

Standard drink measures in Europe

Peoples' understanding of standard drinks and
their use in drinking guidelines, alcohol surveys
and labelling





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Title: Standard drink measures throughout Europe; peoples' understanding of standard drinks and their use in drinking guidelines, alcohol surveys and labelling

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Summary

A standard drink is a notional drink that contains a specified amount of pure alcohol and it is usually expressed as a certain measure of beer, wine or spirits. The purpose of this review is to compare European standard drink measures; review consumers' understanding of standard drinks; and describe the use of standard drinks in drinking guidelines, alcohol surveys and labelling.

The results of a 2014 Italian survey conducted by the Istituto Superiore di Sanità as part of RARHA indicate that there is variation in the number of grams of alcohol in a standard drink among European countries. The most common value is 10g, which is used by 11 countries, followed by 12g, which is used by five countries. It can be difficult for drinkers to estimate what exactly constitutes a standard drink. A review of the evidence indicates that while there seems to be awareness of the term 'standard drink', understanding of what it actually means is limited. Drinkers are not able to define standard drinks accurately. They tend to overstate the appropriate volumes, leading them to overpour drinks and underreport levels of consumption.

This confusion over standard drinks can have serious consequences. It can affect the precision and reliability of the results of surveys of self-reported alcohol consumption and we know that surveys of self-reported consumption result in estimates of per capita consumption well below the level calculated from alcohol sales data. In terms of low risk drinking guidelines drinkers may interpret them in terms of numbers of drinks that correspond to levels of intake that are smaller or larger than those intended by the standard drink definitions included in the guidelines. Regarding the challenging issue of drinkers' inability to accurately gauge their consumption in standard drinks, one potential way to deal with this issue is to place serving size information on alcoholic beverage containers. Labelling drink containers with their alcohol content in terms of standard drinks would better equip all drinkers to follow the advice of health educators.

Standard drink measures in Europe

Introduction

A 'standard drink' (or 'unit of alcohol' in the UK) is a notional drink that contains a specified amount of pure alcohol (ethanol). It is usually expressed as a certain measure of beer, wine, or spirits. One standard drink always contains the same amount of alcohol regardless of the container size or the type of alcoholic beverage, but does not necessarily correspond to the typical serving size in the country in which it is served. The concept of standard drink was introduced as a means of providing information to drinkers to help them measure their own alcohol consumption and is often used in alcohol awareness or education campaigns as a way of communicating official guidelines regarding low-risk drinking. Standard drinks are also commonly used in drinking surveys for calculating respondents' drinking levels and for describing their drinking patterns.

The purpose of this review is to:

- Compare international definitions of a standard drink
- Review the literature on consumers' perceptions of standard drinks
- Compare consumers' actual drinks to standard drinks
- Describe the use of standard drinks in surveys
- Describe alcoholic beverage labelling and drinking guidelines

Search strategy

I used the guidance literature provided by the project co-ordinator and did a general search on pub med using the term standard drink in title or abstract. I perused the 82 papers retrieved to identify literature pertinent to the purpose stated above.

International definitions of a standard drink

Many European countries have a national standard drink, with the UK being the only country that uses the term 'unit' to express their equivalent of a standard drink. As part of the Joint Action RARHA, the Istituto Superiore di Sanità in Italy undertook a survey in 2014 to ascertain to determine the number of grams of alcohol in standard drinks across Europe. 29 out of the 31 European countries invited to participate did so (Bulgaria and Slovakia did not take part). The results of the survey indicated variation in the number of grams of alcohol in a standard drinks between countries (Table 1). The lowest number of grams of alcohol are in the

UK unit at 8 grams and the highest in Austria at 20 grams. Eleven European countries have 10 grams of alcohol in a standard drink and five have 12 grams in a standard drink.

Table 1 Grams of alcohol in a standard drink by country

Country	Number of grams
Austria	20g
Croatia	10g, 14g
Czech Republic	16g
Denmark	12g
Estonia	10g
Finland	12g
France	10g
Germany	10g, 12g
Greece	10g, 16g
Hungary	10g, 14g
Iceland	8g, 12g
Ireland	10g
Italy	12g
Latvia	12g
Lithuania	10g
Luxembourg	12g
Malta	8g, 10g
Netherlands	10g
Norway	12g, 15g
Poland	10g
Portugal	10g
Romania	12g
Slovenia	10g
Spain	10g
Sweden	12g
Switzerland	10g, 12g
United Kingdom	8g

Drinker understanding of standard drinks

It can be difficult for drinkers to estimate what exactly constitutes a standard drink. To establish the amount of pure alcohol and hence the number of standard drinks in a beverage requires knowledge of both the volume of alcohol in the beverage container and its percentage ABV (alcohol by volume).

