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What did you drink yesterday? Public health relevance of a recent recall method used in the 2004 Australian National Drug Strategy Household Survey

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Abstract

Aim—To (i) compare the Yesterday method with other methods of assessing alcohol use applied in the 2004 Australian National Drug Strategy Household Survey (NDSHS) in terms of extent of underreporting of actual consumption assessed from sales data and (ii) illustrate applications of the Yesterday method as a means of variously measuring the size of an Australian “standard drink”, extent of risky/high risk alcohol use, unrecorded alcohol consumption and beverage specific patterns of risk in the general population.

Setting—The homes of respondents who were eligible and willing to participate.

Participants—24,109 Australians aged 12 years and over.

Design—The 2004 NDSHS assessed drug use, experiences and attitudes using a “drop and collect” self completion questionnaire with random sampling and geographic (State and Territory) and demographic (age and gender) stratification.

Measures—Self-completion questionnaire using Quantity-Frequency (QF) and Graduated-Frequency (GF) methods plus two questions about consumption ‘yesterday’: one in standard drinks, another with empirically-based estimates of drink size and strength.

Results—The Yesterday method yielded an estimate of 12.8 g as the amount of ethanol in a typical Australian standard drink (vs. official 10 g). Estimated coverage of the 2003-2004 age 12+ years per capita alcohol consumption in Australia (9.33ml of ethanol) was 69.17% for GF and 64.63% for the QF when assuming a 12.8 g standard drink. Highest coverage of 80.71% was achieved by the detailed Yesterday method. The detailed Yesterday method found that 60.1% of Australian alcohol consumption was above low risk guidelines; 81.5% for 12 to 17-year-olds, 84.8% for 18 to 24-year-olds and 88.8% for Indigenous respondents. Spirit-based drinks and regular strength beer were most likely to be drunk this way, low and mid-strength beer least likely.

Conclusions—Compared to more widely used methods, the Yesterday method minimized underreporting of overall consumption and provided unique data of public health significance. It also provides an empirical basis for taxing alcoholic beverages in accordance with their contributions to harm and can be used to complement individual level measures such as Quantity Frequency and Graduated Frequency.

Keywords

surveys; alcohol; Australia; Indigenous; youth

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1. Introduction

There are many varieties of survey methods used for assessing levels and patterns of alcohol consumption in the general population (1). Each has its own strengths and weaknesses against various criteria such as internal validity (2), the extent of underreporting (3), capacity to measure patterns of hazardous consumption as well as average volume consumed over time (4), ability to assess compliance with national low risk drinking guidelines (5), cost effectiveness (1) and ability to provide beverage specific information (6,7). In this paper we will provide new comparative analyses of data from a large Australian alcohol and other drug use survey regarding what we will refer to here as the “Yesterday” method which involves detailed questions of beverage types and serve sizes of drinks consumed the day before the interview.

The Yesterday Method has been employed in French surveys of alcohol consumption (8) and is also similar in some respects to a long-standing Finnish alcohol consumption survey which enquires in detail about alcohol use over a recent period of time, normally including the respondent's last four drinking days (9). Equivalent methods have for many years been applied in the nutrition field where it is common to have respondents record exactly what they had eaten over the past 24 or 48 hours (10). The 2001 and 2004 Australian National Drug Strategy Household Surveys (NDSHS) used the French approach of conducting roughly equal numbers of interviews each day of the week and including questions on precise consumption on the previous day. Stockwell et al. (2004) reported certain advantages with the Yesterday method using data from the 2001 Australian survey: (i) in comparison with other methods it yielded higher overall levels of self-reported consumption and (ii) it could be used to make estimates of the proportion of all alcohol consumed in a population that placed the consumer at increased risk of acute harm. In a comparative study of various European surveys, Knibbe and Bloomfield (8) also noted the Yesterday method used in the French surveys yielded higher levels of self-reported alcohol consumption than did other surveys in other European countries when compared against official data on per capita alcohol consumption. Since consumption on a single day obviously cannot provide individual-level information about typical consumption patterns relevant to risks for long-term or chronic harms, it was recommended in the second edition of the WHO International guide for monitoring alcohol consumption and related harm (1) that the Yesterday method was used as an adjunct to the Graduated-Frequency (GF) method which identifies an individual's longer term drinking patterns (11). The new WHO Guide (1) stresses some unique advantages of the GF Method (e.g. the ability to assess compliance with national low risk drinking guidelines) and also recommended methods for remedying some methodological criticisms that have been made of it (2).

In the 2004 Australian NDSHS, further refinements were introduced to the 2001 Yesterday questions (12) reported on earlier (3). These included adding the beverage category for home-made wine and removing some ambiguities in the 2001 version regarding typical serve sizes. Importantly, the 2004 NDSHS also included 12 to 13 year olds for the first time, reflecting the relatively young age of first consumption in Australia and growing concerns about teenage substance use (13). The first aim of the analyses presented here was to investigate the impact

of these changes on the “coverage” of self-reported alcohol consumption per capita estimated from the survey compared against official data from the Australian Bureau of Statistics (ABS) for alcohol sales in the 2003-2004 financial year, which includes the NDSHS fieldwork period. In 2001, the coverage of the detailed Yesterday method questions in the survey was assessed at 76.8% of officially recorded alcohol sales, substantially higher than either Quantity-Frequency (49.8%) or Graduated-Frequency methods (57.6%), the latter measures unadjusted for drink ethanol content. The second aim was to examine beverage specific data in order to: (i) validate the estimates based on the Yesterday method against official data on market share of the major beverages (beer, wine and spirits); (ii) make estimates of some sources of unrecorded alcohol consumption; and, (iii) identify beverage specific patterns of risky/high risk alcohol consumption for the Australian population; (iv) identify typical beverage specific drinking preferences on patterns among high risk subpopulations, namely those aged 12 to 17 years of age, 18 to 24 years of age and Indigenous Australians.. In this analysis, risky alcohol consumption refers to drinking at levels above low risk for short-term harm according to the Australian drinking guidelines, i.e., more than six standard drinks (=60g) for men and more than four standard drinks (= 40g) for women on a single day (14).

