

U.S. Alcohol Epidemiologic Data Reference Manual
Volume 7, 1st Edition, June 2003

State Trends in Drinking Behaviors, 1984–2001



U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
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National Institute on Alcohol Abuse and Alcoholism

U.S. Alcohol Epidemiologic
Data Reference Manual
Volume 7, First Edition

**STATE TRENDS IN DRINKING
BEHAVIORS, 1984–2001**

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Table of Contents

List of Tables	v
List of Exhibits.....	v
Foreword.....	vii
1. Introduction.....	1
2. Data Source.....	1
2.1 Sampling and Data Collection.....	1
2.2 Alcohol Items	1
2.3 Data Availability	7
3. Variable Definition and Calculation	7
3.1 Alcohol Variables.....	7
3.1.1 Drinking Status and Drinking Level	7
3.1.2 Five or More Drinks on One Occasion	9
3.1.3 Drinking and Driving	9
3.2 Basic Demographic Information	9
4. Data Analysis Procedures	9
5. Data Tables	11
References.....	12
Appendix A.....	13

List of Tables

1. Percent distribution of drinking status and drinking level in the past month for selected demographic characteristics by State: United States, 1984–2001.....	15
2. Percent distribution of drinking 5 or more drinks on a single occasion one or more times in the past month for selected demographic characteristics by State: United States, 1984–2001	463
3. Percent distribution of driving after having too much to drink one or more times in the past month for selected demographic characteristics by State: United States, 1984–2000	585

List of Exhibits

1. Alcohol Consumption Questions in BRFSS	3
2. State Alcohol Consumption Data Availability in BRFSS, 1984–2001	8
3. Selected Demographic Characteristics	10

Foreword

This Alcohol Epidemiologic Data Reference Manual (AEDRM) is one of a series of manuals that provide data and other information to researchers, health care planners, and others interested in alcohol abuse, associated risk behaviors and illnesses, and alcohol-related mortality. It is hoped that these documents, prepared by the National Institute on Alcohol Abuse and Alcoholism (NIAAA), will serve as a useful reference for both researchers and others interested in the alcoholism field.

This manual is the first edition of Volume 7 of the AEDRM series and provides an extensive compilation of trend data on drinking behaviors at the State level. The data presented in this document are results of a consistent analysis by State and year using data from the Behavioral Risk Factor Surveillance System (BRFSS).

Other volumes of the AEDRM series include information on per capita alcohol consumption, county alcohol problem indicators, hospital discharges with alcohol-related conditions, liver cirrhosis mortality, State trends in alcohol-related mortality, and results from the National Longitudinal Alcohol Epidemiologic Survey.

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1. Introduction

This document provides data indicating trends in alcohol consumption and related risk behaviors in the 50 States and the District of Columbia. It was compiled by the Alcohol Epidemiologic Data System (AEDS) of the National Institute on Alcohol Abuse and Alcoholism (NIAAA) as part of a series of AEDS data reference manuals. Data used in this work were drawn from the Behavioral Risk Factor Surveillance System (BRFSS), an ongoing survey conducted by the States and coordinated by the Centers for Disease Control and Prevention (CDC). We hope that the trend data presented in this document on alcohol consumption and related risk behaviors are of value to State policymakers, public health workers, alcohol researchers, and the general public interested in health and social issues related to alcohol drinking behaviors.

2. Data Source

The BRFSS was initiated by CDC in 1984 to monitor State-level prevalence of the major behavioral risks associated with premature morbidity and mortality among adults. CDC developed standard core questions for States to use to provide data that could be compared across States. In 1984, 15 States initially participated in the monthly data collection. By 1994, all States, the District of Columbia, and three territories were participating in the BRFSS.

2.1 Sampling and Data Collection

All BRFSS data were collected through telephone interviews. Each State's health department used random-digit dialing to select probability samples of adults in households with telephones. The samples represented each State's civilian, non-institutionalized, adult population (persons 18 years of age or older). Most States used three-stage cluster sampling based on the Waksberg method, but some States used simple random, stratified random, or other sampling designs. The sample size varied over time and across States. In 2001, the sample size for the 50 States ranged from 2,032 in Colorado to 8,628 in Massachusetts. (See Appendix A for selected CDC publications for information on survey design, sampling, and other measurement factors.)

2.2 Alcohol Items

BRFSS surveys consist of a set of core questions and several modules; each participating State administers the core set and as many of the modules as they desire and their funding allows. As part of the core questionnaire, alcohol consumption questions included five items concerning drinking behaviors during the month prior to the interview (referenced as "past month" in the questions): any alcohol use, number of days drinking any alcohol (frequency), number of drinks consumed per drinking day (quantity), number of times having 5 or more drinks on an occasion, and number of times driving after having had too much to drink (drinking and driving). Over the years, the wording of these items was not

always consistent. The most noteworthy change occurred in 1989. From 1984 to 1988, the frequency and quantity questions were beverage-specific; they were asked for beer, wine, and liquor separately. Beginning in 1989, the frequency and quantity questions were asked for “any alcoholic beverages.” The historical questions in the alcohol consumption section of BRFSS are displayed in Exhibit 1. Research has shown that beverage-specific questions often result in higher estimates of total alcohol consumption than that calculated from non-beverage-specific questions (Williams et al., 1994). Therefore, comparisons of drinking levels from post-1988 surveys with data from the earlier years are not recommended.

