

# **Alcoholic Beverage Consumption by Adults 21 Years and Over in the United States: Results from the National Health and Nutrition Examination Survey, 2003-2006**

## **Technical Report**

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## Introduction

Alcoholic beverages are consumed by many people in the United States and around the world. These beverages contain ethanol, which differentiates them from other beverages such as coffee, tea, soft drinks, milk, fruit juices, and water. Alcoholic beverages are produced through alcoholic fermentation of fruits, grains, sugar cane juice, or potatoes and other starchy tubers. Some products of fermentation, such as beer and wine, are sold as such, whereas others are distilled to produce distilled spirits, such as whiskey, rum, gin, and vodka. The distilled spirits are consumed as such (straight) or as mixed drinks along with other beverages, both alcoholic and nonalcoholic. Examples of mixed drinks include daiquiri, margarita, gin and tonic, rum and cola, and tequila sunrise.

The objectives of this study were to characterize alcoholic beverage consumption among adults age 21 years and older in the United States, using the data available in the National Health and Nutrition Examination Survey (NHANES), and to compare the alcoholic beverage consumption by older adults, age 65 and over, to younger and middle-aged adults. This information is of interest to the members of the Subcommittee on Ethanol of the Dietary Guidelines Advisory Committee, 2010. They posed the following research questions:

1. How many adults drink alcoholic beverages? Specifically,
  - a. How many adults drink beer, wine, or distilled spirits on a given day?
  - b. How many drink any alcoholic beverage at least once in a year?
2. How much alcohol do adults consume? Specifically,
  - a. What is the distribution of alcoholic beverage intake on a given day?
  - b. What is the distribution of average daily alcoholic beverage consumption?
  - c. What is the distribution of alcoholic beverage consumption by adults on days they drink by frequency of consumption?
  - d. What percentage of adult drinkers and what percentage of all adults drink to excess, that is, what percentage of men drink 5 or more drinks on days they drink, and what percentage of women drink 4 or more?
3. What is the contribution of alcoholic beverages to energy intake, compared to other major sources of discretionary calories, that is, added sugars and solid fats, among those who consume alcohol?
4. How much energy, total sugar, other carbohydrate, protein, and fat are provided by alcoholic beverages among those who consume beer, wine, and distilled spirits?

## Methods

### Data Source

Data used to address the research questions were collected in the National Health and Nutrition Examination Survey, 2003-2004 and 2005-2006 (NHANES 2003-2006). The NHANES, conducted by the Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS), became a continuous survey in 1999 [1,2]. The dietary component of NHANES and the U.S. Department of Agriculture's (USDA) Continuing Survey of Food Intakes by Individuals (CSFII) were integrated at that time. The dietary data collection under the integrated What We Eat in America, National Health and Nutrition Examination Survey, (WWEIA, NHANES) began in 2002 [3]. Data from NHANES are released in 2-year cycles that can be used separately or combined as has been done for this study [4].

### Survey Design

The NHANES survey design is a complex, stratified, multistage probability sample of the civilian, noninstitutionalized population residing in the United States [1]. The stages of sample selection are (1) selection of Primary Sampling Units (PSUs), which are counties or small groups of contiguous counties; (2) segments within PSUs consisting of a block or group of blocks containing a cluster of households; (3) households within segments; and (4) one or more sample persons per household. Random samples of households in each segment are drawn from the list of households. Sample persons are then chosen from the list of all living in the households identified in the previous step. Individuals are drawn at random within designated age-sex-race/ethnicity screening subdomains. On average, 1.6 persons are selected per household.

NHANES respondents are interviewed in their homes and subsequently in mobile exam centers (MECs) where the examination component of NHANES takes place. The dietary intake data analyzed for this report were collected from respondents while they were visiting a MEC. Additional data were collected via a self-administered food frequency questionnaire (FFQ) returned by mail following the MEC visit. It is through the application of the sample weights assigned to each NHANES sample person that estimates based on NHANES data are nationally representative. Sample weights reflect the unequal probability of selection, nonresponse adjustment, and adjustment to independent population controls. Separate sets of sample weights are constructed for the analysis of data collected in the home interviews (interview weight) and for much of the analysis of data collected in the MEC (MEC weight). Additional sets of sample weights are constructed for the analysis of specific subsets of the data. The sample weight sets used in the preparation of this report are the MEC weights and two of these additional sets of weights:

- Dietary sample weights are assigned to each participant who had provided a complete 24-hour intake. In addition to adjusting for sample design and nonresponse, they also adjust for the day of the week of the intake and effectively equalize the days of the week represented in the population estimates. This is particularly important in analysis of foods and nutrients, such as alcohol, that are not consumed in equal amounts on all days of the week. These weights are used in most situations when analyzing the dietary data.
- Food frequency sample weights (FFQ weight), derived from the dietary weights and reflecting the subset of dietary respondents who had also provided the FFQ, which allowed the dietary respondents to be classified by the type of alcoholic beverages consumed over the past 12 months. The FFQ weights were used when analyzing data from the subset of dietary respondents who also provided an FFQ.

## Study Sample and Response Rates

This study includes adults, ages 21 years and over, who participated in the NHANES 2003-2006. The inclusion criteria were (1) for the 24-hour recall data analyses, complete and reliable dietary intake data; (2) for the Alcohol Use Questionnaire (ALQ) data analyses, complete data that allow estimation of alcoholic beverages consumed on average and on days alcoholic beverages were consumed; and (3) for the FFQ data analyses, nine or fewer missing answers in the entire questionnaire and complete responses to the alcohol questions. (The three types of data are described below.)

The response rates differed among the instruments; therefore, the sample sizes varied for the various research questions. Unweighted analytic response rates were as follows:

### **Sample counts and overall response rates for men and women ages 21 years and over used for the study**

Table number	Survey years	Instrument completed	Sample size	Response rate <sup>1</sup>
				(%)
1a	2003-2006	Dietary recall	8,790	66
1b	2003-2006	ALQ	8,479	63
2a	2003-2004 <sup>2</sup>	Dietary recall	4,358	64
2b-d.2	2003-2006	ALQ	8,479	63
3	2003-2004 <sup>2</sup>	Dietary recall and ALQ	4,133	61
4	2003-2006	Dietary recall and ALQ	5,289	61
Appendix 1	2003-2006	FFQ	5,717	43
Appendix 2-4	2003-2006	Dietary recall and FFQ	5,717	43

<sup>1</sup>Overall unweighted response rate for providing data for each analysis; based on all participants selected into the NHANES.

<sup>2</sup>Analyses requiring the MyPyramid Equivalent Database were limited to 2003-2004 because the version required for analyzing 2005-2006 data was not available at the time of this study.

While the response rates for the dietary recalls and the ALQ are less than ideal, they are generally considered acceptable by the research community. The unweighted FFQ response rates, however, are one-third lower and fall below 50 percent. These FFQ data are appropriate for use as covariates in statistical models of relationships between diet and health outcomes, where nonresponse bias is less likely to be a factor [5]; however, the ability of the weighting factors to adjust for nonresponse bias in estimating population parameters, such as those provided in this report, is questionable. Therefore, results estimated from the FFQ data are provided in an appendix rather than in the body of this report.

## Data Collection and Dietary Data Processing in NHANES, 2003-2006

Within NHANES 2003-2006, three instruments are used to collect information on alcoholic beverage consumption:

**1. Alcohol Use Questionnaire (ALQ):** The Alcohol Use component of NHANES 2003-2006 focuses on current and lifetime use of alcohol. The types of alcoholic beverages consumed are not queried. The ALQ is administered to individuals ages 20 years and over by interviewers during the physical examination at the MEC using a computer-assisted personal interviewing system [6, 7]. All adults were eligible for the ALQ. The following questions from the ALQ were used in this study:

**ALQ101.** The next questions are about drinking alcoholic beverages. Included are liquor (such as whiskey or gin), beer, wine, wine coolers, and any other type of alcoholic beverage. In any one year, have you had at least 12 drinks of any type of alcoholic beverage? By a drink, I mean a 12 oz beer, a 5 oz glass of wine, or 1½ oz of liquor.

**ALQ120.** In the past 12 months, how often did you drink any type of alcoholic beverage?  
Probe if needed: How many days per week, per month, or per year did you drink?

**ALQ130.** In the past 12 months, on those days that you drank alcoholic beverages, on the average, how many drinks did you have?