The development of effective alcohol taxation policy, widely agreed to be one of the most significant issues to consider in the reduction of alcohol-related harm (15,16), requires detailed information on the relative contributions of specific beverages to the risk of alcohol-related harm (17). The Yesterday method provides beverage specific data on levels of hazardous consumption for acute alcohol-related problems and can therefore inform the development of alcohol tax policies, specifically on the issue of whether some beverages are under-taxed from a public health point of view.

In summary, the aim of this paper is to investigate the value of augmenting individual consumption measures by including Yesterday method questions in a large national survey so as to support the development of effective alcohol policy and to allow monitoring of population level patterns of hazardous alcohol consumption.

2. Methods

2.1. Data source—We used data from the 2004 NDSHS (11), a large national household survey (Total n=29,245) conducted in June and November 2004 by the Australian Institute of Health and Welfare (AIHW). The 2004 NDSHS was the eighth conducted under the auspices of the National Drug Strategy (NDS). The survey covered alcohol and other drug related attitudes, beliefs, and behaviors, as well as support for various drug-related policy options of respondents aged 12 and over. The sample was based on households selected by a multi stage, stratified area random sample design. Minimum sample sizes sufficient to return reliable strata estimates were allocated to each of Australia's six states and two territories, and the remainder distributed in proportion to population size. The 2004 NDSHS was conducted between June and November 2004. The survey employed the “drop and collect” method and the computer-assisted telephone interview (CATI) method to collect information from respondents. This analysis is based on the drop and collect sample of 24,109 respondents aged 12 years and over since only these included the “Yesterday” questions. Following a trend noticed in other jurisdictions, the total response rate was lower than in 2001 at 46%.

2.2. Estimates of alcohol consumption—The 2004 NDSHS used four methods for assessing alcohol consumption (1,3).

1) Quantity-Frequency survey method (QF): This method asks first: (i) “In the last 12 months, how often did you have an alcoholic drink of any kind?”. Possible response options: every day; 5 to 6 days a week; 3 to 4 days a week; 1 to 2 days a week; 2 to 3 days a month;

about 1 day a month; and, less often. (ii) “On a day that you have an alcoholic drink, how many standard drinks do you usually have?” (An illustrated Standard Drinks Guide” was provided which one standard drink as 10 g or 12.67 ml of ethanol (1,3)). Response options to this question include: 13 or more; 11-12; 7-10; 5-6 drinks; 3-4; or 1-2 standard drinks. The mean values for numbers of drinks in each of quantity ranges were calculated from responses to the “simple” Yesterday question (“how many standard alcoholic drinks did you have yesterday?”, see below). Volume of alcohol consumed in the past year was calculated first using the usual assumption that one Australian standard drink equals 10 g 12.67 mL and secondly with an empirically derived estimate of the size of a standard drink using the detailed Yesterday method (see below).

2) Graduated-Frequency survey method (GF): This method asks how often people drink *specific* amounts of alcohol in one day, starting with large amounts and graduating down to smaller quantities. Respondents are asked to: “Please record how often in the last 12 months you have had each of the following number of standard drinks in a day.” GF frequency response options (arrayed across the page) are the same as those for QF (i.e. every day, 5 to 6 days a week,... less often). Response options for quantities are: 20 or more; 11-19; 7-10; 5-6; 3-4 s; 1-2; or less than 1 standard drink a day; and, none. Estimates of the total volume of alcohol consumption in the last year were made first assuming an Australian standard drink equals 10 g or 12.67 mL of ethanol and secondly with an empirically derived estimate based on responses to the detailed Yesterday.

A common problem with the GF method is that around 10% of respondents report a total number of drinking days in the last year in excess of 365 days (18). To remove these inflated estimates of drinking frequency, we: (i) used the first response to state “Every day” as the drinking frequency *if* this was the first response indicating any consumption; (ii) scored any subsequent items as zero; and, (iii) pro-rated total annual frequency responses for all specified quantities for other respondents reporting more than 365 drinking days so that they totaled exactly 365 days. If less frequent response options were answered for higher amounts before an entry of ‘every day’ then all subsequent lower responses were set to zero and then pro-rating was conducted so that total estimated drinking days did not exceed 365. There were 3280 subjects who chose the first response “Every day” at different drinking levels in the Graduated-Frequency question. There are other options for handling these problems which have been explored (19).

3) The simple Yesterday method: Respondents were asked to indicate the day of the week that the questionnaire was being completed and then asked “How many standard alcoholic drinks did you have yesterday?”. Just over one third of subjects reported any alcohol consumption the day before the interview. The precise meaning of “yesterday” was not defined precisely in terms of hours of the day e.g. up to midnight precisely so was left to the respondent to apply their own interpretation. Estimates of per capita alcohol consumption in the last year were then made with weights applied by day of week with (i) all week days equally weighted; and, (ii) adjusting this simple weighting scheme to take account of the likelihood that drinking on public holidays would be more like drinking on a weekend days than regular weekdays. Such weights were necessary because an equal number of interviews was not completed for each day of the week. Unweighted results would bias population estimates by favoring oversampled days.

