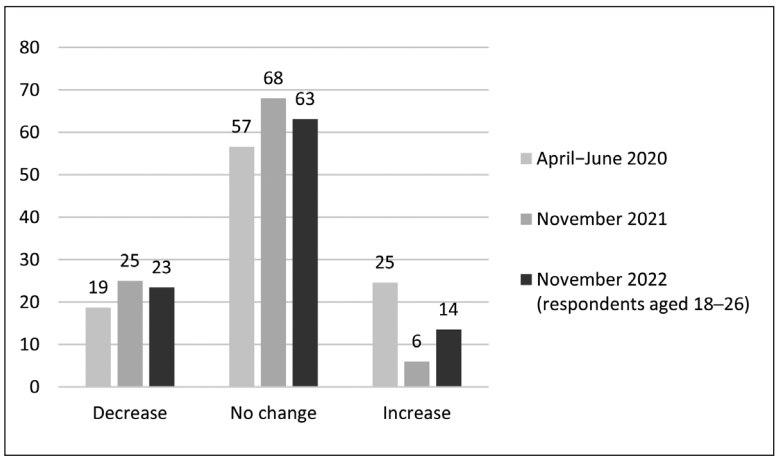

Fig. 3. *Comparison of changes in quantity consumed as reported in individual surveys.*

the limitation of social contacts during recurrent lockdowns. Our findings are consistent with that of Patrick et al. (31), who found that the major motives for increasing alcohol use in young and middle-age US adults were related to relax/relieve tension and to boredom. A study by Monk et al. (32) showed that the context of enforced social restrictions may have been associated with elevated consumption levels. A longitudinal study carried out in Poland by Kosendiak et al. basically support our results (33). Our results also not surprisingly correspond to the summary results for all 21 European countries covered by the ESAC with summary indicator of 2.3% (95% CI: −1.9, 6.7) for drinking frequency, −6.6% (95% CI: −11.1, −2.2) for drinking quantity and −14.0% (95% CI: −18.7, −9.4) for HED (18).

Studies focusing on changes in alcohol use in the general population during the COVID-19 pandemic have produced mixed results. While Acuff et al. (34) claim that decreases and increases appeared equally and Roberts et al. (35) found in their systematic review that the evidence suggests a mixed picture for alcohol use, the meta-analysis of observational studies in the general population found that decreases in drinking frequency, quantity consumed, and mainly heavy episodic drinking were reported more often than increases (36). This meta-analysis also concluded that high-level drinking patterns have persisted or worsened among people with pre-existing high drinking levels or alcohol problems. These two findings are consistent with our results. Also Strizek et al. show mixed results similar to our conclusions (37). Creswell et al. (38) found that alcohol use and alcohol-related problems significantly decreased in heavy drinking young adults during the pandemic, which partly opposes to our results.

Csémy et al. (39), based on other repeated representative surveys, described an increase in regular and frequent drinking of alcoholic beverages (i.e., drinking daily or every other day) from 17.4% in 2019 to 19.8% in 2020, and later, on the contrary, a decrease to 15.4% in 2021, and 15.9% in 2022 in the Czech Republic. According to Winkler et al. (5) there was an increase in the proportion of Czech people who reported frequent drinking of excessive doses of alcohol, i.e., five or more glasses of alcohol on one occasion once a week or more often (from 4.1% in 2017 to 6.4% in 2020), as well as an increase in the average number of glasses of alcohol drunk on one occasion, for all monitored types of alcoholic beverages (from 1.6 to 1.8 glasses of beer, from 1.4 to 1.6 glasses of wine, and from 1.2 to 1.3 glasses of spirits). Winkler et al. (40) showed that the prevalence of alcohol use disorders insignificantly fluctuated between 10.8% in November 2017, 9.9% in May 2020, and 12.1% in November 2020. This is also consistent with our 2020 results: the proportion of heavy drinkers increased only insignificantly from 13.2% to 13.7% (21). On the other hand, a slight decline of heavy episodic drinking in overall population during the first wave of COVID-19 measures in 2020 was identified. However, in the European context it seems that the situation may have worsened, especially among heavy alcohol users (21). Heavy users, i.e., those who used alcohol very frequently (daily or almost daily) in the past 12 months, were found to increase their level of use during the pandemic, while less heavy users tended to decrease it.

Research results do not support the assumption that substantial and unexpected social and economic changes caused by the COVID-19 pandemic, along with corresponding measures, acted as stressors that would have caused the majority of people in Czechia change their alcohol use, however, it seems that the problems of specific population (such as high-risk users) exist. The same patterns were observed in the pilot study among Ukrainian female refugees in the Czech Republic in 2022 (41).