In this report, responses to these questions were used to identify individuals who had consumed alcoholic beverages during the past 12-month period, to identify an individual's average number of drinks on drinking days, and to estimate the average number of drinks per day over all days. This questionnaire was not completed by all MEC respondents, and a few answered "don't know" or had missing values. Only respondents who provided enough data to estimate the number of drinks consumed per drinking day and on average over all days were included.

The MEC sampling weights were used only when analyzing ALQ data alone (tables 1b and 2b-d.2). When the ALQ data were combined with data from the 24-hour dietary recall, the dietary weights were used (table 4).

**2. WWEIA, NHANES 24-Hour Dietary Recall Method:** WWEIA is the dietary intake interview component of the NHANES [3]. Self-reported, 24-hour dietary recalls are conducted twice, separated by 3 to 10 days and not on the same day of the week. The first dietary recall data is collected by in-person interviews in the MEC. A second 24-hour dietary recall (not used in this study) is conducted by telephone interview. Interviewers use a computer-assisted instrument, the Automated Multiple-Pass Method (AMPM), developed by the Agricultural Research Service (ARS), to collect the dietary intake data [8]. For each food consumed, detailed information is collected, including a detailed description of the food, additions to the food, and amount of the food consumed.

USDA's Food and Nutrient Database for Dietary Studies (FNDDS) is used to process dietary data collected in WWEIA, NHANES [9]. The FNDDS is used (1) to assign food codes to the foods reported, (2) to convert the food portions consumed to gram amounts, and (3) to calculate more than 60 nutrient values for each food consumed. FNDDS, Versions 2.0 and 3.0 (FNDDS 2.0, FNDDS 3.0) are used with WWEIA, NHANES 2003-2004 and 2005-2006 dietary data processing, respectively.

The 24-hour recall data used in this study were found in the Individual Food Files (IFFs), which consist of one record per food or beverage consumed by each respondent as identified by a food code. Alcoholic beverages are represented in the IFFs either by a single record or as a set of records identified as comprising a single beverage. In both cases, the IFF records provide the energy and nutrient content of the alcoholic beverages [10,11].

The amounts of alcoholic beverages consumed were translated into the respective numbers of alcoholic drink equivalents in the MyPyramid Equivalents Database (MPED), developed by ARS [12]. One alcoholic drink equivalent is defined as 12 fl oz of beer, 5 fl oz of wine, or 1.5 fl oz of distilled spirits. The MPED Version, 2.0 (MPED 2.0) for WWEIA, NHANES 2003-2004 also includes added sugars and was used to calculate the number of teaspoon equivalents of added sugars consumed through alcoholic beverages and other foods.

Ninety-nine adults in this study had reported consuming 8 or more alcoholic drink equivalents. ARS conducts quality checks on the dietary recall data. In addition, the authors reviewed the dietary intake records of these adults and found the reported amounts of alcoholic beverages to be plausible; therefore, these reports were included in the analyses. Eighty percent of these highest consumption reports were for weekend days (Friday-Sunday).

For this study, all reported alcoholic beverages were grouped into four categories: beer, wine, distilled spirits consumed straight, and distilled spirits consumed along with other beverages as mixed drinks. Appendix 1 includes a list of alcoholic beverages in FNDDS 2.0 and 3.0, along with their food codes and categories used in this study. In WWEIA, NHANES 2003-2006, reports of alcoholic beverages consumed in combination with nonalcoholic beverages or other ingredients can be identified through the "combination codes" found in the dataset. Such combination drinks were reclassified as mixed drinks if they contained any of the straight or mixed distilled liquor codes; for example, when rum is added to cola or fruit juice. Also, the few beer or wine and distilled spirit combinations reported were considered to be mixed drinks. If either wine or beer was combined with a nonalcoholic item, such as lemon or seltzer, the

additions were included; and the classification remained as beer or wine. The analyses excluded cooking wine and alcoholic beverages used as ingredients or flavorings in bakery products and cooked foods.

**3. NHANES Food Frequency Questionnaire (FFQ):** The NHANES 2003-2006 included a food frequency questionnaire (FFQ) [13,14]. Respondents who completed at least one 24-hour dietary recall interview were eligible for the FFQ, which was mailed to survey participants' homes. In this report, these data are referred to as the FFQ data. The FFQ was used to collect information on the frequency of food consumption of 139 food and beverage items during the past 12 months. Questions were asked about a wide variety of foods and beverages, including:

**Q10.** Over the past 12 months, did you drink beer?  
If Yes,

**Q10a.** How often did you drink beer in the summer?

Response options: Never, 1 time per month or less, 2-3 times per month, 1-2 times per week, 3-4 times per week, 5-6 times per week, 1 time per day, 2-3 times per day, 4-5 times per day, or 6 or more times per day

**Q10b.** How often did you drink beer during the rest of the year?

Response options: Never, 1 time per month or less, 2-3 times per month, 1-2 times per week, 3-4 times per week, 5-6 times per week, 1 time per day, 2-3 times per day, 4-5 times per day, or 6 or more times per day

**Q11.** How often did you drink wine or wine coolers?

Response options: Never, 1 time per month or less, 2-3 times per month, 1-2 times per week, 3-4 times per week, 5-6 times per week, 1 time per day, 2-3 times per day, 4-5 times per day, or 6 or more times per day

**Q12.** How often did you drink liquor or mixed drinks?

Response options: Never, 1 time per month or less, 2-3 times per month, 1-2 times per week, 3-4 times per week, 5-6 times per week, 1 time per day, 2-3 times per day, 4-5 times per day, or 6 or more times per day

In this study, the FFQ data were used to identify consumers of the different types of alcoholic beverages over a 12-month period. A respondent may have drunk more than one type of alcoholic beverage (beer, wine, and mixed drinks) during this period. Not all eligible respondents returned a completed FFQ. Of the FFQs returned, some were deemed incomplete because they had more than nine missing responses. FFQ sampling weights were constructed for the analysis of respondents with complete FFQs.

## Statistical Analyses

The descriptive statistics used in this report are means and percentages and their standard errors. Survey design was accounted for in data analyses so that the results would yield national estimates for the age and gender groups studied. Three different sampling weights were used, one for each of the data collection instruments used (ALQ, 24-hour dietary recall, and FFQ). SAS and SUDAAN, which was specifically developed for analyzing survey data, were used to analyze the data (Windows Individual User, SAS-Callable SUDAAN Release 9.2, Research Triangle Institute, Research Triangle Park, North Carolina, USA; SAS Release 9.2, SAS Institute Inc., Cary, North Carolina). Ratios, such as the percentage of energy provided by alcoholic beverages, were estimated using the population ratio approach (i.e., using the RATIO procedure). Appendix 2 summarizes the study methodology, including the instruments and the selected questions, inclusion criteria for the study samples, specific sample weights used, sample sizes for each analysis, and the statistics estimated.

## Results

Table 1a (p. 9) provides a snapshot in time of the percentages of adults who drank any alcoholic beverage on a given day during the time period of 2003-2006. An estimated 33 percent of men and 17 percent of women consumed some amount of an alcoholic beverage on a given day. Men were about three times more likely as women to drink beer (23.4 versus 7.0 percent) and also twice as likely to drink mixed drinks (7.1 versus 3.5 percent). About 6 percent of adults drank wine on a given day, and 2 percent drank straight distilled spirits with little difference between the percentages for men and women. Older adults, age 65 years and older, were less likely to drink alcoholic beverages than younger adults. Table 1b (p. 10), on the other hand, provides the percentages of adults who drank any alcoholic beverage over a previous 1-year period of time: 76 percent of men and 65 percent of women.

Table 2a (p. 11) shows that the average daily intake of alcoholic beverages (estimated from the 24-hour recall) was 1.3 drink equivalents for men and 0.4 drink equivalents for women. Because the dietary recalls are collected year-round and on all days of the week, these means represent the means of individuals' long-run daily average, or "usual" intakes at the population level. (The distributions of usual alcoholic beverage intakes are summarized on p. 21.) On a given day, 8 percent of men and 10 percent of women drank the equivalent of 1 alcoholic beverage; 7 percent of men and 3 percent of women drank 2.