For example, to calculate the amount of pure alcohol in an alcoholic beverage requires multiplying the serving size of the drink (in millilitres) by the %ABV of the drink and dividing by 1.25 (1ml=1.25g) to establish the grams of pure alcohol in that specific drink. If a standard drink contains 10g of pure alcohol then the number of grams is multiplied by 10 [1]. Given the calculations involved, it is probably not surprising that most drinkers have difficulty in assessing what a standard drink is. This is particularly the case for drinks with a high %ABV such as spirits as small differences in volume can have a large impact. It can also be difficult to estimate wine volume due to the use of varying glass sizes. In addition, the %ABV can range from 9-16%. Beer is the easiest for drinkers to estimate as beer is the most standardised and most beer is sold in single serve containers [2]. This inaccuracy arises due to underestimation of beverage volumes or strengths as measured by alcohol by volume (ABV).

Numerous studies have examined drinkers' knowledge of what a standard drink is.

- A 2012 Irish survey tested 1,020 respondents' knowledge of standard drinks. All respondents were provided with a definition of the term 'standard drink' and were then asked the number of standard drinks in four different alcoholic drinks of various measures. A standard drink in Ireland contains 10g of pure alcohol. 58% had heard of the term 'standard drink'; 24% were aware that a 200 millilitre glass of wine contains two standard drinks, 51% were aware that a half pint of Guinness contains one standard drink, 39% knew how many standard drinks are in a pint of lager and 33% knew how many standard drinks are in a single measure of spirits. Just 9% knew the correct number of standard drinks in all four of the measures asked [3].
- A 2009 survey in England found that 90% of 2,110 respondents had heard of measuring alcohol consumption in units. In relation to units, 63% of those who had drunk beer in the last year knew that a unit of beer is half a pint (8 g), 27% per cent of respondents correctly said that a unit is less than a small glass of wine and 69% of those who drank spirits were aware that a single measure was 1 unit [4].
- In 2013, approximately half of 1,497 adults in Scotland were able to correctly identify the number of units in a pint of beer, measure of spirits or a glass of wine (47- 51%), with 29% correctly identifying the number of units in all three drink types. Awareness of the unit content of a bottle of wine was much lower with 18% able to correctly identify the number of units in a bottle. Public awareness of unit content had changed little since 2007 [5].
- A US study of 106 resident doctors showed that although 89% of respondents stated that they had previously learned about screening for at-risk alcohol use, the majority did not know basic facts about standard drink equivalents. Each respondent was asked 10 questions and the average number of correct answers was 3.48. Fewer than 20% knew that a US standard drink of liquor equalled 1.5 ounces (45 ml) and only a third knew that a standard drink of wine equals 5 ounces. The majority were not aware of the amount of alcohol contained in common bottle sizes such as a pint of beer. Just 43% knew how many ounces were in a US pint of beer; 20% knew how many ounces are in a fifth of vodka; 59% incorrectly

thought that typical table wine contained 18-20% ABV. As healthcare settings such as emergency departments and primary care centres are often used to screen patients for at-risk and problem drinking, it is important that the relevant staff have sufficient knowledge on standard drinks so assess drinking and provide appropriate intervention [6].

Other studies have examined the practice of pouring alcoholic beverages in comparison with a standard drink.

- In an Australian study of 844 drinkers aged 65-74, participants were shown pictures of typical standard drinks. They were then asked to nominate their three most commonly consumed alcoholic beverages and to pour each of the three beverages as one standard drink (10g). Based solely on amounts poured, men over-poured a standard drink of wine by 38%, spirits by 58% and beer by 15%. Women over-poured wine by 18%, spirits by 25% and beer was under-poured by 21% [7].

- In a US study, 106 students completed an alcohol survey and were then asked to pour fluid into empty cups of different sizes and to estimate the volume of a single beer and a shot of liquor. In every cup size of each drink type, students overestimated how much fluid they should pour to create a standard drink, with the magnitude of the discrepancy increasing with cup size. Collapsed across cup sizes, students exceeded the amount of alcohol in a shot by 26% and beer by 25% [8].

