Distribution of alcohol use in Australia

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Executive Summary

SUMMARY

This study aims to investigate the sociodemographic characteristics and the alcohol consumption patterns among people who use alcohol at the heaviest levels. Specifically, using the 2019 National Drug Strategy Household Survey (NDSHS) this report:

1) Re-examines the distribution of drinking in Australia.

2) Identifies the sociodemographic characteristics of these heaviest drinkers.

3) Assesses how key drinking and risk behaviours differ for the heaviest drinkers compared to other people who drink alcohol – focusing on heavy drinking occasions and alcohol type.

In order to understand the characteristics of the heaviest drinkers, this study examines the proportion of participants included in this group by sex, age group, employment status, remoteness, neighbourhood disadvantage, main drink type and drinking location. A logistic regression analysis was also conducted to identify which factors had the strongest association with heavy drinking.

KEY FINDINGS

1. In 2019, the heaviest drinking 5% of the Australian population drank 36.1% of all alcohol consumed. This concentration was observed when analysing larger cohorts - the heaviest drinking 10% of the Australian population drank 54.1% of all alcohol consumed, and the heaviest drinking 20% of the Australian population accounted for 75.1% of all alcohol consumed.

2. The heaviest drinking 5% of the population drank 7.83 standard drinks per day on average and the heaviest drinking 10% drank 3.89 standard drinks per day on average.

3. Analysis of the heaviest drinking 10% of the population found:

   • Regular strength beer and cask wine was their most common main drink type

   • The age groups more likely to be among the heaviest drinking 10% were 50–59-year olds (13%) and 40–49-year olds (12%)

   • The heaviest drinking 10% were more likely to be men than women, and also more likely to live in rural and regional localities. They were more likely to report drinking in several locations, including at home, in pubs/clubs and in public spaces.

IMPLICATIONS AND CONCLUSIONS

Results have remained relatively stable in comparison to previous Australian analysis investigating alcohol consumption among the heaviest drinking population. Results also show that the heaviest drinkers continue to consume well above the National Health and Medical Research Council (NHMRC) Australian guidelines to reduce health risks from drinking alcohol (Alcohol Guidelines).

Introduction

Alcohol has a significant impact on the health and wellbeing of Australians, being a leading risk factor for global disease burden and causally contributing to over 60 medical conditions (Rehm et al., 2009).

Following Skog's (1985) "distribution of consumption" model, researchers have found that a small proportion of consumers account for a high proportion of total alcohol intake. Seminal work by Room (1970) found that the heaviest drinking 10% of the American population consumed 60% of the reported alcohol drunk. While these findings concur with similar historical studies (Lemmens, Tan, & Knibbe, 1990; Skog, 1985), this total may be an underestimation due to the omission of people drinking less frequently than once a month (see argument in (Greenfield & Rogers, 1999)). More recent international estimates similarly find skewed distributions; finding that the heaviest drinking 4% in the United Kingdom drank 30% of the total alcohol consumed (Bhattacharya et al., 2018), the heaviest 10% in the United States consume 55.3% (Kerr & Greenfield, 2007), and the heaviest drinking 10% in Brazil consume 44.2% (Caetano, Mills, Pinsky, Zaleski, & Laranjeira, 2012). Several studies have also identified that the majority of alcohol consumed is well above national guidelines (Stockwell, Surge, & Macdonald, 2005), including in Australia where (at the time of the study) the Alcohol Guidelines recommend consuming no more than two standard drinks on any one day (Callinan, Livingston, Room, & Dietze, 2018; National Health and Medical Research Council, 2009).

In terms of understanding who makes up this heavy drinking group, research has found young adults to be disproportionately represented in the heaviest drinkers (Caetano et al., 2012). For example, people aged 18-29 years were found to account for 45% of all adults drinking despite only representing 27% of the population in the United States (Greenfield & Rogers, 1999). Greenfield and Rogers (1999) also found that women contributed to only 24% of the country's total reported consumption, were underrepresented in the top volume levels and were found to contribute proportionally less to the highest volume groups. Indeed, men have been found to consume more alcohol than women across the globe (Wilsnack, Vogeltanz, Wilsnack, & Harris, 2000), and be overrepresented in the heaviest consuming group (Caetano et al., 2012). When looking at specific drinking occasions, researchers in Switzerland found that 69.3% of 19-year-old men's total weekly consumption was in

the form of risky single occasion drinking days (Gmel, Gaume, Faouzi, Kulling, & Daeppen, 2008). However, there are vast cultural differences in drinking and the position of drinking practices in a society and there is a need to consider a wider array of settings individually, using national data.