Table 2b (p. 12) shows that the average daily intake of alcoholic beverages (estimated from the ALQ) was 0.8 drinks for men and 0.2 drinks for women and that 84 percent of men and 96 percent of women had an average daily intake of no more than 1.5 alcoholic beverage per day over a 1-year period. However, unlike other episodically consumed foods and beverages, for alcoholic beverages, it is often the amount consumed on consumption days, rather than an average over all days that is of interest. Tables 2c (pp. 13-14) provides the estimated number of drinks consumed by drinkers on days when alcoholic beverages were consumed: 2.1 drinks for women and 3.3 for men. About half of drinkers had an average alcoholic beverage intake on drinking days that exceeded the daily limits set by the 2005 Dietary Guidelines for Americans

[15]; that is, 47 percent of male drinkers drank an average of more than 2 drinks on drinking days, and 57 percent of female drinkers consumed more than 1. Infrequent drinkers generally drank less on drinking days than more frequent drinkers did. Table 2d.1 (p. 15) shows that 22 percent of male drinkers had an average of 5 or more drinks on the days they had alcoholic beverages; and 13 percent of female drinkers had 4 or more drinks. Table 2d.2 (p. 16) presents these same results, expressed as percentages of all adults (i.e., those who drank alcoholic beverages and those who did not): 16 percent of all men drank 5 or more drinks, and 9 percent of all women drank 4 or more drinks.

Table 3 (p. 17) shows that in 2003-2004 the energy contribution of alcoholic beverages to the diets of male and female consumers of alcoholic beverages (7 and 4 percent, respectively), while important, was considerably less than the contributions of added sugars (14 percent) and solid fats (19 percent). Like alcoholic beverages, added sugars and solid fats are considered discretionary sources of energy; that is, they carry few nutrients relative to the amount of energy contributed [16]. A surprising finding was that among adults who considered themselves to be non-drinkers (a group characterized by those respondents who reported drinking no alcoholic beverages over the past year), alcoholic beverages provided a very small, but measurable, amount of energy (0.1 percent of total energy).

Table 4 (p. 18) characterizes the energy contribution of alcoholic beverages. In 2003-2006, among alcoholic beverage consumers, these beverages provided 8.1 percent and 4.6 percent of the total energy in the diets of men and women, respectively. The tables included in Appendix 3 characterize the energy contributions of beer, wine, and distilled spirits separately among consumers of those beverages (pp. 27-29). The carbohydrate content of alcoholic beverages, especially beer, was a noteworthy source of energy in addition to energy obtained from ethanol. The fat content of alcoholic beverages was negligible and provided no more than 1 kcal per day in the diets of all sex-age groups (data not shown).

**Table 1a. Estimated percentages of adults who consumed any beer, wine, or distilled spirits on a given day, United States, 2003-2006**

Sex and age (yr)	Sample size	Any alcoholic beverage		Beer		Wine		Distilled spirits					
								All		Straight		Mixed drinks	
	N	%	(se)	%	(se)	%	(se)	%	(se)	%	(se)	%	(se)
<b>Men</b>													
21 and over	4,214	32.8	(1.08)	23.4	(0.95)	6.0	(0.63)	8.7	(0.69)	1.8	(0.28)	7.1	(0.73)
21-64	3,020	34.4	(1.12)	26.0	(1.07)	5.4	(0.67)	8.6	(0.77)	1.9	(0.31)	6.9	(0.80)
65+	1,194	24.7	(1.86)	10.4	(1.18)	9.1	(1.50)	8.8	(0.91)	#1.2	(0.57)	7.7	(0.82)
<b>Women</b>													
21 and over	4,576	17.4	(1.00)	7.0	(0.59)	6.6	(0.64)	5.3	(0.50)	1.9	(0.34)	3.5	(0.35)
21-64	3,426	18.8	(1.09)	8.0	(0.69)	6.9	(0.67)	5.6	(0.57)	2.0	(0.39)	3.7	(0.41)
65+	1,150	11.7	(1.32)	2.9	(0.76)	5.6	(1.19)	4.0	(0.79)	#1.1	(0.44)	2.9	(0.61)

se = standard error.

# Indicates an estimate with potentially lower precision due to a relative standard error greater than 30% and/or small sample size.

Source: WWEIA/NHANES, 2003-2006, 24-hour recall.

**Table 1b. Estimated percentage of adults who consumed any alcoholic beverage at least once in the past 12 months, United States, 2003-2006**

Sex and age (yr)	Sample size	Any alcoholic beverage	
	N	%	(se)
<b>Men</b>			
21 and over	4,095	76.3	(1.52)
21-64	2,925	80.0	(1.43)
65+	1,170	56.8	(2.47)
<b>Women</b>			
21 and over	4,384	65.3	(1.66)
21-64	3,274	70.6	(1.67)
65+	1,110	42.4	(2.67)

se = standard error.

Source: NHANES, 2003-2006, Alcohol Use Questionnaire.

**Table 2a. Estimated distribution of alcoholic beverage consumption on a given day, United States, 2003-2004**

Sex and age (yr)	Sample size	Number of drink equivalents <sup>1</sup>									
		0	1 <sup>2</sup>	2 <sup>3</sup>	3 <sup>3</sup>	4 <sup>3</sup>	5 <sup>3</sup>	6 <sup>3</sup>	7 <sup>3</sup>	8 or more <sup>3</sup>	
	N	Mean (se)	% (se)	% (se)	% (se)	% (se)	% (se)	% (se)	% (se)	% (se)	% (se)
<b>Men</b>											
21 and over	2,089	1.3 (0.08)	65.9 (1.66)	8.3 (0.94)	6.8 (0.89)	5.8 (0.70)	4.1 (0.40)	2.2 (0.43)	2.3 (0.37)	1.0 (0.23)	3.6 (0.55)
21-64	1,443	1.4 (0.09)	63.4 (1.77)	8.2 (0.98)	7.1 (1.00)	6.6 (0.81)	4.7 (0.47)	2.3 (0.52)	2.4 (0.46)	1.2 (0.27)	4.1 (0.70)
65+	646	0.6 (0.06)	78.1 (1.63)	9.0 (1.60)	5.1 (0.70)	#2.0 (0.71)	#1.3 (0.61)	#1.7 (0.56)	#1.5 (0.52)	#0.5 (0.29)	#0.9 (0.57)
			0	1	2	3	4	5	6 or more		
<b>Women</b>											
21 and over	2,269	0.4 (0.04)	80.9 (1.78)	10.0 (1.10)	3.1 (0.71)	2.1 (0.51)	1.6 (0.48)	0.7 (0.16)	1.5 (0.26)		
21-64	1,619	0.5 (0.05)	79.3 (1.99)	10.6 (1.20)	3.3 (0.75)	2.3 (0.55)	1.9 (0.58)	#0.8 (0.19)	1.8 (0.32)		
65+	650	0.2 (0.03)	87.5 (1.51)	7.7 (1.38)	2.5 (0.88)	#1.6 (0.92)	#0.4 (0.44)	#0.3 (0.26)	#0.0 (0.00)		

<sup>1</sup> 1 drink equivalent = 12 fl oz beer, 5 fl oz wine, or 1.5 fl oz distilled spirits.

<sup>2</sup> Less than 1.5 but more than 0 drink equivalents.

<sup>3</sup> Average number of drinks per day, rounded to a whole number.

se = standard error.

# Indicates an estimate with potentially lower precision due to a relative standard error greater than 30% and/or small sample size.

Source: WWEIA/NHANES, 2003-2004, 24-hour recall, and MyPyramid Equivalents Database, 2.0.

**Table 2b. Estimated distribution of average daily consumption of alcoholic beverages, United States, 2003-2006**

Sex and age (yr)	Sample size	Number of drinks										
		0 <sup>1</sup>		1 <sup>2</sup>		2 <sup>3</sup>		3 <sup>3</sup>		4 <sup>3</sup>		5 or more <sup>3</sup>
	N	Mean (se)	% (se)	% (se)	% (se)	% (se)	% (se)	% (se)	% (se)	% (se)	% (se)	
<b>Men</b>												
21 and over	4,095	0.8 (0.03)	23.7 (1.52)	60.0 (1.19)	7.7 (0.47)	4.4 (0.35)	1.6 (0.27)	2.6 (0.34)				
21-64	2,925	0.8 (0.04)	20.0 (1.43)	62.5 (1.13)	8.2 (0.56)	4.7 (0.41)	1.8 (0.32)	2.9 (0.38)				
65+	1,170	0.4 (0.04)	43.2 (2.47)	47.1 (2.51)	5.2 (0.95)	2.4 (0.49)	#0.8 (0.35)	1.2 (0.39)				
<b>Women</b>												
21 and over	4,384	0.2 (0.02)	34.7 (1.66)	61.5 (1.54)	2.3 (0.37)	0.9 (0.15)	0.6 (0.16)					
21-64	3,274	0.3 (0.02)	29.4 (1.67)	66.6 (1.63)	2.4 (0.41)	1.0 (0.18)	0.7 (0.19)					
65+	1,110	0.1 (0.02)	57.6 (2.67)	40.2 (2.43)	1.9 (0.49)	#0.3 (0.19)	#0.1 (0.06)					

<sup>1</sup> No alcoholic beverages in the past 12 months.