- Another US study asked 133 students the number of ounces of alcohol in a standard drink of beer (12oz), spirits (1.25oz) and wine (4oz). With the exception of beer, students incorrectly defined the volumes of standard servings of alcohol. Wine was overestimated by an average of 75% and spirits by 90%. When asked to pour water into clear plastic cups of various sizes to create standard drinks, they filled the cups too high and with beer and wine the volumes poured increased with the size of the cups. There was a positive relationship between the amount of alcohol that students thought should be present in a standard drink and how many ounces they free-poured. This suggests that students underestimate how much alcohol they actually consume, which could lead them to provide inaccurate responses on alcohol surveys. Their performance in the free-pour tasks led them to increase their self-reported levels of consumption by roughly 12% overall [9].

- A total of 371 Australian university students were asked to estimate the amount of pure alcohol contained in a standard drink in grams (10 g) and to estimate the number of standard drinks contained in popular alcoholic beverages. Students generally overestimated the amount in a standard drink (mean=18.34g). Most of the students (58%) overestimated the number of standard drinks in beer; 41% underestimated the number of standard drinks in a 750ml bottle of wine. The majority of students (57%) correctly identified the number of standard drinks in a shot of spirits [10].

- In the UK, 309 secondary school and 125 university students were asked what they believed to be: the volume (in mL) of pure ethanol in a 'unit', and the alcohol unit content of 10 drinks selected to cover different sized servings of three types of alcoholic drinks consumed

by young people. They were also asked to pour their 'usual' drinks. Participants' usual drinks were substantially larger than one unit, and participants tended to underestimate the unit content of drinks. Although university students gave a significantly greater number of accurate estimates than did school students, only one-quarter of their estimates were within $\pm 10\%$ of the actual content. The majority of estimates were underestimates: 52.0% among school students; 65.3% among university students. In the pouring exercise, participants poured bigger drinks when they were given bigger glasses. With the exception of the small glass of beer, the average alcohol content of 'usual' drinks was significantly larger than one unit. Overall, 85.9% of 'usual' drinks contained more than one unit, and only 21% were within $\pm 10\%$ of one unit [11].

How actual drinks compare to standard drinks

- In a US study, 321 pregnant women were asked to define the size of their alcoholic beverages, for each different type of beverage they had during the 12 months before they knew they were pregnant. The mean self-selected drink size of beer contained 18.2 grams of pure alcohol, 52% more alcohol than the US standard drink size (12 g). The self-selected spirits drink size contained almost 90% more alcohol than the standard drink size [12].
- Another US study asked a sample of pregnant women to define their drink sizes not by pouring liquids, but by indicating drink levels on models and photographs. They reported median values of 1.3 and 2.0 times the standard drink (12 g) for wine and spirits respectively [13].
- In a Dutch study 863 subjects were asked to pour their usual drink (using water) into a typical beverage glass. When results were compared to a standard drink of alcohol (10 g), over-estimation was evident; the self-poured spirits contained 26% more alcohol than the standard drink and the self-poured wine contained 4% more. For wine the glasses used were only 8% bigger than the standard drink volume of 100 ml, while spirits were poured in glasses that contained about one-third more volume, which may explain some of the results. [14].
- In a Scottish study, 238 drinkers were asked to pour into a glass provided by the researcher 'the drink of red wine you would pour at home' and this was repeated using whisky. In the case of whisky, the participant was given the choice of using a spirit tumbler or a tall glass. The mean amount of alcohol in a drink of self-poured wine corresponded to 1.92 UK units (1 unit = 8 g). For whisky, the corresponding figure was 2.3 UK units [15].
- A UK study asked 283 participants to select a glass most similar to what they would use for that beverage at home, to pour their "usual glass", and then to estimate the number of units poured. The majority (95%) reported they had heard of units. The mean number of units poured of wine was 1.90 and of spirits was 1.93 [16].
- An Australian study asked 340 subjects to pour a variety of alcoholic beverages using their own glasses and water. For women aged 18–44 years, the mean numbers of standard

drinks (10 g) for poured were 1.0–1.5 for red wine and white wine, and 1.0–1.9 for spirits. The ranges for men were 1.1–1.5 for wine and 1.1–1.8 for spirit [17].

- In Spain two field studies were simultaneously conducted among 10,751 subjects to gather data about home and public alcohol consumption. In one study, 1,600 people at a supermarket who had purchased alcohol were asked to choose the cup or glass they would use at home to drink the beverage they had bought and were then asked to fill the glass in the same way as at home. A drink of beer contained a mean of 9.6g, wine contained 10.9g and spirits contained 20.0. This study did not consider brand variation in ethanol content so the actual overall variation in ethanol content may have been even larger [18].