4) The detailed Yesterday method: Respondents were given more detailed questions that allowed them to select particular glass, can or bottle sizes and to specify approximate beverage strength: Respondents were asked “How many bottles, glasses, cans or nips (a ‘nip’ in Australia is equivalent to a ‘shot’) of alcohol did you drink yesterday?” In the instrument, a range of descriptions of glasses and containers was provided for each of 12 beverage varieties (12) and

daily alcohol consumption was thus estimated based on the sum of all beverage varieties consumed Yesterday. Conversion factors of typical beverage strengths and serve sizes were updated where appropriate from those previously used by Stockwell et al. (2004). Published industry sources, websites and a nutrition guide (20) were the sources for these conversion factors which are summarized in Appendix A. An identical procedure to 3) above was used to estimate per capita consumption for those aged 12 years and over, i.e. use of weights to adjust for the uneven distribution of interviews conducted on different days of the week.

2.3. Alcohol consumption estimates from the sale data—Comparisons were made among the various estimates of per capita alcohol consumption (12+ years) derived from the survey methods described above. Each of the estimates was also assessed in relation to its proximity to the “gold standard”, taken as an estimate of per capita alcohol consumption based on official alcohol sales data for the 2003-2004 financial year. For 2003-2004, the amount of ethanol consumed per person (12+years) was 9.33 litres. This estimate is based on a total volume of ethanol of 157,000,000 litres consumed in Australia in the 2003-2004 financial year (21) and an estimated residential population aged 12 years and older of 16,833,534 in 2003-2004 (22).

2.4. Estimates of an empirically-based Australian standard drink—The simple and detailed Yesterday questions were used to estimate how much alcohol people *actually* consumed when they reported having had one standard drink. The main method was to take respondents who responded to *both* the simple and detailed Yesterday questions and to divide the number of standard drinks given in response to the simple question into the estimated total amount of ethanol reported in the detailed method. To remove the effects of highly discrepant responses, outliers first were excluded from the analysis if either of the simple or detailed methods resulted in a response equivalent to more than three times the alcohol content of that obtained by the other method. A threefold difference between the two estimates was taken as the upper limit of a reasonable estimation error on the part of respondents, higher differences being excluded as not realistically comparable. A total of 7,772 respondents answered both the simple and empirical Yesterday questions without such discrepant responses.

2.5 Estimates of beverage-specific risks—The detailed Yesterday method was used to estimate the unique contribution of each of 12 main beverages to total and risky/high risk alcohol consumption for acute harm variously for the total sample, those aged 12-17 years, those aged 19-24 years and Indigenous people. To achieve this, the estimated number of standard drinks consumed by each respondent “yesterday” for each of the 12 beverage types was calculated as well as the total number of drinks they consumed that day. This was a group level not an individual level analysis. Put another way, the question being addressed was when Australians drink above their low risk drinking guidelines for consumption in a single day, is that more likely to involve consumption of beer, wine, spirits, premix spirits, fortified wine, home-made alcohol or other beverages - and in what proportions? We estimated (i) the percentage of specific beverages consumed on risky drinking days and, (ii) the amount of specific beverages consumed on risky drinking days as a percentage of all consumption on risky drinking days for the total sample as well as sub samples of interest. There were 99 respondents aged 12-17 years and 594 respondents aged 18-24 years who recorded some consumption of alcohol on the previous day. The 2004 NDSHS sampled 372 Indigenous people using the drop and collect method, 90 of whom recorded some consumption on the previous day.

2.6. Statistical analyses—Statistical analyses were completed using SAS SURVEYMEANS, SURVEYFREQ and SURVEYREG procedures because these procedures analyze sample survey data taking into account the sample design (23,24). The weighting

statement was used to account for the unequal probability of sampling and non response. More details on weighting in the 2004 NDSHS can be found elsewhere (13). The proportion of lifelong abstainers was estimated based on the question: “Have you ever tried alcohol?” and a total of 24,025 cases representing 99.7% responded to this question. The proportion of current drinkers was estimated regarding the question: “Have you had an alcoholic drink of any kind in the last 12 months?” and a total of 21630 cases representing 89.61% of total cases in the survey responded to this question. Due to some missing data, alcohol consumption of the sample in the past year was estimated from 20,845 respondents (86.46%) when using the QF method, 20,214 (83.84%) when using the GF method and 20,547 (85.23%) using the Yesterday method. A total of 8,364 respondents or 34.69% of the sample recorded some consumption of alcohol on the previous day of the survey and therefore Yesterday alcohol consumption.

3. Results

3.1. Characteristics of the sample—The drop and collect sample consisted of 24,109 respondents whose mean age was 44.77 years (SD=18.83, Range 12 to 97). Table 1 presents the demographic characteristics of the sample and the proportions of lifelong abstainers and those who reported having an alcoholic drink of any kind in the past year among Australians aged 12 years and over. The majority of the sample were aged 40 years and over and slightly more were female (56.2%) than male. Only 5.37% of respondents reported that they had never tried alcohol in their life. Approximately 83% of respondents reported having an alcoholic drink of any kind in the last year.