<sup>2</sup> An average of less than 1.5 alcoholic beverages per day.

<sup>3</sup> Average number of drinks per day, rounded to a whole number.

se = standard error.

# Indicates an estimate with potentially lower precision due to a relative standard error greater than 30% and/or small sample size.

Source: NHANES, 2003-2006, Alcohol Use Questionnaire.

**Table 2c.1. Estimated distribution of average alcoholic beverage consumption by men on days they drank by frequency of consumption; male consumers of alcoholic beverages, United States, 2003-2006**

Drinking frequency and age (yr)	Sample size	Number of drinks													
		Mean	1		2		3		4		5		6 or more		
	N	#	(se)	%	(se)	%	(se)								
At least once over the past year															
21 and older	2,892	3.3	(0.09)	25.4	(1.04)	27.6	(1.06)	16.1	(0.72)	9.4	(0.62)	5.0	(0.51)	16.5	(1.12)
21-64	2,272	3.5	(0.10)	21.9	(1.01)	27.5	(1.16)	16.9	(0.74)	10.0	(0.71)	5.5	(0.54)	18.4	(1.22)
65+	620	1.9	(0.08)	52.0	(2.56)	28.7	(1.89)	10.2	(1.94)	4.9	(1.14)	#1.7	(0.71)	2.6	(0.64)
Less than once a month															
21 and older	598	2.5	(0.18)	46.9	(1.85)	24.9	(2.31)	9.8	(1.50)	6.5	(1.41)	2.1	(0.77)	9.8	(1.72)
21-64	447	2.7	(0.20)	43.0	(2.13)	26.0	(2.47)	10.5	(1.79)	7.1	(1.62)	#2.3	(0.88)	11.0	(1.91)
65+	151	1.6	(0.12)	69.9	(4.62)	17.9	(3.57)	#5.8	(2.56)	#3.0	(2.18)	#1.1	(0.73)	#2.2	(1.08)
At least once a month, less than once a week															
21 and older	675	3.2	(0.15)	25.7	(2.15)	32.6	(2.13)	15.1	(1.98)	8.0	(1.47)	4.5	(1.14)	14.2	(1.78)
21-64	561	3.3	(0.16)	22.6	(2.04)	32.8	(2.20)	15.8	(2.10)	8.4	(1.66)	4.9	(1.25)	15.5	(1.91)
65+	114	1.6	(0.08)	57.4	(5.33)	30.8	(5.70)	#7.1	(3.42)	#4.0	(2.58)	#0.0	(0.00)	#0.7	(0.56)
At least once a week															
21 and older	1,619	3.7	(0.10)	18.3	(1.32)	26.6	(1.41)	18.5	(1.13)	10.8	(0.69)	6.2	(0.66)	19.6	(1.14)
21-64	1,264	3.9	(0.11)	14.7	(1.35)	25.8	(1.53)	19.3	(1.23)	11.5	(0.71)	6.7	(0.76)	21.9	(1.27)
65+	355	2.0	(0.10)	43.6	(3.02)	32.2	(3.01)	12.8	(2.19)	5.8	(1.64)	#2.3	(1.13)	#3.3	(1.02)

se = standard error.

# Indicates an estimate with potentially lower precision due to a relative standard error greater than 30% and/or small sample size.

Source: NHANES, 2003-2006, Alcohol Use Questionnaire.

**Table 2c.2. Estimated distribution of average alcoholic beverage consumption by women on days they drank by frequency of consumption; female consumers of alcoholic beverages, United States, 2003-2006**

Drinking frequency and age (yr)	Sample size	Number of drinks											
		Mean	1		2		3		4		5 or more		
	N	#	(se)	%	(se)	%	(se)	%	(se)	%	(se)	%	(se)
At least once over the past year													
21 and older	2,501	2.1	(0.05)	43.1	(1.39)	30.6	(1.14)	13.1	(0.83)	6.4	(0.52)	6.8	(0.72)
21-64	2,080	2.2	(0.06)	39.0	(1.49)	32.1	(1.31)	14.2	(0.96)	7.0	(0.56)	7.7	(0.84)
65+	421	1.4	(0.03)	72.5	(2.04)	20.3	(1.73)	4.6	(1.14)	#1.9	(0.62)	#0.8	(0.26)
Less than once a month													
21 and older	991	1.8	(0.06)	56.3	(2.41)	26.0	(1.79)	10.5	(1.31)	3.5	(0.76)	3.6	(0.91)
21-64	815	1.8	(0.07)	52.2	(2.78)	28.1	(2.13)	11.7	(1.52)	3.9	(0.85)	4.2	(1.08)
65+	176	1.2	(0.04)	81.6	(3.21)	13.6	(3.00)	#3.4	(1.64)	#1.3	(0.90)	#0.1	(0.07)
At least once a month, less than once a week													
21 and older	708	2.3	(0.08)	37.4	(2.60)	35.4	(2.16)	12.0	(1.53)	7.4	(1.19)	7.8	(1.05)
21-64	621	2.3	(0.09)	34.1	(2.70)	36.7	(2.43)	13.0	(1.59)	7.9	(1.27)	8.4	(1.18)
65+	87	1.4	(0.12)	73.1	(6.57)	21.7	(6.14)	#1.5	(0.93)	#2.5	(1.81)	#1.2	(1.25)
At least once a week													
21 and older	802	2.4	(0.08)	34.5	(2.02)	31.4	(1.74)	16.3	(1.51)	8.4	(1.16)	9.3	(1.17)
21-64	644	2.6	(0.09)	30.0	(2.30)	32.2	(2.13)	17.8	(1.78)	9.4	(1.27)	10.6	(1.34)
65+	158	1.5	(0.07)	62.8	(3.81)	26.4	(2.85)	#7.3	(1.92)	#2.2	(1.30)	#1.3	(1.30)

se = standard error.

# Indicates an estimate with potentially lower precision due to a relative standard error greater than 30% and/or small sample size.

Source: NHANES, 2003-2006, Alcohol Use Questionnaire.

**Table 2d.1. Estimated percentages of male drinkers who drink an average of 5 or more drinks and of female drinkers who drink an average of 4 or more drinks on days they drink alcoholic beverages, United States, 2003-2006**

Sex and age (yr)	Sample size	5 or more drinks	
	N	%	(se)
<b>Men</b>			
21 and over	2,892	21.5	(1.37)
21-64	2,272	23.9	(1.46)
65+	620	4.3	(0.94)
		4 or more drinks	
<b>Women</b>			
21 and over	2,501	13.2	(0.89)
21-64	2,080	14.7	(1.01)
65+	421	#2.7	(0.63)

se = standard error.

# Indicates an estimate with potentially lower precision due to a relative standard error greater than 30% and/or small sample size.

Source: NHANES, 2003-2006, Alcohol Use Questionnaire.

**Table 2d.2. Estimated percentages of all men who drank an average of 5 or more drinks and of all women who drank an average of 4 or more drinks on days they drank alcoholic beverages, United States, 2003-2006**

Sex and age (yr)	Sample size	5 or more drinks	
	N	%	(se)
<b>Men</b>			
21 and over	4,095	16.4	(1.13)
21-64	2,925	19.1	(1.25)
65+	1,170	2.4	(0.52)
		<b>4 or more drinks</b>	
<b>Women</b>			
21 and over	4,384	8.6	(0.61)
21-64	3,274	10.4	(0.72)
65+	1,110	1.1	(0.28)

se = standard error.

Source: NHANES, 2003-2006, Alcohol Use Questionnaire.