The official data on alcoholic beverage sales provided by the Ministry of Finance of the Czech Republic and Nielsen IQ (the fourth part of our study) can be compared with data of the Czech Statistical Office (CZSO) concerning per capita alcohol consumption. According to the CZSO (42), the total recorded per capita consumption of pure alcohol (all figures in this paragraph are given in terms of pure alcohol) decreased from 10.0 litres in 2019 to 9.7 litres in the years 2020, 2021 and 2022. While the consumption of spirits stagnated (2.8 litres in 2019, 2020 and 2021, and 2.7 litres in 2022), the consumption of beer decreased from 4.8 litres in 2019 to 4.6 litres in 2020, and 4.5 litres in 2021, and increased again to 4.7 litres in 2022, and wine consumption was stable (2.3 litres in 2019 and 2020, 2.4 litres in 2021, and again 2.3 litres in 2022). The overall decline in consumption does not appear to be as significant as indicated by the sales data, but the trend remains the same. For instance, there was a decrease in beer consumption by 0.3 litres of pure alcohol per person between 2019 and 2021, which roughly translates to a reduction of just six litres of beer per person per year. The increase in volumes sold in off-premises (retail) outlets in 2020 can be explained by the lack of access to alcohol in the hospitality sector (on-premises).

Studies from other countries found that alcohol-specific policy restrictions implemented in response to the COVID-19 pandemic were associated with reduced consumption. However, the magnitude and direction of change was moderated by area-based deprivation level, albeit inconsistently across various deprivation measures (43). A study from New Zealand by Huckle et al. (44) showed that online alcohol delivery during the COVID-19 pandemic restrictions was associated with heavier drinking in the past week. Leifman et al. (45) found that there was an overall reduction in alcohol sales of 3.6% during pandemic based on data from multiple European countries, however, Czechia was not included. According to our data, the total alcohol per capita consumption in Czechia has declined in 2020 and 2021 compared to 2019. We found an increase in alcohol sales in 2020 and a decrease in 2021. The study does not include the 2021–2022 data, so the comparison of the results is only limited (45). In line with Hardie at al. (46) we also found that the reductions in on-premises alcohol consumption following COVID-19 lockdown restrictions were largely offset by increased sales in the retail sector and drinking at home.

Limitations of the Study

The discussion should be read with possible limitations of the reported surveys. The main limitation of the presented results is the questionable representativeness. Especially for the first survey conducted in 2020, along with other web-based surveys, some subgroups (e.g., older adults or young men with education lower than high school) may not be well captured. Additionally, those without Internet access might have been excluded from the participation completely. The representativeness of a convenient self-selected sample is often poor, but weighting the sample based on gender, age, and education helped to improve its representativeness.

The sample of the third survey differed by focusing only on young adults aged 18–26 years, which may be an important source of possible differences from the previous two surveys. We are aware of this fact. Data for other age groups are, however, not available, and with a careful analysis and interpretation we got interesting findings.

All three questionnaires recorded self-reported changes in alcohol use, which were assessed retrospectively by survey respondents. Retrospective assessment of substance use is known to be inaccurate due to recall and social desirability biases (47). These biases, as well as subjective interpretation of the questions, may have affected the meaning of the categories "much less" and "much more" in particular. These categories may therefore not indicate equal amounts or frequencies of alcohol use, and their meaning may depend on the respondent's baseline level of alcohol use and should be interpreted cautiously.

Furthermore, quantity-frequency measures, used in AUDIT-C, which ask about the average amount of alcohol consumed and the frequency of drinking, have been shown to underestimate alcohol consumption and to be less accurate than longitudinal daily drinking measures, which ask about the amount of alcohol consumed on each day such as drinking diaries (48). An underestimation of alcohol consumption using the AUDIT C questions is likely caused by the fact that it is an expected socially desirable outcome and should therefore be viewed with caution.

The above-mentioned limitations of retrospective online surveys are in part addressed by use of alcohol sales data, which are not based on self-reporting, and thus provide a means of triangulation. However, while the Ministry of Finance data include both on-premises and off-premises sales, the Nielsen IQ data only include off-premises sales in all kinds of shops except petrol stations and e-commerce.

It is also necessary to have in mind the observation of Sheila Jasanoff: "the COVID-19 pandemic has confounded the world's expectations; it began in surprise, continued with chaos, and devolved into conspiracy theories" (49). During the pandemic time, as the fear was decreasing, people were gradually reducing their compliance with COVID-19 restrictions (50). This was present also in Czechia, and thus the effect of the (mobility and other) restrictions affecting alcohol consumption was not stable over time. Jasanoff argues that the issue is related to "overestimating the certainty of our predictions and our capacity for control" (49).

CONCLUSIONS

Our research results do not support the hypothesis that substantial and unexpected social and economic changes caused by the COVID-19 pandemic, along with corresponding governmental measures, acted as stressors that would have caused the majority of people in Czechia changing their behaviour related to alcohol use. The decrease in on-premises alcohol consumption was plausibly offset by home drinking, when alcoholic beverages were widely available and accessible from retail and e-shops without any restrictions during the whole COVID-19 period. A positive phenomenon was a decrease in heavy episodic drinking, especially in the beginning of the pandemic. However, pre-pandemic high-risk users (in terms of amount consumed) increased their consumption. This group of high-risk users poses a challenge to the treatment system.

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Conflicts of Interest

None declared

Authors' Contributions

VR, BP and MB contributed equally to this work.

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