3.2. New estimate of Australian standard drink size—The 7,772 respondents included in this analysis, because they responded to both simple and detailed Yesterday questions, reported a mean of 56.12 ml (44.29 g) of ethanol in the detailed Yesterday question (SD=58.66; range 3.30 to 1224.00). They reported a mean of 3.51 standard drinks in the simple Yesterday question (SD=3.32; range 0.25 to 50.00). This results in an estimate of 16.22 ml (SD= 5.35, range 4.25 to 37.98) or 12.80 g (SD= 4.22, range 3.35 to 29.96) of alcohol consumed for each reported “standard drink”. Estimates were identical whether weighted or unweighted data were used.

3.3. Coverage of official alcohol sales achieved by different methods—Per capita ethanol consumption (12+ years) estimated from different survey methods as described above ranged from 4.71 litres to 7.53 litres (see Table 2). The detailed Yesterday question yielded the highest estimate of 7.53 litres, accounting for 80.71% of the official estimate of alcohol consumption for Australians aged 12 years and over for 2003-2004. GF was superior to QF with 52.41% versus 50.48% (when assuming a standard drink was 12.67 ml or 10 g ethanol) or 69.17% versus 64.63% (with the empirically based estimate for a standard drink of 16.22 ml or 12.8 g ethanol) coverage of official estimates from sales data. On a population basis, the simple Yesterday method was marginally superior to GF with a coverage of 58.41% when using the adjustment for public holidays.

Per person alcohol consumption significantly differed by age group and sex (see Table 3). While those aged 12-17 years reported the least consumption, those aged 18-24 years drank ethanol (including home-brewed beer and home-made-wine) drank the most. Australian males drank 6.92 litres more of ethanol (including home-brewed beer and home-made-wine) than females in 2004 (95% CI_{diff}: 6.23-7.62).

3.3. Beverage-specific contributions to risky alcohol consumption—A total of 8,364 respondents recorded some consumption of alcohol on the previous day (see Table 4). These data were used to estimate proportions of all alcohol consumed on a typical day in Australia in 2004 that could be classified as risky or high risk according to Australian alcohol

guidelines (14). Regular strength beer (34.4%), spirits (30.5% for straight and premixed spirits combined) and wine (23.6% for cask and bottled wine combined) were the main contributors to risky alcohol consumption. In terms of the extent to which the individual beverage types were consumed on “risky” drinking days, straight spirits (79.7%), alcoholic cider (78.9%), premixed spirits (71.8%) and regular strength beer (72.6%) were the top four on this scale of drinking risk. Overall, 60.1% of reported consumption was on “risky” drinking days. As would be expected, low alcohol beer was least likely to be consumed on risky drinking days (26.0%) and mid strength beer (45.0%) was also less likely than other beverage types to be drunk on risky drinking days. There were only minor differences between cask wine (40.7%) and bottled wine (44.0%).

Table 5 shows a comparison of the market share attributed to different beverages estimated from: (i) self-reported alcohol consumption using the detailed Yesterday method in the NDSHS 2004 survey; and, (ii) ABS official national beverage consumption estimates. The results suggest that the detailed Yesterday method underreported regular strength beer consumption and/or slightly overestimated wine and spirits consumption. While the estimate of total beer accounted for 47.7% of all alcohol consumption in the ABS, the survey estimate only account for 39.4% of total alcohol consumption. Regular strength beer was obviously underreported in the survey because there were similar estimates of both mid and low strength beer in the survey and the ABS. Compared with ABS estimates, the survey might have overestimated the wine and spirits consumption.

As shown in Table 6, among 12 to 17 year olds, all below the legal drinking age of 18 years in Australia, 81.5% of all consumption occurred on risky drinking days. Straight spirits were most likely to be drunk in a risky fashion by 12 to 17 year olds (98.9%), followed by regular beer (78.9%) and premixed spirits (76.7%) among the most widely used beverages. Spirit-based beverages held the highest market share of 62.7% of total alcohol consumption, with a slightly more consumed as straight spirits than premixed, followed at some distance by beer (17.3%).

Among 18 to 24 year olds, 84.9% of all consumption occurred on risky drinking days. Low and mid strength beer (combined because of the small sample size) were least likely to be consumed on risky drinking days (60.9%) but only contributed a tiny portion of total consumption (3.4%). Spirits was the most popular beverage (straight and premixed combined contributed 50.5% of total consumption) followed by regular strength beer (32.1% of total consumption).

Among Indigenous respondents, 88.8% of all consumption was reported to have occurred on a risky drinking day and there was a minimal difference between beverage types regarding the probability of being consumed on a risky day. Most popular beverages were regular strength beer (35.0%) and premixed spirits (18.7%).

4. Discussion

A large Australian household survey was used to evaluate the Yesterday method of enquiring about a population's patterns of alcohol use in terms of its ability to provide good coverage of known alcohol sales data as well as specific information of public health relevance on drinking patterns associated with specific beverage types. Estimates of per capita adult alcohol consumption provided by the Australian Bureau of Statistics we used as the “gold standard” (21). These are based principally upon import, export data and taxation data. They do not allow for home-made beer or wine, illicit production or imported alcohol. Given Australia's unique geography, cross-border trade and alcohol brought in by tourists (which is restricted by law) is minimal. We were able to separate estimates of home-made alcohol consumption in our survey data in order to make their comparisons with these official estimates.