- In the US, 310 drinkers were asked to prepare their usual drink of each beverage at home and to measure each beverage with a provided beaker, which contained information on the brand or type of each beverage to specify the percentage of alcohol. The largest mean drink alcohol content was found for spirits at 0.89 ounces, 48.3% larger than a standard drink (14 g). Wine drinks had the second highest mean alcohol content at 0.66 ounces, 10% larger than a standard drink, while beer drinks were found to contain the least alcohol with a mean of 0.56 ounces, 6.7% less alcohol than the standard [19].

- A US study asked 266 pregnant women to select their usual drinking vessels (glasses, bottles and cans) and to indicate their usual pour or fill level for each alcoholic beverage they reported drinking in the 12 months before they became pregnant. They were also asked how many ounces they thought were in each of their vessels. Underestimates were more pronounced for higher ethanol content beverages and for beverages that are frequently poured from larger containers (spirits and wine) rather than bottled as a single serving such as beer. Most spirits drinkers (90%) and approximately three-quarters of the wine drinkers drank larger-than-standard drink sizes, with the median drink size 1.5 to 2.0 times larger than the standard size for those beverages. In addition, 61% of spirits drinkers said their drinks contained less than the actual number of ounces in the pour level they had identified on their selected vessels for these beverages. In general, women did not underestimate the size of their beer [20].

- A US study of 198 college students and 86 bartenders were asked to pour liquid, corresponding to a standard drink or 'shot' (1.5 ounces, 44.3 ml) from 1500 ml spirits bottles into short, wide and tall, slender glasses. Both the students and bartenders poured more into short, wide glasses than into tall slender glasses (46.1 ml v 44.7 ml and 54.6 ml v 46.4 ml, respectively). Practice reduced the tendency to overpour, but not for short, wide glasses. Despite an average of six years of experience, bartenders poured 21% more into short, wide glasses than tall, slender ones; paying careful attention reduced but did not eliminate the effect. [21]

While there seems to be awareness of the terms 'standard drink' and 'unit', understanding of what these terms actually mean is limited. Drinkers are not able to define standard drinks accurately. They tend to overstate the appropriate volumes, leading them to overpour drinks

and underreport levels of consumption. This is especially pertinent when alcohol is consumed at home rather than in licensed premises. The results of these studies indicate the importance of paying attention to specific beverage types and containers. Pouring practices appear to vary widely depending on the type of beverage and/or the type of container. Beverages with a higher ABV such as spirits are most likely to be over-poured than beverages with a lower percentage ABV, for example, beer. This may be explained by the fact that beer is usually sold and consumed in set volumes, while the volumes of spirit and wine poured is usually in the control of the drinker, and therefore likely to deviate from a standard measure. To avoid overpouring, tall, narrow glasses should be used instead of short, wide glasses. To avoid underestimating the amount of alcohol consumed, it may be useful in surveys using self reports of standard drinks to ask about the shape of the glass. These results also highlight the importance for accurate measurement of local knowledge of drink types and container size for accurate alcohol intake assessment.

Use of standard drinks in surveys

When surveys of alcohol consumption are conducted, respondents are generally provided with the definition of a standard drink used in that country and then asked about their alcohol consumption with that definition in mind. These drinks are often defined for the respondents in terms of the typical container sizes of beer, wine or spirits to assist respondents to comprehend what constitutes a standard drink. Terms such as ounces, millilitres, or grams of ethanol are generally not used as they are not easily understood by consumers [22]. However, the results of the studies above clearly demonstrate that there are considerable differences between respondents' perceptions of what a standard drink constitutes and the actual definition of a standard drink, especially in relation to spirits and wine. While one standard is taken by researchers to apply to all beverage types, in reality, beverages differ by their typical serving size and ABV. Regardless of what they are told constitutes a standard drink, some respondents may report the number of drinks they consume in terms of the drink they actually consume. This confusion over standard drinks can have serious consequences and can affect the precision and reliability of the results of the survey.