Looking specifically at Australia, studies have similarly found a small proportion of people who drink alcohol account for the majority of alcohol consumed. For example, in Victoria, Australia, researchers concluded that the heaviest consumers, who made up 3% of their sample, purchased 20% of the total litres of per capita of alcohol (Sharma, Vandenberg, & Hollingsworth, 2014). These people were also more likely to purchase cask wine and full-strength beer and pay significantly less per standard drink compared to light drinkers (Sharma et al., 2014). Recent Australian research examining the heaviest drinking population group and their sociodemographic characteristics found that the heaviest drinking 10% of the population drank 54.4% of all alcohol consumed and that these drinkers were more likely to be men, more likely to drink cask wine and full-strength beer, purchase cheap alcohol and more likely to live in regional and remote areas (Livingston & Callinan, 2019)[1]. This research has provided first insights on the heaviest drinkers, however there is a need to provide updated statistics on these characteristics following trends in consumption more broadly, including the declining trend in consumption among young people (Australian Institute of Health and Welfare, 2017).

Understanding how consumption is skewed and who the heaviest drinkers are in the Australian population is a crucial endeavour and will help researchers and policy makers identify who and how (population- or individual-level strategies) to target prevention or intervention initiatives. Following the work of Livingston and Callinan (2019) based on the 2016 National Drug Strategy Household Survey (NDSHS), this study aims to investigate the sociodemographic characteristics and the alcohol consumption patterns among Australia's heaviest drinkers. Specifically, using the 2019 NDSHS this report will:

1) Re-examine the distribution of drinking in Australia.
2) Identify the sociodemographic characteristics of the heaviest drinkers with graphical representation of who is over-represented in the heaviest drinking category.
3) Assess how key drinking and risk behaviours differ for these heaviest drinkers compared to other people who drink alcohol – focusing on heavy drinking occasions and alcohol type.

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[1] This study uses an earlier wave of the data set used in the current study – the 2016 National Drug Strategy Household Survey [NDSHS] and the 2013 International Alcohol Control [IAC] study.

Method

PARTICIPANTS AND PROCEDURE

The NDSHS is a survey of licit and illicit drug use in Australia which is conducted every three years. The 2019 NDSHS was administered via drop and collect paper forms (74.4%), online surveys (25.3%) and computer assisted telephone interview (0.3%) using multi-stage, stratified random sampling (Australian Institute of Health and Welfare, 2020). The 2019 NDSHS had a 49.0% response rate. A total of 22,015 participants (men = 9,804, women = 12,211) aged 14 and over completed the survey. Participants who did not answer the alcohol consumption questions (n = 1,293, 5.9%) were excluded from the analysis. In the 2019 NDSHS survey, alcohol consumption was obtained via a graduated quantity frequency method presented in a non-grid format for 50% of online participants, compared to a grid format for the remainder of participants (Australian Institute of Health and Welfare, 2020). To prevent any differences in the reporting of alcohol consumption due to the differences in format of the graduated quantity frequency question, participants who did not complete the graduated quantity frequency question in a grid format were excluded from the analysis (n=2,312, 11.2%). This left a total sample of 18,410 (men = 8,280, 45.0%; women = 10,130, 55.0%).

MEASURES

Dependent variable:

 Alcohol consumption – Participants were asked if they have consumed alcohol in the past 12 months; those who did not were recorded as abstainers who consumed zero drinks in the past year. Participants who reported that they consumed alcohol in the past 12 months, were asked about their drinking using a graduated quantity frequency method that asked participants to report how often (every day, 5-6 days a week, 3-4 days a week, 1-2 days a week, 2-3 days a month, about 1 day a month, less often or never) they had consumed a certain amount of alcohol measured by standard drinks (10 g pure alcohol) per day (20 or more, 11-19, 7-10, 5-6, 3-4, 1-2, less than 1, or none).

An annual estimate of total alcohol consumption was calculated by multiplying the mid-point of each volume category (e.g., for the 11-19 drinks category, a volume of 15 is used) by the mid-point of each frequency category (e.g., for 5-6 days per week, a frequency of 5.5*52 = 286 is used). If a participant reported more than 365 drinking occasions in the last 12 months, then their heaviest 365 occasions were used. The mean number of drinks per day was then calculated by dividing the annual estimate of total alcohol consumption by 365.