**Table 3. Estimated mean daily intake of alcoholic beverages (drink equivalents<sup>1</sup>), total energy intake, and percentage of energy provided by alcoholic beverages, added sugars, solid fats, and all other sources of energy; adult consumers and non-consumers of alcoholic beverages, United States, 2003-2004**

Sex and age (yr)	Sample size	Alcoholic beverages		Total energy intake		Energy from alcoholic beverages		Energy from added sugars <sup>2</sup>		Energy from solid fats <sup>3</sup>		Energy from all other dietary sources	
		N	Drink equivalents <sup>1</sup> (se)	kcal	(se)	%	(se)	%	(se)	%	(se)	%	(se)
<b>Alcoholic beverage consumers<sup>4</sup></b>													
<b>Men</b>													
21 and over	1,393	1.7	(0.09)	2705	(36.2)	7.4	(0.51)	13.3	(0.35)	18.8	(0.41)	60.5	(0.82)
21-64	1,076	1.7	(0.10)	2789	(44.1)	7.3	(0.53)	13.7	(0.34)	18.8	(0.46)	60.2	(0.88)
65+	317	1.3	(0.15)	2028	(45.7)	8.8	(1.56)	9.1	(0.74)	19.0	(0.77)	63.2	(1.01)
<b>Women</b>													
21 and over	1,191	0.7	(0.05)	1907	(19.4)	4.1	(0.37)	14.3	(0.60)	19.4	(0.47)	62.3	(0.91)
21-64	961	0.7	(0.06)	1939	(23.4)	4.2	(0.41)	14.6	(0.63)	19.5	(0.48)	61.7	(0.93)
65+	230	0.4	(0.08)	1676	(54.6)	3.0	(0.61)	11.1	(1.00)	18.0	(1.03)	67.9	(1.50)
<b>Alcoholic beverage non-consumers<sup>5</sup></b>													
<b>Men</b>													
21 and over	603	*		2286	(51.7)	0.1	(0.04)	15.4	(0.74)	20.0	(0.49)	64.5	(1.02)
21-64	299	*		2539	(83.2)	0.1	(0.05)	16.4	(1.14)	20.0	(0.54)	63.6	(1.32)
65+	304	*		1829	(31.8)	0.1	(0.05)	13.0	(0.92)	20.1	(1.00)	66.9	(0.80)
<b>Women</b>													
21 and over	946	*		1761	(25.7)	0.1	(0.06)	14.9	(0.64)	19.5	(0.58)	65.5	(0.67)
21-64	554	*		1865	(37.4)	0.1	(0.08)	15.3	(0.70)	19.7	(0.73)	65.0	(0.95)
65+	392	*		1540	(43.7)	0.1	(0.05)	13.9	(1.46)	18.8	(0.58)	67.2	(1.65)

<sup>1</sup> 1 drink equivalent = 12 fl oz beer, 5 fl oz wine, or 1.5 fl oz distilled spirits.

<sup>2</sup> Added sugars excludes those present in mixed drinks.

<sup>3</sup> Solid fats include fats present in meat and milk products, hydrogenated fats, and those derived from palm or coconut oils.

<sup>4</sup> Consumed alcoholic beverages during the past 12 months.

<sup>5</sup> Did not consume alcoholic beverages during the past 12 months.

se = standard error.

\* Indicates a non-zero estimate too small to display.

Source: WWEIA/NHANES, 2003-2004 and MyPyramid Equivalents Database, 2.0.

**Table 4. Estimated mean daily intake of alcoholic beverages (grams), total energy intake, and percentage and amount of energy provided by alcoholic beverages and the energy sources; adult consumers of alcoholic beverages, United States, 2003-2006**

Sex and age (yr)	Sample size	Amount of beverage	Total energy	Contribution to total energy	Energy	Ethanol	Total sugars	Other carbohydrates	Protein	
	N	g (se)	kcal (se)	% (se)	kcal (se)	kcal (se)	kcal (se)	kcal (se)	kcal (se)	
<b>Men</b>										
21 and over	2,840	461 (20.0)	2704 (30.7)	8.1 (0.29)	218 (8.3)	157 (5.7)	11 (2.3)	45 (2.0)	6 (0.3)	
21-64	2,228	493 (22.2)	2786 (32.5)	8.2 (0.32)	229 (9.3)	163 (6.4)	12 (2.6)	49 (2.1)	7 (0.3)	
65+	612	235 (25.2)	2122 (49.4)	6.7 (0.62)	142 (14.2)	113 (11.6)	#6 (1.9)	21 (2.7)	3 (0.4)	
<b>Women</b>										
21 and over	2,449	155 (14.0)	1883 (19.0)	4.6 (0.30)	87 (5.6)	64 (3.9)	11 (1.5)	11 (1.1)	1 (0.2)	
21-64	2,034	165 (16.3)	1912 (21.8)	4.8 (0.33)	92 (6.4)	67 (4.3)	12 (1.7)	12 (1.3)	2 (0.2)	
65+	415	84 (10.6)	1695 (31.7)	3.3 (0.45)	56 (7.7)	42 (5.2)	6 (1.9)	5 (0.8)	1 (0.2)	

se = standard error.

# Indicates an estimate with potentially lower precision due to a relative standard error greater than 30% and/or small sample size.

Source: WWEIA/NHANES, 2003-2006, 24-hour recall.

## Discussion

### Methodological Considerations

The NHANES is a rich source of information on alcoholic beverage consumption. The 24-hour dietary recalls from WWEIA provide a detailed assessment of the types and amounts of alcoholic beverages consumed for a snapshot in time. The dietary interviewers are trained extensively and use a standardized, computer-assisted interview instrument, the Automated, Multiple-Pass Method. Individuals' alcohol intakes often vary considerably from day to day, so a 24-hour dietary recall does not provide a reliable estimate of an individual's long-term average or "usual" daily intake. However, the mean of a group's 1-day intake can yield a reasonable estimate of the group's mean usual intake, if the recalls are collected on all days of the week and seasons of the year, as is the case with NHANES 2003-2006. Therefore, the mean intakes reported here for groups are a good approximation of their mean usual intakes. The second dietary recall is used when estimating the distribution of usual intakes [17].

Because some misreporting is likely, these estimates are likely to be biased to some degree. Underreporting of energy, for example, has been documented in several studies that have employed a multiple-pass procedure, similar to that used in NHANES, for collecting 24-hour recalls. These studies used doubly-labeled water as a biomarker of energy intake [18,19]. It is likely that the degree of underreporting varies among types of foods, between men and women, and by body weight status (normal, overweight, or obese). Such differences preclude the setting of an overall adjustment factor to correct for underreporting. However, the potential for bias is not of a magnitude to suggest that population estimates derived from them are unfit for use by policymakers.

The response rates for the FFQ, shown above, suggest the possibility of nonresponse bias, that is, those who did not mail the questionnaire back or otherwise did not respond to earlier parts of the survey may have dietary behaviors that differ from those who did respond. Weighting factors cannot adjust for this type of bias. In this study, we used the FFQ only to identify consumers of beer, wine, and distilled spirits. Because these beverages are episodically consumed, such identification cannot be based on one or two 24-hour recalls. The mean daily number of alcoholic drink equivalents consumed by those who completed the FFQ did not differ significantly from those who did not complete it (1.2 versus 1.5, respectively;  $p > .05$ ), a reassuring finding; and the percentage who reported consuming any alcoholic beverage over the past year was similar.

In this report, average daily consumption of alcoholic beverages is estimated using two instruments: the 24-hour recall (table 2a) and the ALQ (table 2b). The estimates derived from the recalls are about 1½ times higher than those derived from the ALQ. This suggests that any potential underreporting of alcoholic beverages is lower with the recalls than with the ALQ. Contributing to the difference in these two estimates were the 14 respondents who reported drinking no alcoholic beverages during the past year when answering the alcohol use questionnaire and then reported drinking an alcoholic beverage as part of the 24-hour dietary recall. The amounts reported in these instances ranged from 1 fl oz of wine to 36 fl oz of beer.

The NHANES does not specifically inquire about binge drinking, which is defined by the National Institute of Alcohol Abuse and Alcoholism as a pattern of alcohol consumption that brings the blood alcohol concentration level to 0.08 percent or above, a pattern that usually corresponds to 5 or more drinks on a single occasion for men or 4 or more drinks on a single occasion for women, generally within about 2 hours [20]. Tables 2.d.1 and 2.d.2 apply the standards of 5 or more drinks for men and 4 or more for women to the average daily amounts consumed on drinking days. People who consume lower amounts, on average, may at times consume more than these amounts on particular occasions and are not captured in these tables. Therefore, the estimates provided underestimate the proportion of binge-drinkers in the U.S. population.