We know that surveys of self-reported alcohol consumption result in estimates of per capita consumption well below the level calculated from alcohol sales data. It has long been recognised that population surveys of self-reported alcohol consumption result in estimates of per capita consumption well below the level estimated from alcohol sales data. The usual range of coverage from surveys is in the region of 40-60% [23]. In Australia, it is estimated from the National Drug Strategy Household Survey that self-reported alcohol consumption accounts for 53-78% of per capita alcohol sales [24]. In a recent Irish population survey, self-reported alcohol consumption based on 'typical drink questions' accounted for just 39% of per

capita sales, even though the concept of a standard drink was explained in detail to each respondent and visual aids were provided depicting a standard drink according to beverage type [25]. The literature indicates that there are three reasons why self-reported alcohol consumption does not accurately reflect per capita alcohol sales: the confusion regarding what constitutes a standard drink, variations in drinking vessels and the variations in alcohol by volume content of different beverages [7] [13] [26]. When conducting surveys it is critical that researchers and respondents define a standard drink in a comparable way [27]. If there are discrepancies between both values, this can have particular implications if the survey is using self-reported alcohol consumption levels to determine thresholds for binge or risky single occasion drinking and harmful drinking patterns. If definitions of harmful drinking are based on self-reported survey data, inaccurate survey responses could call the thresholds into question. For example, if respondents underreport their true levels of consumption, which is feasible given the published literature on consumers' understanding of standard drinks, then the thresholds used in surveys to denote binge drinking and harmful drinking may be too low.

Importance of standard drinks for low-risk drinking guidelines

Dawson [28] states that 'perhaps the best illustration of the complexity of defining risk drinking can be obtained by comparing international low risk drinking guidelines. Many of the differences across countries in the specific numbers of drinks comprising daily or weekly limits reflect variation in the standard drink size used to express the daily and/or weekly limits. Thus, according to Dawson [27], it must be understood that many drinkers will interpret drinking guidelines in terms of numbers of drinks that correspond to levels of intake that are smaller or larger than those intended by the standard drink definitions included in the guidelines. In light of this, it might be argued that standard drink sizes for any given country should reflect the most common container or serve sizes in that country, even if this leads to lack of comparability across countries. That is, the standard drink definitions that maximize prevention efforts may not be those best suited for comparative research purposes. Research addressing how guidelines are understood by drinkers who typically pour non-standard drinks might help to improve the delivery of drinking guidelines to these individuals.

Regarding the perplexing and challenging issue of drinkers' inability to accurately gauge their consumption in standard drinks, the most obvious solution lies in the approach that has been adopted by a number of Western countries, in which alcoholic beverage containers explicitly state how many standard drinks (units) they contain. Even in the absence of such labelling, it has been argued that if risks attributed to drinking five or more drinks are based on scientific evidence relying on actual as opposed to standard drink sizes, coupled with other sources of consumption underreporting, then drinking less than five drinks, irrespective of

how closely they correspond to standard drink size, will reduce harm in the aggregate. That is, if one assumes that relative risks associated with various consumption levels are overstated because of underreporting of consumption, then adherence to low-risk drinking limits should prove effective even for individuals whose actual drink sizes are larger than standard. Hence, publicizing low-risk drinking limits should play an important role in any activities aimed at preventing alcohol-related harm.

Standard drink labelling

One potential way to deal with this issue is to place serving size information on alcoholic beverage containers. The size of a container influences the size of the drinks that students pour. In general, students pour bigger servings into bigger containers. A study by Wansink and van Ittersum (2003) [29] suggested that the shapes of containers can also influence perceptions of drink volumes. Such findings could have important implications for alcohol education efforts. In summary, with the exception of beer, students lacked knowledge of standard servings of alcohol. They overestimated the appropriate volumes of standard servings of wine, shots, and the amount of liquor in mixed drinks. Positive relationships existed between students' definitions of standard drinks and the size of the drinks that they poured in the free-pour tasks. Feedback regarding misperceptions of standard drink volumes led to an increase in levels of self-reported consumption. Such findings raise serious questions about the validity of students' self-reported drinking habits, as well as definitions of risky drinking based on self-reported levels of alcohol consumption. The findings strongly suggest that we need to do a better job of educating our students about the definitions of standard drinks. Beverage manufacturers could assist in this process by including serving size information on containers.

In a 1991 Australian study, 67% of respondents had heard of a standard drink (10g). The 74 respondents were asked to pour a single drink of beer and wine from a 750 ml bottle into various glass sizes (contents measured in millilitres). Standard drink equivalences were 10 g ethyl alcohol per drink. Beer drinkers achieved greater accuracy in this task when the bottles had standard drink labels, even when the glass size and beverage strength were varied. Wine drinkers had equal difficulty with this task whether standard drink or percentage labels were used. The addition of a 'ladder' up the side of a wine bottle with graduations in standard drinks would be necessary for wine drinkers to achieve a high level of accuracy. We conclude that labelling drink containers with their alcohol content in terms of standard drinks would better equip all drinkers to follow the advice of health educators [30].

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