Independent variables:

Main drink type – Participants were asked to select their main drink from the following list: cask wine, bottled wine, regular strength beer, mid-strength beer, low-strength beer, home-brewed beer, pre-mix spirits (can or bottle), spirits, cider, fortified wine, other pre-mixed drinks and other. The last three categories were omitted from the analyses presented in this report due to low endorsement.

Regular drinking location – Participants were also asked to select all the locations where they usually drink their alcohol: in their own home, at a friend's home, at a party, at rave/dance parties, in restaurants/cafes, in pubs/clubs, at school/TAFE/university, in the workplace, in public spaces (e.g., parks, beaches), in a car, and somewhere else. In this study we focussed on eight drinking locations, excluding the following locations due to low endorsement: at school/TAFE/university, in a car, and somewhere else.

Demographic variables – Participants were also asked about their sex (men or women), age (age groups: 14-17, 18-24, 25-29, 30-39, 40-49, 50-59, 60-69 or 70+), employment status (not in the labour force, looking for work or employed), remoteness (major cities, inner regional, or outer regional/remote/very remote), and neighbourhood disadvantage or Socio-Economic Indexes for Areas (SEIFA: 1st - least advantaged, 2nd, 3rd, 4th, 5th - most advantaged) which were derived from a participants postcode.

ANALYSIS

All respondents, regardless of whether they consumed alcohol, were sorted by the amount they consumed. The participants' total alcohol consumption had a random fraction of a standard drink (a value between 0 and 1) added to their total annual alcohol consumption in order to avoid clustering of participants in groups with the more common total alcohol consumption values. Participants were then sorted in order of lowest total alcohol consumption to the highest alcohol consumption and split into the 20 groups to identify the group who consumed the least alcohol (0 percentile) and the group that consumed the most alcohol (95th percentile) in the last 12 months.

A new binary variable was created to distinguish between the heaviest drinking 10% of the Australian population (hence forth referred to as heaviest drinkers) and the remaining 90% of the Australian population. In order to understand the characteristics of the riskiest users, the proportion of each independent variable (sex, age group, employment status, remoteness, neighbourhood disadvantage, main drink type and drinking location) was calculated and presented in several figures.

A logistic regression analysis was then conducted to identify which independent variables had the strongest association with being in the heaviest drinker group. All results presented in this paper have been weighted to account for disproportionate representation in the sample compared to population benchmarks based on age, sex, and location. Analyses were conducted using Stata version 15.1 (StataCorp).

Results

The mean number of drinks per day and the proportion of all alcohol consumed for the percentile with the least alcohol consumption in the last year (0 percentile) through to the most alcohol consumed (95th percentile) are shown in Table 1.

Table 1: The distribution of alcohol consumption among the Australian population, 2019 NDSHS

| PERCENTILE	MEAN NUMBER OF DRINKS PER DAY	PROPORTION OF ALL ALCOHOL CONSUMED
0	0.00	0.0%
5	0.00	0.0%
10	0.00	0.0%
15	0.00	0.0%
20	0.00	0.0%
25	0.01	0.1%
30	0.03	0.2%
35	0.07	0.3%
40	0.13	0.6%
45	0.23	1.1%
50	0.34	1.6%
55	0.46	2.1%
60	0.65	3.0%
65	0.86	4.0%
70	1.14	5.3%
75	1.44	6.7%
80	1.85	8.6%
85	2.69	12.4%
90	3.89	18.0%
95	7.83	36.1%

The lightest drinking 20% of the Australian population were abstainers and reported no alcohol consumption in the last year. Meanwhile, the heaviest drinkers (that is the heaviest drinking 10% of the Australian population) accounted for 54.1% of all alcohol consumed in 2019. The heaviest drinkers also consumed at least 3.22 standard drinks per day (this was the amount that the drinkers at the 90th percentile consumed). The figures presented below illustrate the proportion of each characteristic (i.e., independent variable) that are in the heaviest 10% of drinkers.