### Other Estimates from NHANES, 2001-2006

Estimates of mean daily intakes of ethanol, expressed as a percentage of daily energy intake, for 2001-2002, 2003-2004, and 2005-2006 have been published elsewhere [21]. These estimates include only the ethanol portion of alcoholic beverages, not the carbohydrate contribution. They include the ethanol in solid foods; for example, wine in spaghetti sauce, as well as beverages. Estimates have been provided for 21 age-gender groups, 3 racial/ethnic groups, 3 income groups where family income is expressed in dollars, and 3 income groups where family income is expressed as a percentage of the Federal poverty level. Estimates for adults in 2005-2006 are provided below:

#### **Estimated average daily percent of energy contributed by all sources of ethanol, adults age 20 and older, WWEIA, NHANES 2005-2006**

	Percent (se)
<b>Men</b>	
20 and over	4.3 (0.25)
20-64	4.5 (0.30)
65+	3.1 (0.45)
<b>Women</b>	
20 and over	2.1 (0.18)
20-64	2.4 (0.20)
65+	1.2 (0.21)
Non-Hispanic Whites	3.5 (0.23)
Non-Hispanic Blacks	2.3 (0.27)
Mexican Americans	2.0 (0.47)
Income <130% of poverty	2.5 (0.27)
Income 131-185% of poverty	2.5 (0.37)
Income >185% of poverty	3.4 (0.22)

se = standard error.

The estimated distributions of long-term average daily intake or “usual” intake of food groups, including alcoholic beverages, expressed as number of drink equivalents, for 17 age-gender groups in 2001-2004 have been published [22]. The percentiles are estimated using the first and second 24-hour recalls in NHANES and the MyPyramid Equivalents Database. A two-part statistical model accommodates the large number of recalls that do not include alcoholic beverages by separating the probability of consumption from the consumption-day amount [17]. Findings for adults are provided below:

**Estimated percentiles of long-term average or “usual” number of alcoholic beverages consumed per day, adults age 19 and older, WWEIA, NHANES 2001-2004**

Sex and age (yr)	Mean (se)	50 <sup>th</sup> pct (se)	90 <sup>th</sup> pct (se)	95 <sup>th</sup> pct (se)
-----drink equivalents-----				
<b>Men</b>				
19+	1.2 (0.07)	0.58 (0.08)	3.29 (0.16)	4.56 (0.24)
19-30	1.3 (0.13)	0.64 (0.13)	3.54 (0.30)	4.87 (0.38)
31-50	1.4 (0.09)	0.78 (0.10)	3.78 (0.24)	5.09 (0.33)
51-70	1.0 (0.08)	0.46 (0.08)	2.76 (0.18)	3.84 (0.24)
71+	0.6 (0.06)	0.19 (0.05)	1.65 (0.17)	2.46 (0.22)
<b>Women</b>				
19+	0.4 (0.03)	0.09 (0.02)	1.11 (0.08)	1.80 (0.11)
19-30	0.3 (0.05)	0.07 (0.02)	0.95 (0.13)	1.60 (0.21)
31-50	0.5 (0.05)	0.15 (0.04)	1.41 (0.14)	2.20 (0.17)
51-70	0.4 (0.05)	0.09 (0.03)	1.04 (0.14)	1.68 (0.16)
71+	0.2 (0.03)	0.03 (0.01)	0.48 (0.10)	0.89 (0.16)

Estimates of the prevalence of alcohol consumption and other types of data related to alcohol consumption are also available from the National Institute on Alcohol Abuse and Alcoholism (NIAAA). This information is summarized in Appendix 4.

**Appendix 1. Classification of alcoholic beverages into beer, wine, distilled spirits, and mixed drinks, WWEIA, NHANES 2003-2006**

<b>Category</b>	<b>Food code</b>	<b>Description</b>
Beer	93101000	Beer (Includes Ale)
	93102000	Beer, Lite
Wine	93401000	Wine, Dry, Table (Includes Burgundy, Claret, Rhine)
	93401010	Wine, Red, Table
	93401020	Wine, White, Table
	93401100	Wine, Rice (Includes Saki)
	93402000	Wine, Dessert (Includes Marsala, Port, Madeira)
	93403000	Wine, Light
	93404000	Wine Cooler
	93405000	Wine Spritzer
Distilled spirits	93201000	Cordial or Liqueur
	93501000	Brandy (Includes Applejack, Cognac)
	93502000	Whiskey (Includes Bourbon, Scotch, Rye)
	93503000	Gin
	93504000	Rum
	93504100	Rum Cooler
	93505000	Vodka
Mixed drinks	93301000	Cocktails, not further specified
	93301010	Alexander
	93301020	Bacardi Cocktail
	93301030	Bloody Mary
	93301032	Cape Cod
	93301040	Daiquiri
	93301060	Gin & Tonic
	93301080	High Ball
	93301085	Kamikaze
	93301090	Manhattan
	93301100	Margarita
	93301110	Martini
	93301120	Mint Julep
	93301130	Old Fashioned
	93301140	Screwdriver (Includes Harvey Wallbanger, Slo-Screw)
	93301141	Seabreeze
	93301142	Seven and Seven
93301150	Tom Collins (Includes Vodka Collins)	
93301160	Whiskey Sour (Includes Scotch, Vodka, Apricot, Brandy Sour)	
93301170	Bourbon & Soda (Includes Scotch & Soda, Rum & Soda)	

93301190	Rum & Cola
93301200	Pina Colada
93301250	White Russian
93301270	Fruit Punch, Alcoholic
93301310	Mai Tai
93301320	Tequila Sunrise
93301360	Long Island Iced Tea
93301370	Fuzzy Navel Cocktail
93301400	Irish Coffee (Includes Coffee Royale)
93301450	Liqueur with Cream
93301500	Frozen Daiquiri
93301510	Frozen Margarita
93301550	Eggnog, Alcoholic
93302000	Rum, Hot Buttered

## Appendix 2. Summary of methodology<sup>1,2</sup>

Table no.	Abbreviated title and survey years	Instrument type and mode [variable location/name]	Inclusion criteria <sup>1</sup>	Sample weights	Sample size <sup>2</sup>	Estimated population parameters and notes
1a	Percentages of adults consuming alcoholic beverages on a given day, 2003-2006	24-hr dietary recall, interviewer-administered in MEC [Individual Food Files (IFF)]	Complete and reliable 24-hr recall	Dietary day 1 sample weights	Total 8,790 Men 4,214 Women 4,576	Percentage consuming any alcoholic beverage, beer, wine, straight distilled spirits, and mixed drinks on a given day
1b	Percentages of adults who consumed alcoholic beverages in the past 12 months, 2003-2006	Alcohol Use Questionnaire (ALQ), interviewer-administered in MEC [ALQ120]	Complete alcohol use questions	MEC sample weights	Total 8,479 Men 4,095 Women 4,384	Percentage consuming any alcoholic beverage in the past 12 months
2a	Distribution of alcoholic beverage consumption on a given day, 2003-2004	24-hr dietary recall, interviewer-administered in MEC [Individual Food Files (IFF) and MyPyramid Equivalents Database (MPED 2.0)]	Complete and reliable 24-hr recall	Dietary day 1 sample weights	Total 4,358 Men 2,089 Women 2,269	Percentage drinking 0, 1, 2, 3, 4, 5, 6, 7, and 8 or more drink equivalents on a given day Notes: One drink equivalent is defined as 12 fl oz of beer, 5 fl oz of wine, or 1½ fl oz of distilled spirits. Includes only 2003-2004 data, hence the smaller sample size.
2b	Distribution of average daily consumption of alcoholic beverages, 2003-2006	Alcohol Use Questionnaire (ALQ), interviewer-administered in MEC [ALQ120]	Complete alcohol use questions (includes those who did not drink in the past 12 months)	MEC sample weights	Total 8,479 Men 4,095 Women 4,384	Percentage of non-drinkers and percentage consuming an average of 1, 2, 3, 4, and 5 or more drinks per day over the past 12 months Note: A respondent's definition of 1 drink may not be the same as the standard definition of 1 drink, which is 12 fl oz of beer, 5 fl oz of wine, or 1½ fl oz of distilled spirits.
2c.1 and 2c.2	Distribution of average alcoholic beverage consumption by men and women on days they drank, 2003-2006	Alcohol Use Questionnaire (ALQ), interviewer-administered in MEC [ALQ120 and 130]	Complete alcohol use questions and drank any alcoholic beverage in the past 12 months	MEC sample weights	Total 5,393 Men 2,892 Women 2,501	Among those who drank any alcoholic beverage in the past 12 months, percentage consuming 1, 2, 3, 4, and 5 or more drinks per drinking day by frequency of consumption Note: The estimate is based on integer responses to the question on the average number of drinks consumed on days they drank.