Consistent with previous findings (3), the Yesterday method achieved a higher coverage of known alcohol sales data than did other methods. Indeed the estimate derived from the detailed Yesterday method involving empirically based estimates of typical beverage strengths and serve sizes, yielded a higher coverage rate (80.71%) than it did in 2001 (76.5%). Improvements in the 2004 survey methodology suggest that these estimates are more reliable than those from 2001. The sample was larger in 2004 and it included Australians aged 12-13 years old for the first time (12). Furthermore, the Yesterday response options were expanded to include a wider variety of types and sizes of alcohol containers and some ambiguities were eliminated. These are higher rates of coverage than are typically obtained from more usual methods (1) and in this particular survey, were substantially higher than the coverage rates found for unadjusted QF (50.48%) and GF (52.41%). It should also be noted that the latter estimates will be somewhat inflated as these methods includes both recorded and unrecorded consumption whereas the “gold standard” does not include unrecorded consumption.

A new application of the Yesterday method was the derivation of empirically based estimates of the size of a “standard drink” which were then applied to the QF and GF estimates. While Australian low risk drinking guidelines define a standard drink as 12.67 ml or 10 g of ethanol (14) and the standard drink labels on all alcohol containers used this definition, this method allows a better estimation of the *actual* drink sizes people are likely to have in mind when they are attempting to report in terms of standard drinks (25). It is important to note that a detailed and illustrated guide to standard drinks was provided as part of the survey instrument which provided the usual definition of 12.67 mL or 10 g ethanol. The resulting estimate of 16.22 ml or 12.8 g of ethanol consumed per reported standard drink provided proportionately higher coverage rates when used for the QF and GF methods, 64.63% and 69.17% respectively. We suggest, however, that this new estimate has no implications for the definition of low risk drinking guidelines since the same problem will have affected the many epidemiological studies linking levels of alcohol use with different harms.

More detailed examination of major beverage varieties, however, indicated that the estimates obtained using the set of assumptions outlined in Appendix A regarding beverage strength and serve size resulted in both over estimation of wine and spirits sales and underestimation of beer sales. It is not possible to determine whether these variations in estimates based on the Yesterday survey method compared with official sales data were due to sampling biases or faulty assumptions regarding typical serve sizes and beverage strengths. Clearly all beverage specific estimates have to be interpreted in the light of these apparent distortions of beer relative to wine and spirits. Comparisons of patterns of consumption *within* the major beverage varieties, however, should not be affected by any such underlying biases. Thus, the expected finding that low alcohol beer is least likely and regular strength beer the most likely brewed beverages to be consumed on risky drinking days among both the total population as well as within each individual subgroup is a robust result. Limited differences between cask and bottled wine consumption are also likely to be valid within the population sampled. Long-standing concerns regarding the consumption of cask wine by Indigenous Australians (26) may still be well founded despite the lack of apparent differences between bottled and cask wine for this sample. It is relevant to note that for a number of years price differential excise taxes have created incentives for producers, retailers and consumers to favour lower alcohol content beers while cask wine (usually 4 L bags of wine presented in a cardboard box) and fortified wines represent the cheapest forms of alcohol in Australia (e.g. 27). Spirits attract the highest rates of excise tax in Australia and, with the exception of premixed spirits usually in the strength range of 5% to 7%, mostly have the highest retail prices per standard drink of ethanol.

The sample of Indigenous people in the 2004 NDSHS was small and likely to have been highly biased towards those in urban areas. As such, these Indigenous estimates is unlikely to reflect consumption patterns in more remote and less well resourced communities. It is also important

to acknowledge that a weakness of the 2004 survey was the low response rate achieved (46%) which is likely to affect the overall pattern of results, an increasing problem with public surveys in Australia and elsewhere (27). While the relatively low response rate of the 2004 NDSHS may result in more conservative estimates of the prevalence of risky drinking levels, this weakness is less likely to affect the comparisons made here between different survey methods utilised.

We are not aware of previous analyses of the extent to which home produced alcohol is used in a risky fashion. It is interesting that home-made wine was reported as more likely to have been consumed on risky drinking days than either bottled or cask wine. In the case of home-brewed beer, this was only slightly less likely to be consumed on risky drinking days than was regular strength beer. The objective of developing more accurate estimates of such sources of normally unrecorded alcohol consumption is perhaps slightly compromised by the apparent differential underreporting of beer versus other beverages. However, we submit that estimates of otherwise unrecorded consumption of home-made beer can be reliably estimated by this method as a proportion of all beer consumption reported in the survey, and similarly in relation to home-made wine versus recorded wine sales. This approach could also be developed for other sources of unrecorded consumption such as wastage, cross-border trade and tourism effects. The Yesterday method creates a sampling of drinking behaviour across the whole population rather than a sampling of individuals which facilitates estimates of these basic characteristics of the alcohol market. Estimates reflect patterns of consumption on a “typical day” in Australia after applying weights not only for age and sex and jurisdiction but also for day of week to ensure equal representation across all seven week days. As a consequence, as the majority of people do not drink every day only a proportion of respondents provided information. While such individuals will tend to be the more frequent drinkers, nonetheless the weighting procedures ensure the result represents typical drinking if not typical drinkers as it is also typical for many people not to drink at all.

In terms of the individual contributions of specific beverages to total risky alcohol consumption, regular strength beer contributes at least a third of all such consumption, spirits in all forms a little less than a third, wine about one quarter and miscellaneous other beverages the remainder. Given that beer consumption is likely to be underestimated, it can be confidently concluded that beer makes the largest overall contribution to risky alcohol use in Australia. In relation to particular population groups of concern (young and Indigenous people), however, much higher proportions of risky drinking is associated with spirits consumption, whether of premixed or straight spirits.