Figure 1 illustrates the proportion of men and women who were included among the heaviest drinkers. A total of 15% of men and 5% of women were found to be in the heaviest drinkers group.
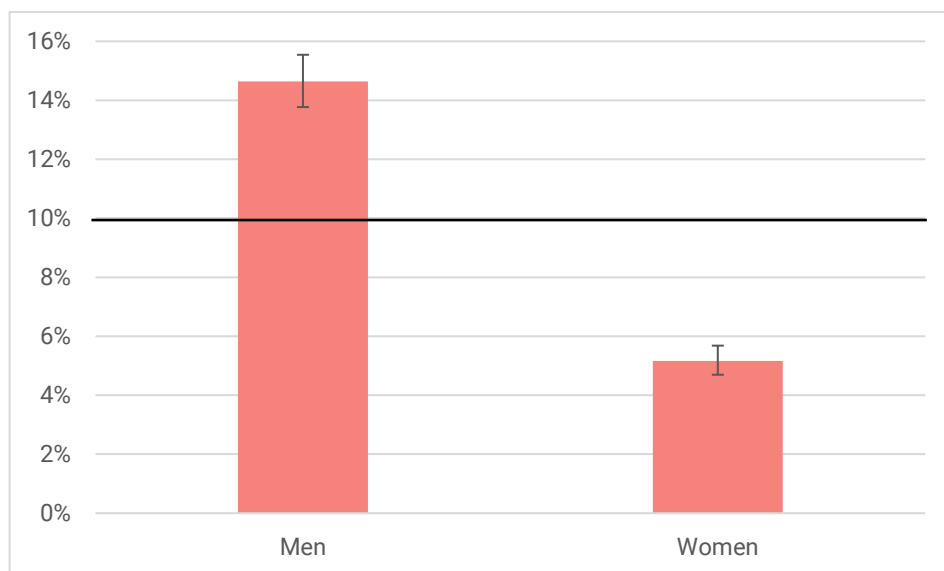
Figure 1. The proportion (with 95% confidence intervals) of Australian men and women who are in the top 10% of drinkers.

Figure 2 shows the proportion of Australians within each age group who are also among the heaviest drinkers. A total of 13% of Australians aged 50-59 years and 12% of Australians aged 40-49 years were found to be in the heaviest drinkers group. Meanwhile, only 1% of Australians in the youngest age group (14-17 years) were included in the heaviest drinkers group.
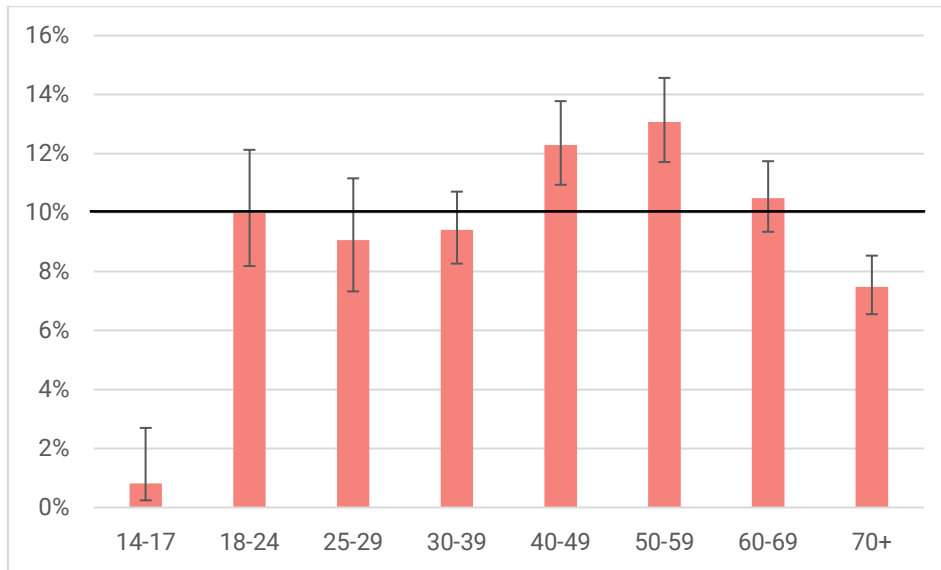
Figure 2. The age characteristics of the top 10% of drinkers (proportions with 95% confidence intervals).