2d.1	Among drinkers only, percentages of men who drank $\geq 5$ drinks and women who drank $\geq 4$ drinks, on average, on drinking days, 2003-2006	Alcohol Use Questionnaire (ALQ), interviewer-administered in MEC [ALQ 120 and 130]	Complete alcohol use questions and drank any alcoholic beverage in the past 12 months	MEC sample weights	Total 5,393 Men 2,892 Women 2,501	Among those who drank any alcoholic beverage in the past 12 months, men who drank $\geq 5$ drinks and women who drank $\geq 4$ drinks, on average, on drinking days
2d.2	Among all adults, percentages of men who drank $\geq 5$ drinks and women drinkers who drank $\geq 4$ drinks, on average, on drinking days, 2003-2006	Alcohol Use Questionnaire (ALQ), interviewer-administered in MEC [ALQ120 and 130]	Complete alcohol use questions	MEC sample weights	Total 8,479 Men 4,095 Women 4,384	Percentages of all men who drank $\geq 5$ drinks and all women who drank $\geq 4$ drinks, on average, on drinking days Note: Total sample includes both those who drank in the past 12 months and those who did not.
3	Mean number of alcoholic drinks consumed, mean total energy intake, and percent energy from alcoholic beverages, added sugars, solid fats, and all other energy sources, 2003-2004	Alcohol Use Questionnaire (ALQ), interviewer-administered in MEC and 24-hr dietary recall, interviewer-administered in MEC [Individual Food File (IFF) and MyPyramid Equivalents Database (MPED 2.0)]	Complete alcohol use questions and complete and reliable 24-hr recall	Dietary day 1 sample weights	Total 4,133 Men 1,996 Women 2,137	Mean number of drink equivalents and total energy, percent energy from alcoholic beverages, added sugars, solid fats, and other energy sources from food. Population proportion was used to estimate percentages. Notes: The sum of the percentages is approximately equal to 100. MPED 2.0 was used to estimate the mean number of drink equivalents and amounts of added sugars and solid fats. One drink equivalent is defined as 12 fl oz of beer, 5 fl oz of wine, or 1½ fl oz of distilled spirits. Added sugars exclude that present in mixed drinks. Includes only 2003-2004 data, hence the smaller sample size.
4	Mean intakes of alcoholic beverage, total energy intake for the day, and energy and selected macronutrients from alcoholic beverages, 2003-2006	Alcohol Use Questionnaire (ALQ), interviewer-administered in MEC [ALQ120] and 24-hr dietary recall, interviewer-administered in MEC [Individual Food Files (IFF)]	Complete alcohol use questions and complete and reliable 24-hr recall	Dietary day 1 sample weights	Total 5,289 Men 2,840 Women 2,449	Mean intakes of alcoholic beverages (grams) and total energy, mean energy and selected macronutrients and percentage of total energy from alcoholic beverages. Population ratios were used to estimate percentage of total energy from alcoholic beverages. Note: The ALQ was used to identify alcoholic beverage consumers; they may not have necessarily reported an alcoholic beverage on the 24-hour recall.

Appendix 3, table 1	Percentages of adults who consumed beer, wine, and distilled spirits/mixed drinks in the past 12 months, 2003-2006	Food Frequency Questionnaire (FFQ), self-administered and mailed-in, and 24-hr dietary recall, interviewer-administered in MEC	Nine or fewer missing responses in FFQ and complete and reliable 24 hr recall	FFQ sample weights	Total 5,717 Men 2,613 Women 3,104	Percentage consuming any beer, wine, and distilled spirits/mixed drinks in the past 12 months
Appendix 3, table 2	Mean intakes of beer and total energy, and energy and selected macronutrients from beer, 2003-2006	Food Frequency Questionnaire (FFQ), self-administered and mailed-in, and 24-hr dietary recall, interviewer-administered in MEC [Individual Food Files] (IFF)	Nine or fewer missing responses in FFQ and reported drinking beer in the past 12 months and complete and reliable 24 hr recall	FFQ sample weights	Total 2,647 Men 1,615 Women 1,032	Mean intakes of beer (grams) and total energy, mean energy and selected macronutrients and percentage of total energy from beer. Population ratios were used to estimate percentage of total energy from beer. Note: The FFQ was used to identify beer consumers; they may not have necessarily reported beer on the 24-hour recall.
Appendix 3, table 3	Mean intakes of wine and total energy, and energy and selected macronutrients from wine, 2003-2006	Food Frequency Questionnaire (FFQ), self-administered and mailed-in, and 24-hr dietary recall, interviewer-administered in MEC [Individual Food Files] (IFF)	Nine or fewer missing responses in FFQ and reported drinking wine in the past 12 months and complete and reliable 24 hr recall	FFQ sample weights	Total 2,473 Men 1,082 Women 1,391	Mean intakes of wine (grams) and total energy, mean energy and selected macronutrients and percentage of total energy from wine. Population ratios were used to estimate percentage of total energy from wine. Note: The FFQ was used to identify wine consumers; they may not have necessarily reported wine on the 24-hour recall.
Appendix 3, table 4	Mean intakes of distilled spirits/mixed drinks and total energy, and energy and selected macronutrients from distilled spirits/mixed drinks, 2003-2006	Food Frequency Questionnaire (FFQ), self-administered and mailed-in, and 24-hr dietary recall, interviewer-administered in MEC [Individual Food Files] (IFF)	Nine or fewer missing responses in FFQ and reported drinking distilled spirits/mixed drinks in the past 12 months and complete and reliable 24 hr recall	FFQ sample weights	Total 2,566 Men 1,277 Women 1,289	Mean intakes of distilled spirits/ mixed drinks (grams) and total energy, mean energy and selected macronutrients and percentage of total energy from distilled spirits/mixed drinks. Population ratios were used to estimate percentage of total energy from distilled spirits/mixed drinks. Note: The FFQ was used to identify distilled spirits/ mixed drink consumers; they may not have necessarily reported distilled spirits or a mixed drink on the 24-hour recall.

<sup>1</sup>All tables include adults age 21 years and older.

<sup>2</sup>The analytic sample sizes used for each table vary according to the target population and how many survey participants completed the appropriate data collection instruments.

### Appendix 3. Energy provided by beer, wine, and distilled spirits

**Appendix 3. Table 1. Estimated percentage of adults who consumed beer, wine, or distilled spirits at least once in the past 12 months; United States, 2003-2006**

Sex and age (yr)	Sample size	Any alcoholic beverage		Beer		Wine		Distilled spirits	
	N	%	(se)	%	(se)	%	(se)	%	(se)
<b>Men</b>									
21 and over	2,613	74.1	(1.49)	66.7	(1.57)	45.9	(1.70)	52.9	(1.68)
21-64	1,838	77.4	(1.58)	70.9	(1.67)	46.9	(1.79)	55.9	(1.86)
65+	775	58.0	(2.95)	45.7	(2.99)	41.1	(2.51)	38.4	(2.80)
<b>Women</b>									
21 and over	3,104	64.6	(1.60)	37.9	(1.64)	49.9	(1.70)	46.6	(1.58)
21-64	2,351	68.4	(1.75)	42.2	(2.02)	52.0	(1.84)	50.6	(1.68)
65+	753	47.5	(2.45)	18.6	(1.59)	40.7	(2.27)	28.6	(2.58)

se = standard error.

Source: NHANES, 2003-2006, Food Frequency Questionnaire.

**Appendix 3. Table 2. Estimated daily mean intake of beer (grams), mean total energy intake, and mean percentage and amount of energy provided by beer and the energy sources; adult consumers of beer,<sup>1</sup> United States, 2003-2006**

Sex and age (yr)	Sample size	Beer intake	Total energy	Contribution to total energy	Energy	Ethanol	Total sugars	Other carbohydrates	Protein	
	N	g (se)	kcal (se)	% (se)	kcal (se)	kcal (se)	kcal (se)	kcal (se)	kcal (se)	
<b>Men</b>										
21 and over	1,615	425 (30.6)	2687 (39.6)	5.8 (0.36)	156 (10.4)	105 (7.2)	1 (0.1)	45 (2.9)	6 (0.4)	
21-64	1,262	455 (33.9)	2769 (42.4)	6.0 (0.39)	166 (11.5)	113 (8.0)	1 (0.1)	48 (3.3)	7 (0.4)	
65+	353	197 (31.1)	2066 (54.9)	3.6 (0.63)	74 (13.0)	50 (8.3)	*	22 (4.3)	3 (0.6)	
<b>Women</b>										
21 and over	1,032	137 (19.2)	1926 (31.4)	2.4 (0.31)	45 (6.1)	32 (4.4)	*	12 (1.5)	2 (0.2)	
21-64	904	141 (20.6)	1945 (34.2)	2.4 (0.33)	47 (6.6)	33 (4.7)	*	12 (1.7)	2 (0.2)	
65+	128	95 (23.3)	1730 (51.7)	1.8 (0.46)	31 (7.6)	22 (5.4)	*	8 (2.0)	1 (0.3)	

<sup>1</sup> During the past 12 months.

se = standard error.