In relation to alcohol taxation strategy for Australia, these findings are consistent with the view that the tax advantages given to lower alcohol content beers encourage lower risk patterns of consumption (28). They also suggest that wine should not be excluded from view and regarded as a low-risk product given its substantial overall contribution to risky alcohol consumption. At present, wine attracts no excise tax in Australia – a move designed in the early 1970s to encourage Australia's wine export industry (28). The findings also underline concern about the consumption of spirits and premixed spirits among young people. In an ideal world, taxation rates on different beverages would take account of their alcohol content and empirical evidence such as is presented here regarding the extent to which they are associated with risky and high risk patterns of use (17).

In conclusion, we recommend inclusion of the Yesterday Method in other national alcohol surveys in other countries as an adjunct to methods which are capable of describing longer term patterns such as the Graduated-Frequency Method. Clearly, local efforts would be required to make accurate empirical estimates of both drink sizes and drink strengths in order to apply the Yesterday Method. We suggest that, at least in large population surveys, the method

facilitates description of the characteristics of an alcohol market that are of particular relevance for the development of public health policy.

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Appendix

Appendix A

Conversion factors of typical beverage strengths and serve sizes provided in the 2004 NDSHS

BEER	Alcohol content (%)	Cans (ml)	Small bottle (ml)	Large bottle (ml)	Small glass* (ml)	Medium glass* (ml)	Large glass* (ml)	Pint* (ml)	Other size
Home-brewed	4.90		375	750	200	270	400	570	400
Regular strength	4.90	375	375	750	200	270	400	570	400
Mid strength	3.50	375	375	750	200	270	400	570	400
Low alcohol	2.70	375	375	750	200	270	400	570	400
WINE	Alcohol content (%)		Small bottle (ml)	Large bottle (ml)	Small glass (ml)	Medium glass (ml)	Large glass (ml)		Other size
Home-made	11.50		375	750	120	160	200		160
Cask	11.00				120	160	200		160
Bottled	11.50		375	750	120	160	200		160
PRE-MIXED SPIRITS		Cans	Bottles	Large bottle					
In cans	5.00	408							400
In bottles	5.00		300	650					430
STRAIGHT SPIRITS	Alcohol content (%)	Mini bottle (ml)	Small bottle (ml)	Large bottle (ml)	Single shot (ml)	Double shot (ml)	Triple shot (ml)		Other size
Bottled & liqueurs	34.00	50	350	700	30	60	90		200
ALCOHOLIC CIDER	Alcohol content	Cans (ml)	Small bottle (ml)	Large bottle (ml)	Small glass* (ml)	Medium glass* (ml)	Large glass* (ml)		Other size
Cider	5.50	375	375	750	200	270	400		400
OTHER	Alcohol content (%)	Cans (ml)	Small bottle (ml)	Large bottle (ml)	Small glass (ml)	Medium glass (ml)	Large glass (ml)		Other size
Fortified wine	18.00		375	750	60	120	180		60
Champagne	11.00	375	375	750	120	160	200		160
Cocktail	19.00	1.5 drinks	3 drinks	n/a	n/a	n/a	180		60
Other	5.50	375	375	750	60	120	180		60

Notes:

* These estimates of serve sizes were calculated from pouring experiments and make allowance for the "head" on beers and ciders when poured into a glass.

References

1. WHO. International guide for monitoring alcohol consumption and related harm. Vol. second edition. Geneva; Department of Mental Health and Substance Abuse Non-communicable Diseases and Mental Health Cluster. World Health Organization: In press
2. Gmel G, Graham K, Kuendig H, Kuntsche S. Measuring alcohol consumption--should the 'graduated frequency' approach become the norm in survey research? *Addiction* 2006;101:16-30. [PubMed: 16393189]
3. Stockwell T, Donath S, Cooper-Stanbury M, et al. Under-reporting of alcohol consumption in household surveys: a comparison of quantity-frequency, graduated-frequency and recent recall. *Addiction* 2004;99:1024-33. [PubMed: 15265099]
4. Rehm J, Greenfield TK, Walsh G, et al. Assessment methods for alcohol consumption, prevalence of high risk drinking and harm: a sensitivity analysis. *Int J Epidemiol* 1999;28:219-24. [PubMed: 10342682]
5. Stockwell, T.; Sturge, J.; Macdonald, S. Bulletin 1 December 2005. Center for Addictions Research of BC; Victoria, BC: 2005. Patterns of Risky Alcohol Use in British Columbia and Canada – Results of the 2004 Canadian Addiction Survey.
6. Dawson DA. Volume of ethanol consumption: effects of different approaches to measurement. *J Stud Alcohol* 1998;59:191-7. [PubMed: 9500306]
7. Dawson DA, Room R. Towards agreement on ways to measure and report drinking patterns and alcohol-related problems in adult general population surveys: the Skarpo conference overview. *J Subst Abuse* 2000;12:1-21. [PubMed: 11288465]