Figure 3 displays the proportion of Australians living in major cities, inner regional and outer regional/remote localities who were included in the heaviest drinker group. A total of15% of Australians who live in outer regional/remote/very remote localities were found to be included among the heaviest drinkers compared to 11% of those living in inner regional and 9% of those living in major city localities.
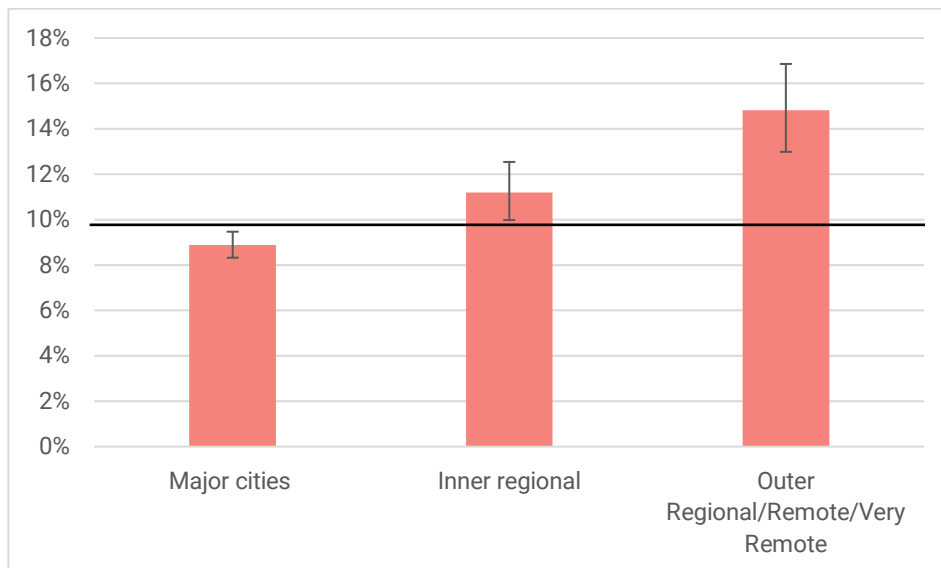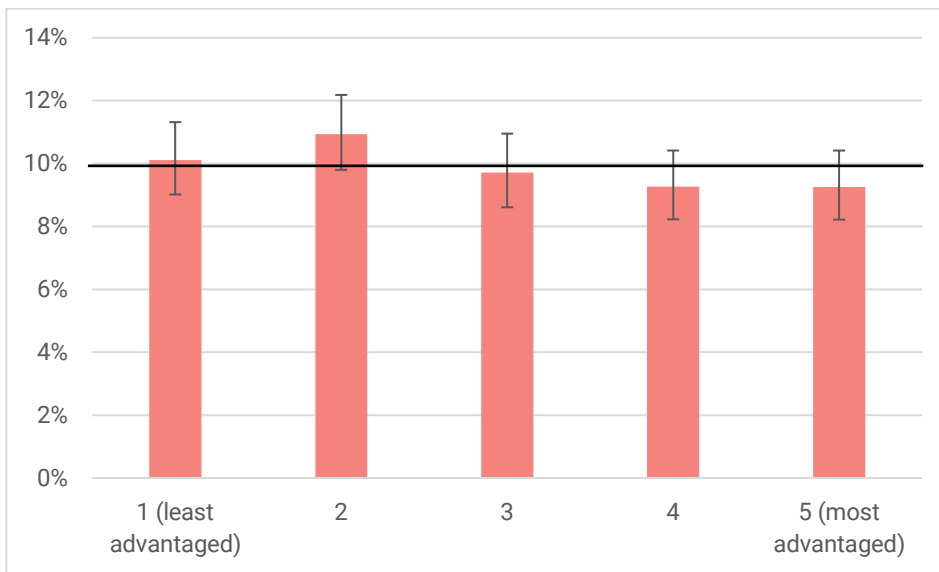

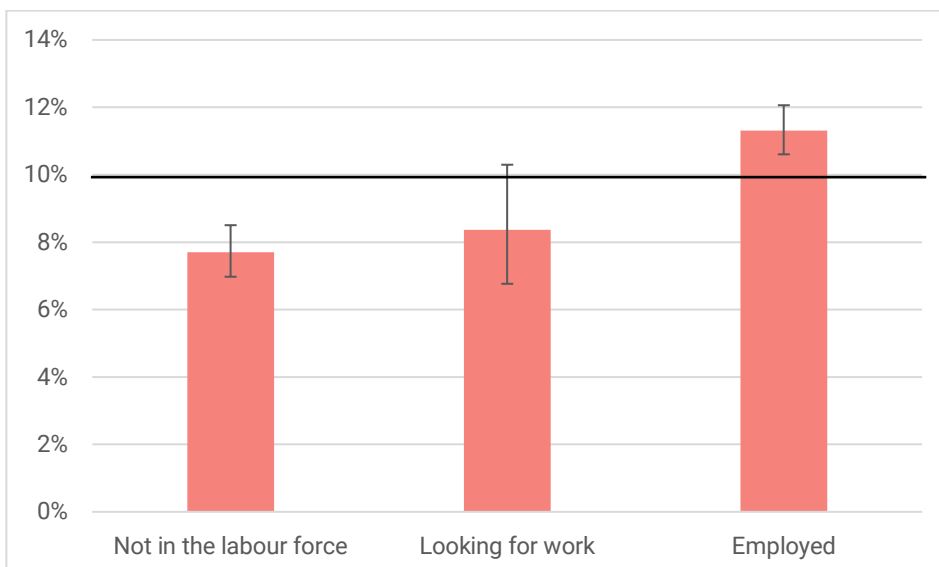**Figure 3. The proportion (with 95% confidence intervals) of Australians living in major cities, inner regional and outer regional/remote/very remote who were among the top 10% of drinkers.**