\* Indicates a non-zero estimate too small to display.

Source: NHANES, 2003-2006, Food Frequency Questionnaire and 24-hour recall.

**Appendix 3. Table 3. Estimated daily mean intake of specified wine (grams), mean total energy intake, and mean percentage and amount of energy provided by wine and the energy sources; adult consumers of wine,<sup>1</sup> United States, 2003-2006**

Sex and age (yr)	Sample size	Wine intake	Total energy	Contribution to total energy	Energy	Ethanol	Total sugars	Other carbohydrates	Protein	
	N	g (se)	kcal (se)	% (se)	kcal (se)	kcal (se)	kcal (se)	kcal (se)	kcal	
Men										
21 and over	1,082	38 (4.5)	2690 (39.7)	1.2 (0.13)	32 (3.7)	27 (3.2)	2 (0.2)	3 (0.3)	*	
21-64	795	35 (4.9)	2793 (47.3)	1.0 (0.14)	29 (4.1)	25 (3.6)	2 (0.2)	3 (0.4)	*	
65+	287	54 (10.9)	2118 (54.9)	2.2 (0.41)	46 (9.2)	40 (8.0)	2 (0.3)	4 (0.8)	*	
Women										
21 and over	1,391	33 (4.2)	1856 (26.2)	1.4 (0.18)	26 (3.3)	22 (2.8)	2 (0.5)	2 (0.3)	*	
21-64	1,125	33 (4.0)	1891 (29.1)	1.4 (0.17)	26 (3.1)	21 (2.7)	2 (0.5)	2 (0.3)	*	
65+	266	35 (9.7)	1657 (41.5)	1.7 (0.44)	28 (7.4)	25 (6.5)	1 (0.3)	3 (0.7)	*	

<sup>1</sup> During the past 12 months.

se = standard error.

\* Indicates a non-zero estimate too small to display.

Source: NHANES, 2003-2006, Food Frequency Questionnaire and 24-hour recall.

**Appendix 3. Table 4. Estimated daily mean intake of distilled spirits and mixed drinks (grams), mean total energy intake, and mean percentage and amount of energy provided by distilled spirits and mixed drinks and the energy sources; adult consumers of distilled spirits,<sup>1</sup> United States, 2003-2006**

Sex and age (yr)	Sample size	Distilled spirits and mixed drink intake		Total energy		Contribution to total energy		Energy		Ethanol	Total sugars	Other carbohydrates	Protein			
		g	(se)	kcal	(se)	%	(se)	kcal	(se)	kcal	(se)	kcal	(se)	kcal		
Men																
21 and over	1,277	49	(5.7)	2738	(45.8)	2.1	(0.21)	57	(6.1)	47	(5.1)	9	(1.4)	1	(0.2)	*
21-64	1,000	46	(5.3)	2822	(51.5)	1.9	(0.23)	52	(6.6)	42	(5.5)	9	(1.4)	1	(0.2)	*
65+	277	70	(15.6)	2139	(45.3)	4.0	(0.75)	86	(16.6)	77	(14.6)	#9	(3.5)	1	(0.4)	*
Women																
21 and over	1,289	39	(5.0)	1908	(28.8)	2.1	(0.28)	39	(5.1)	27	(3.2)	11	(2.0)	1	(0.4)	*
21-64	1,106	40	(5.7)	1934	(31.8)	2.1	(0.30)	41	(5.8)	28	(3.6)	11	(2.2)	2	(0.4)	*
65+	183	31	(8.6)	1698	(48.6)	1.6	(0.43)	28	(7.2)	21	(5.4)	#6	(2.2)	*		*

<sup>1</sup> During the past 12 months.

se = standard error.

# Indicates an estimate with potentially lower precision due to a relative standard error greater than 30% and/or small sample size.

\* Indicates a non-zero estimate too small to display.

Source: NHANES, 2003-2006, Food Frequency Questionnaire and 24-hour recall.

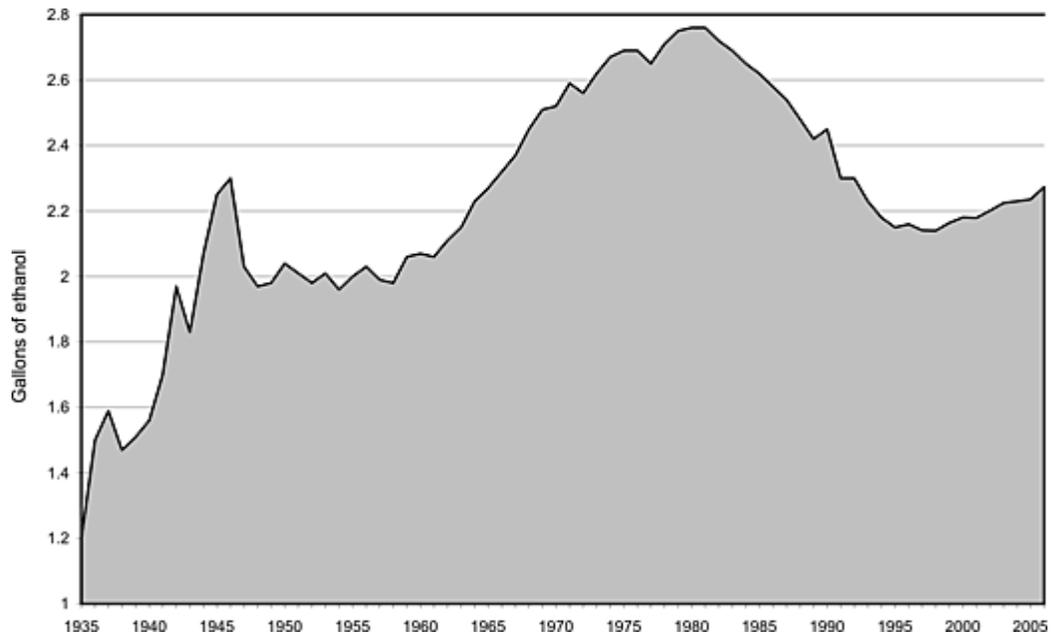
## **Appendix 4. Estimates of alcoholic beverage consumption From the National Institute of Alcohol Abuse and Alcoholism**

The National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), sponsored by NIAAA, provided estimates for the U.S. population age 18 and older. The format of the questions is similar to the NHANES questions administered in the MEC. Results from NESARC indicated that in 2001-2002, 72 percent of men and 60 percent of women were current drinkers of alcoholic beverages [23]. Using the same definition of excessive drinking used in this report, 44 percent of men who were current drinkers and 29 percent of women who were current drinkers had drunk to excess at least once in the past year; and 28 and 15 percent, respectively, had done so 12 or more times.

Unlike the NHANES ALQ, NESARC also asked about past-year consumption of beer, wine, liquor (distilled spirits), and coolers separately. A respondent was considered to have a preference for a single beverage if he/she received at least 75 percent of his/her past-year ethanol intake from one of the four types of beverage. In 2001-2002, among current drinkers, beer was preferred by 50 percent of men, followed by wine (9 percent), distilled spirits (7 percent), and coolers (2 percent). Wine was preferred by 25 percent of women, followed by beer (19 percent), distilled spirits (10 percent), and coolers (9 percent).

NIAAA also determines trends in the consumption of alcohol in the United States, based on alcoholic beverage sales data, either collected from States or provided by beverage industry sources [24]. An estimate of the average ethanol content of the alcoholic beverages is used to convert the gallons of sold or shipped beer, wine, and distilled spirits into gallons of ethanol (pure alcohol) before calculating the per capita consumption rates. Population data from the U.S. Bureau of the Census are used to calculate per capita consumption rates, which are based on the population age 14 years and older. Reports provide data on consumption of beer, wine, and distilled spirits and for all alcoholic beverages combined for the United States, for each State, and for the four census regions of the United States. These data are particularly useful for gaining an understanding of changes in consumption over long periods of time, as shown in figure 1.

Figure 1. Total per capita ethanol (pure alcohol) consumption, United States, 1935–2006



From 2003 to 2006, the time period of the estimates provided in this report, per capita ethanol consumption in the United States increased from 2.20 to 2.27 gallons per person. In 2006, the per capita consumption levels by region were 2.23 gallons per capita in the South, 2.24 in the Northeast, 2.26 in the Midwest, and 2.38 in the West [24].

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