8. Knibbe RA, Bloomfield K. Alcohol Consumption Estimates in Surveys in Europe: Comparability and Sensitivity for Gender Differences. *Subst Abuse* 2001;22:23–38. [PubMed: 12466667]
9. Makela, K. Measuring the Consumption of Alcohol in the 1968-1969 Alcohol Consumption Study. Social Research Institute of Alcohol Studies; Helsinki, Finland: 1971.
10. Briefel RR, Sempos CT. Dietary methodology workshop for the third National Health and Nutrition Examination Survey. March 1986. *Vital Health Stat* 1992;4:1–108.
11. Greenfield TK. Ways of measuring drinking patterns and the difference they make: experience with graduated frequencies. *J Subst Abuse* 2000;12:33–49. [PubMed: 11288473]
12. Australian Institute of Health and Welfare. DRUG STATISTICS SERIES Number 13. Australian Institute of Health and Welfare; Canberra: 2005. 2004 National Drug Strategy Household Survey - First Results.
13. Roy Morgan Research/AIHW. National Drug Strategy Household Survey 2004 Technical report. Roy Morgan Research/AIHW; Melbourne, Victoria: 2005.
14. National Health and Medical Research Council. Australian Alcohol Guidelines: Health Risks and Benefits. Commonwealth Department of Health and Aged Care; Canberra: 2001.
15. Babor, T. Alcohol : no ordinary commodity : research and public policy. Oxford University Press; Oxford: 2003.
16. Toumbourou JW, Stockwell T, Neighbors C, et al. Interventions to reduce harm associated with adolescent substance use: an international review. *The Lancet* 2007;369:41–51.
17. Stockwell, T.; Leng, J.; Sturge, J. CARBC Technical report. CARBC; Victoria, BC: 2006. Alcohol pricing and public health in Canada: issues and opportunities..
18. Graham K, Demers A, Rehm J, Gmel G. Problems with the graduated frequency approach to measuring alcohol consumption: results from a pilot study in Toronto, Canada. *Alcohol Alcohol* 2004;39:455–62. [PubMed: 15289203]
19. Greenfield TK, Nayak MB, Bond J, Ye Y, Midanik LT. Maximum quantity consumed and alcohol-related problems: assessing the most alcohol drunk with two measures. *Alcohol Clin Exp Res* 2006;30:1576–82. [PubMed: 16930220]
20. Borushek, A. Calorie and fat counter. Family Health Publications; Nedlands: 2006.
21. Australian Bureau of Statistics. Apparent Consumption of Alcohol, Australia, 2004-05. Australian Bureau of Statistics; Canberra: 2006. accessible at: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/productsbytitle/48BD96605A358A0ACA256F16007D736D?OpenDocument>
22. Australian Bureau of Statistics. Time Series Workbook. Australian Bureau of Statistics; Canberra: 2007. Population by Age and Sex, Australian States and Territories: TABLE 9. Estimated Resident Population By Single Year Of Age, Australia. accessible at: [http://www.ausstats.abs.gov.au/ausstats/abs@archive.nsf/0/97CB17571FC7FCEFC257242001B2665/\\$File/320109.xls](http://www.ausstats.abs.gov.au/ausstats/abs@archive.nsf/0/97CB17571FC7FCEFC257242001B2665/$File/320109.xls)
23. Anthony, A.; Donna, W. New SAS Procedures for Analysis of Sample Survey Data. SAS Institute Inc; Cary, NC: 2007. accessible: http://www.ats.ucla.edu/stat/SAS/library/svy_survey.pdf
24. SAS Institute. SAS/STAT 9.1 user's guide. Vol. 1-7. N.C., SAS Institute; Cary: 2004.
25. Kerr WC, Greenfield TK, Tujague J, Brown SE. A drink is a drink? Variation in the amount of alcohol contained in beer, wine and spirits drinks in a US methodological sample. *Alcohol Clin Exp Res* 2005;29:2015–21. [PubMed: 16340459]
26. Gray D, Chikritzhs T, Stockwell T. The Northern Territory's cask wine levy: health and taxation policy implications. *Aust N Z J Public Health* 1999;23:651–3. [PubMed: 10641360]
27. Caetano R. Non-response in alcohol and drug surveys: a research topic in need of further attention. *Addiction* 2001;96:1541–5. [PubMed: 11784451]
28. Stockwell T, Crosbie D. Supply and demand for alcohol in Australia: relationships between industry structures, regulation and the marketplace. *Int. J. Drug Policy* 2001;12:139–152. [PubMed: 11399417]

Table 1

The demographic characteristics of the sample and the proportions of lifelong and past year abstainers

Characteristics	Sample		Lifelong Abstainers		Past 12 Month Drinkers	
	N [†]	% [‡]	N [†]	% [‡]	N [†]	% [‡]
Total	24109	100.0	1208	5.37 ***	20214	83.25 ***
Age						
12-17	1798	7.46	327	19.84	910	48.13
18-24	2259	9.37	67	3.60	2071	90.34
25-39	6179	25.63	168	2.95	5570	89.84
40-64	9671	40.11	274	3.04	8492	87.27
65+	4202	17.43	372	9.55 ***	3171	74.09 ***
Sex						
Female	13550	56.20	776	6.51	11090	80.19
Male	10559	43.80	432	4.16	9124	86.56

Notes:

*P<0.05

**P<0.01

[†] Estimates were based on unweighted data.