Figure 4 includes the proportion of Australians classified as living in a disadvantaged neighbourhood who were among the heaviest drinkers. The proportion of Australians within each neighbourhood advantage group who

were among the heaviest drinkers was very similar, with the proportion varying between 9% and 11%. This indicates that there is no substantial difference between the heaviest drinkers and their neighbourhood disadvantage classification. In Figure 5 the proportion of Australians within the three employment-based groups who were among the heaviest drinkers are shown. 11% of employed Australians were among the heaviest drinkers. This is compared with approximately 8% of Australians who are not in the labour force or are looking for work, respectfully.
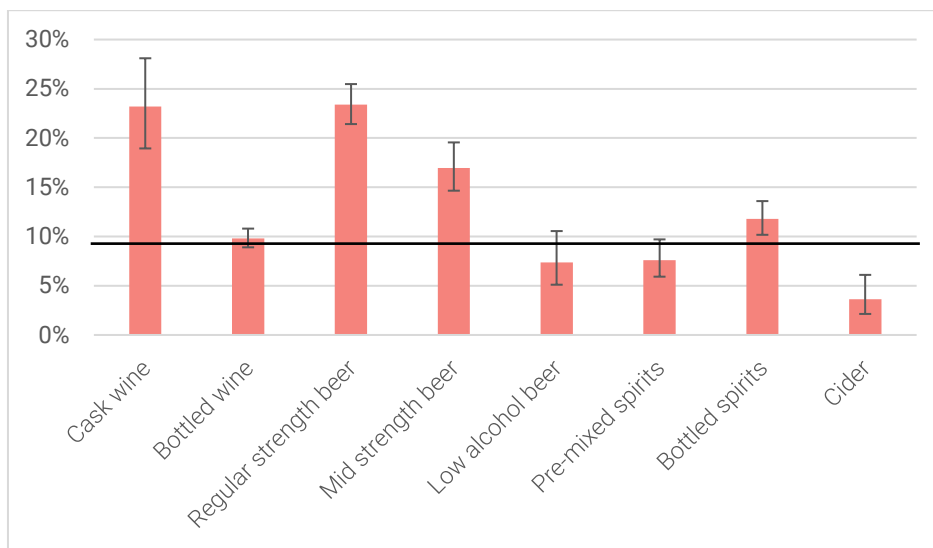

Figure 4. The proportion (with 95% confidence intervals) of Australians who live in the least advantaged to most advantaged neighbourhoods and were also among the top 10% of drinkers.

Figure 5. The proportion (with 95% confidence intervals) of Australians in each of the employment-based groups who are among the top 10% of drinkers.

Figure 6 illustrates the proportion for each of the main drink types for those among the heaviest drinkers. Figure 6 shows that almost a quarter (23%) of Australian drinkers who reported cask wine and regular strength beer, as their main drink types were also among the heaviest drinkers. Finally, Figure 7 shows the proportion of the different drinking locations for the heaviest drinkers. In terms of drinking locations, the heaviest drinkers reported that they usually consume alcohol in public spaces (29%) more than in restaurants/cafes (12%).

Figure 6. The proportions (with 95% confidence intervals) of drinkers who select each drink type as their "main drink" among the top ten percent of drinkers.
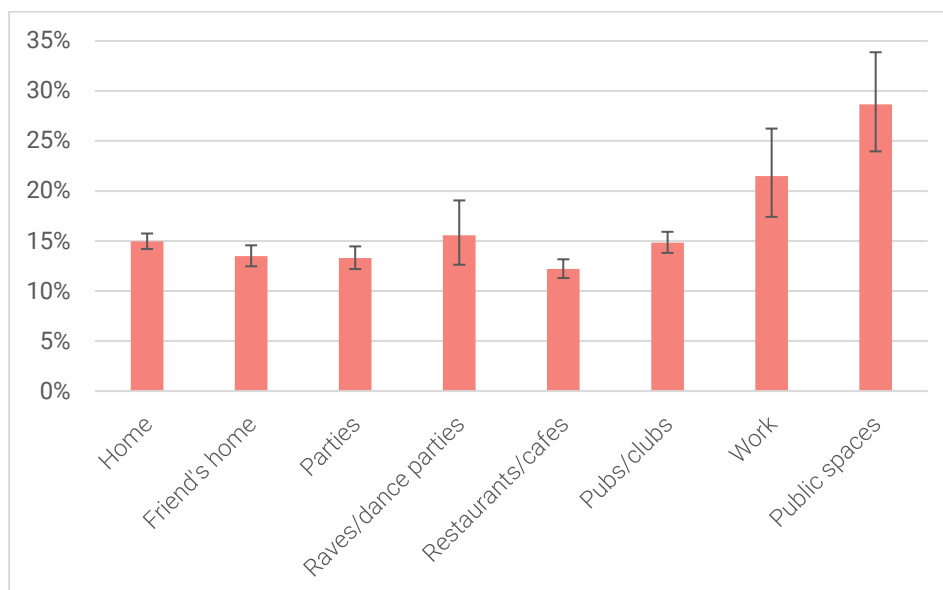
Figure 7. The regular drinking locations for the top ten percent of drinkers (proportions with 95% confidence intervals). Please note that the 10% reference line does not apply to this figure as respondents could select more than one location where they usually drink alcohol.

Table 2 shows the direction of the significant relationship between the socio-demographic and drinking variables and the heaviest drinkers (please see the Appendix for the complete table of results for the logistic regression).

Women and drinkers living in average and more advantaged neighbourhood were significantly less likely to be among the heaviest drinkers. Participants aged 40-59 were more likely to be among the heaviest drinkers compared to those aged 30-39. While, participants aged 14-17 were significantly less likely to be among the heaviest drinkers compared to those aged 30-39. Participants amongst the heaviest drinkers were more likely to report cask wine and regular beer consumption and less likely to report low strength beer, pre-mixed spirits, and cider as their main drink type. Those among the heaviest drinkers were also more likely to report drinking at home, in pubs/clubs and in public spaces, and less likely to report drinking in restaurants/cafes.

Table 2. Predictors of heaviest drinkers group membership by socioeconomic and drinking based variables with a multivariate logistic regression model.

		ODDS RATIO
Sex	Men	1 (Ref)
	Women	↓
Age group	14-17	↓
	18-24	-
	25-29	-
	30-39	1 (Ref)
	40-49	↑
	50-59	↑
	60-69	-
	70+	-
Employment status	Not in the labour force	1 (Ref)
	Looking for work	-
	Currently employed	-
Remoteness	Major cities	1 (Ref)
	Inner regional	↑
	Outer Regional/Remote/Very Remote	↑
Neighbourhood disadvantage quintile	Least advantaged	1 (Ref)
	2	-
	3	↓
	4	↓
	Most advantaged	↓
Main drink type	Bottled wine	1 (Ref)
	Cask wine	↑
	Regular beer	↑
	Mid-strength beer	-
	Low-strength beer	↓
	Pre-mixed spirits	↓
	Spirits	-
	Cider	↓
Drinking locations (each location's reference category is those who don't drink at that location)	Home	↑
	Friend's home	
	Parties	-
	Raves/dance parties	-
	Restaurants/cafes	↓

Pubs/clubs	↑
Work	-
Public spaces	↑

Discussion

Results revealed that the heaviest drinking 10% of the Australian population accounted for 54.1% of all the alcohol consumed in 2019. This percentage has remained relatively stable in comparison to previous Australian analysis also investigating alcohol consumption among the heaviest drinking population (Livingston & Callinan, 2019). The heaviest drinkers were consuming at least 3.2 drinks per day. This is well above the 2009 NHMRC guidelines (no more than two standard drinks on any one day) in place at the time of survey and the newly released guidelines advising no more than 10 drinks per week ([2]National Health and Medical Research Council, 2020) . This was similar to the 2016 study, which showed that the heaviest drinkers consumed at least 3.1 standard drinks per day (Livingston & Callinan, 2019).

In unpacking the demographic characteristics of the heaviest drinkers, we identified several unique factors. Firstly, almost a quarter (23%) of Australian drinkers who reported cask wine and regular strength beer as their main drink types were among the heaviest drinkers. These findings are consistent with previous research in Victoria (Sharma et al., 2014) and nationally (Livingston & Callinan, 2019), which found that cask wine and beer are more likely to be consumed by the heaviest drinkers. This was found again in the multivariate regression models – even after controlling for age, sex and other factors, regular strength beer and cask wine were disproportionately consumed by the heaviest drinkers.