[‡] Estimates were based on weighted data. X² test:

*** P<0.001.

Table 2

Per capita ethanol consumption for Australians aged 12 and over derived from different questioning methods (litres) in the last year compared with alcohol consumption estimates from ABS[†]

Methods	Ethanol Per Person Aged 12+ (Litres) in 2004		
	NDSHS (95% CI)	ABS [†]	% [‡]
Quantity-Frequency (QF)			
- yesterday standard drink as mid-points	4.71 (4.59-4.82)	9.33	50.48
- new standard drink (16.22 ml or 12.8 g)	6.03 (5.88-6.18)	9.33	64.63
Graduated-Frequency (GF)			
- yesterday standard drink as mid-points	4.89 (4.78-5.00)	9.33	52.41
- new standard drink (16.22 ml or 12.8 g)	6.45 (6.31-6.59)	9.33	69.17
Yesterday – simple standard drink			
- all week days equally weighted	5.34 (5.18-5.50)	9.33	57.23
- public holidays weighted as weekends*	5.45 (5.28-5.62)	9.33	58.41
Yesterday – detailed estimates of content			
- all week days equally weighted	7.38 (7.05-7.71)	9.33	79.10
- public holidays weighted as weekends	7.53 (7.19-7.86)	9.33	80.71

Note:

* Estimates excluded home-brewed beer and home-made wine reported in the 2004 NDSHS for comparability with ABS data. When these are included, the NDSHS estimates are: 7.67 for all week days equally weighted and 7.82 litres for public holidays weighted as weekends.

[†] Australian Bureau of Statistics.

[‡] % of the estimate in NDSHS to that in ABS.

Table 3

Per capita ethanol consumption (litres) for different age groups and sexes of Australians (12 + years) derived from detailed yesterday method applied in the 2004 NDSHS

Demographics	Per Capita Alcohol Consumption & 95% Confidence Interval (CI)
Age in years	***
12-17	1.73 (1.17-2.29)
18-24	10.93 (8.53-13.32)
25-39	8.61 (7.99-9.24)
40-64	8.78 (8.33-9.24)
65+	5.31 (4.90-5.72)
Sex	***
Female	4.50 (4.28-4.72)
Male	11.42 (10.77-12.08)

F test: *P<0.05 **P<0.01

P<0.001

Table 4

Percentage of drinks of each beverage type reported drunk on 'risky' drinking days, as a percentage of all drinks consumed on risky drinking days, and contribution to total self-reported drinks (estimated from the detailed Yesterday question)

Beverage type	N reporting beverage Yesterday	% of Drinks on Risky Drinking Days	% of Risky Drinks to Total Risky Drinks	% of Drinks to Total Drinks [†]
Home-brewed beer	236	66.8	3.2	2.9
Regular strength beer	1932	72.6	34.4	28.4
Mid-strength beer	663	45.0	3.9	5.2
Low alcohol beer	752	26.0	1.5	3.4
Home-made wine	118	48.9	0.8	0.9
Cask wine	1457	40.7	6.6	9.8
Bottled wine [‡]	3040	44.0	17.0	23.2
Premixed spirits	786	71.8	10.3	8.7
Straight spirits	1228	79.7	20.2	15.2
Alcoholic cider	71	78.9	0.7	0.5
Fortified wine	321	43.8	1.1	1.5
Other [‡]	92	61.3	0.4	0.4
Total drinks	8,364	60.1	100.0	100.0

Note:

[†] Includes champagne.

[‡] Includes cocktails and unclassified other beverages.

Table 5

A comparison of market share for different beverages estimated from the detailed Yesterday method and ABS official national beverage estimates

Beverage type	Yesterday method self-reported % of total alcohol consumption [†]	ABS % of total alcohol consumption [‡]
Beer		
Regular strength beer	30.3	38.2
Mid-strength beer	5.5	5.6
Low alcohol beer	3.6	4.0
Total beer	39.4	47.7
Wine		
Cask wine	10.3	n/a
Bottled wine	24.8	n/a
Total wine	35.2	31.3
Spirits		
Pre-mixed spirits	9.2	8.7
Straight spirits	16.2	12.3
Total spirits	25.5	21.0
Total alcohol	100.0	100.0

Note:

[†]The estimates were based on beverage types listed in Table 4.

[‡]Estimates based on ABS statistics (22).

Table 6

Percentages of different beverages consumed on 'risky' drinking days, consumption of individual beverages on risky drinking days as a percentage of all alcohol drunk on risky drinking days, and 'market share' of total alcoholic beverage consumption, all estimated from the detailed Yesterday questions for specific high risk groups

Beverage type	% of Drinks on Risky Drinking Days	% of Risky Drinks to Total Risky Drinks	% of Drinks to Total Drinks [†]
Aged 12-17 years			
Regular strength beer	78.9	16.8	17.3
Mid/low strength beer	26.0	1.7	5.3
Cask wine	38.8	0.9	2.0
Bottled wine [‡]	53.1	3.5	5.3
Premixed spirits	76.7	23.7	25.2
Straight spirits	98.9	45.6	37.5
Others [‡]	84.6	7.8	7.5
Total	81.5	100.0	100.0
Aged 18-24 years			
Regular strength beer	84.9	32.2	32.1
Mid/low strength beer	60.9	2.4	3.4
Cask wine	81.4	1.9	2.0
Bottled wine [‡]	64.6	6.5	8.5
Premixed spirits	85.7	25.0	24.7
Straight spirits	94.0	28.6	25.8
Others [‡]	79.7	3.4	3.6
Total	84.8	100.0	100.0
Indigenous people			
Regular strength beer	91.8	36.2	35.0
Mid/low strength beer	81.2	7.4	8.1
Cask wine	73.5	2.3	2.8
Bottled wine [‡]	90.3	8.2	8.1
Premixed spirits	86.4	18.2	18.7
Straight spirits	89.9	13.9	13.7
Others [‡]	90.1	13.8	13.6
Total	88.8	100.0	100.0

Note:

[†] Includes champagne

[‡] Includes home-brewed beer, home-made wine, alcoholic cider, and fortified wine, cocktail and other unclassified drinks.