We also found that the heaviest drinkers were more likely to report drinking at home, in pubs/clubs and in public spaces. The concentration of home consumption among the heaviest drinkers supports a burgeoning body of work investigating home based consumption, finding that 63% of all consumption occurs in this space, and which calls for specific prevention efforts targeting the habitual nature of this consumption (Callinan, Livingston, Dietze, & Room, 2014; Callinan, Livingston, Room, & Dietze, 2016). Again, similar to previous findings (Caetano et al., 2012; Greenfield & Rogers, 1999; Livingston & Callinan, 2019), there were more men among the heaviest drinkers compared to women. Men are consistently found to exceed women in terms of consumption levels and

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[2] These guidelines stipulate no more than 4 standard drinks on any one day and 10 standard drinks in a week to reduce the harm from alcohol (National Health and Medical Research Council, 2020).

rates of heavy drinking, with men also found to experience increased rates of alcohol-related harms and consequences compared to women (Wilsnack et al., 2000).

We also found that 13% of those 50–59-years and 12% of those 40–49-years were among the heaviest drinkers. These age groups were also significantly more likely to be the heaviest drinkers than those in the 30–39-year age category. In addition, participants aged 14-17 years were less likely to be the heaviest drinkers than those in the 30–39-year age category. These results correspond with the declining trend in youth drinking (Australian Institute of Health and Welfare, 2017), suggesting that young people are less likely to be consuming heavily and at levels that put them at increased risk of harm. Finally, those in rural and regional localities being more likely to be among the heaviest drinkers again corresponds with previous findings in Australia (Livingston & Callinan, 2019), and previous research finding more harmful consumption outside of major cities (Miller, Coomber, Staiger, Zinkiewicz, & Toumbourou, 2010).

The self-reported nature of the data needs to be kept in mind when interpreting the results. This kind of data is particularly subject to biases when examining the upper end of the distribution (Gmel & Rehm, 2004). However, evidence has been provided to show that the NDSHS provides robust and broadly reliable evidence on consumption (Livingston & Callinan, 2019; Mäkelä & Huhtanen, 2010).

In conclusion, the heaviest 10% of Australian drinkers accounted for 54.1% of all the alcohol consumed in 2019. These drinkers were more likely to be men, consume alcohol in the home, pubs/clubs and public spaces and live in rural and regional localities.

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Appendix

Table A1. Predictors of being among the heaviest drinkers by socio-economic and drinking based variables with a logistic regression model.

		Odds Ratio (95% Confidence Interval)
Sex	Men	1 (Ref)
	Women	0.41 (0.35, 0.47)*
Age	14-17	0.21 (0.04, 0.96)*
	18-24	1.17 (0.86, 1.60)
	25-29	1.00 (0.73, 1.37)
	30-39	1 (Ref)
	40-49	1.35 (1.09, 1.67)*
	50-59	1.43 (1.16, 1.77)*
	60-69	1.14 (0.91, 1.43)
	70+	0.91 (0.68, 1.20)
Employment status	Not in the labour force	1 (Ref)
	Looking for work	1.10 (0.79, 1.52)
	Currently employed	0.96 (0.79, 1.16)
Remoteness	Major cities	1 (Ref)
	Inner regional	1.22 (1.02, 1.45)*
	Outer Regional/Remote/Very Remote	1.52 (1.25, 1.86)*
Neighbourhood disadvantage quintile	Least advantaged	1 (Ref)
	2	0.90 (0.74, 1.11)
	3	0.79 (0.64, 0.97)*
	4	0.73 (0.59, 0.90)*
	Most advantaged	0.78 (0.62, 0.97)*
Main drink type	Bottled wine	1 (Ref)
	Cask wine	2.09 (1.53, 2.85)*
	Regular beer	1.59 (1.32, 1.91)*
	Mid-strength beer	1.00 (0.80, 1.26)
	Low-strength beer	0.44 (0.29, 0.68)*
	Pre-mixed spirits	0.60 (0.43, 0.83)*
	Spirits	0.92 (0.74, 1.14)
	Cider	0.33 (0.19, 0.58)*
Drinking locations (each location's reference category is those	Home	3.40 (2.59, 4.47)*
	Friend's home	1.00 (0.85, 1.18)
	Parties	0.94 (0.79, 1.11)
	Raves/dance parties	1.05 (0.76, 1.45)
	Restaurants/cafes	0.70 (0.59, 0.82)*

who don't drink at that location)	Pubs/clubs	1.44 (1.22, 1.68)*
	Work	1.24 (0.91, 1.71)
	Public spaces	2.38 (1.77, 3.22)*

* $p < 0.05$