Exhibit 1. Alcohol Consumption Questions in BRFSS.

(Numbers in parentheses indicate the years when the version of the question was used. C = Core Question, M = Module Question.)

1. Any Alcohol Use

During the past month, have you had at least one drink of any alcoholic beverage such as beer, wine, wine coolers, or liquor?

1=Yes

2=No

7=DK/NS

9=Refused

(2000 - M, 1999 - C, 1998 - M, 1997 - C, 1996 - M, 1995 - C, 1994 - M, 1993 - C)

These next few questions are about the use of beer, wine, wine coolers, cocktails, or liquor, such as vodka, gin, rum, or whiskey--all kinds of alcoholic beverages that people drink at meals, special occasions, or when just relaxing. Have you had any beer, wine, wine coolers, cocktails, or liquor during the past month, that is, since _____?

1=Yes

2=No

9=Refused

(1992 - C, 1991 - C, 1990 - C, 1989 - C)

These next few questions are about the use of beer, wine, or liquor--all kinds of alcoholic beverages that people drink at meals, special occasions, or when just relaxing. Have you had any beer, wine or liquor during the past month, that is, since _____?

1=Yes

2=No

9=Refused

(1988 - C, 1987 - C, 1986 - C, 1985 - C, 1984 - C)

2. Frequency

A drink of alcohol is 1 can or bottle of beer, 1 glass of wine, 1 can or bottle of wine cooler, 1 cocktail, or 1 shot of liquor. During the past 30 days, how often have you had at least one drink of any alcoholic beverage?

1 = ___ = Days per week

2 = ___ = Days in past 30

888=No drinks in past 30 days

777=DK/NS

999=Refused

(2001- M)

During the past month, how many days per week or per month did you drink any alcoholic beverages, on the average?

1 = ___ = Number days per week

2 = ___ = Number days per month

777=DK/NS

999=Refused

(2000 - M, 1999 - C, 1998 - M, 1997 - C, 1996 - M, 1995 - C, 1994 - M, 1993 - C, 1992 - C, 1991 - C, 1990 - C, 1989 - C)

Exhibit 1. Alcohol Consumption Questions in BRFSS. (Continued)

During the past month, how many days per week or per month did you drink any beer?

1= ___ =Days per week
2= ___ =Days per month
888=Never or none
777=DK/NS
999=Refused

Also, during the past month, how many days per week or per month did you drink any wine?

1= ___ =Days per week
2= ___ =Days per month
888=Never or none
777=DK/NS
999=Refused

And, during the past month, about how many days per week or per month did you have any liquor to drink, such as vodka, gin, rum, or whiskey?

1= ___ =Days per week
2= ___ =Days per month
777=DK/NS
888=Never or none
999=Refused

(1988 - C, 1987 - C, 1986 - C, 1985 - C, 1984 - C)

3. Quantity

On the days when you drank, about how many drinks did you drink on the average?

___ =Number of drinks
77=DK/NS
99=Refused

(2001- M)

A drink is 1 can or bottle of beer, 1 glass of wine, 1 can or bottle of wine cooler, 1 cocktail, or 1 shot of liquor.

On the days when you drank, about how many drinks did you drink on the average?

___ =Number of drinks
77=DK/NS
99=Refused

(2000 - M, 1999 - C, 1998 - M, 1997 - C, 1996 - M, 1995 - C, 1994 - M, 1993 - C, 1992 - C, 1991 - C, 1990 - C, 1989 - C)

On the days you drank beer, about how many beers did you drink on the average?

___ =Number of beers
77=DK/NS
99=Refused

Exhibit 1. Alcohol Consumption Questions in BRFSS. (Continued)

On the days when you drank wine, about how many glasses of wine did you drink on the average?

__ __=Number of glasses of wine

77=DK/NS

99=Refused

On the days when you drank any liquor, about how many drinks did you have on the average?

__ __=Number of drinks

77=DK/NS

99=Refused

(1988 - C, 1987 - C, 1986 - C, 1985 - C, 1984 - C)

4. Five or More Drinks

Considering all types of alcoholic beverages, how many times during the past 30 days did you have 5 or more drinks on an occasion?

__ __=Number of times

88=None

77=DK/NS

99=Refused

(2001- M)

Considering all types of alcoholic beverages, how many times during the past month did you have 5 or more drinks on an occasion?

__ __=Number of times

88=None

77=DK/NS

99=Refused

(2000 - M, 1999 - C, 1998 - M, 1997 - C, 1996 - M, 1995 - C, 1994 - M, 1993 - C)

Considering all types of alcoholic beverages, that is beer, wine, wine coolers, cocktails, and liquor, as drinks, how many times during the past month did you have 5 or more drinks on an occasion?

__ __=Number of times

88=None

77=DK/NS

99=Refused

(1992 - C, 1991 - C, 1990 - C, 1989 - C)

Considering all types of alcoholic beverages, that is beer, wine, and liquor, as drinks, how many times during the past month did you have 5 or more drinks on an occasion?

__ __=Number of times

88=None

77=DK/NS

99=Refused

(1988 - C, 1987 - C, 1986 - C, 1985 - C, 1984 - C)

Exhibit 1. Alcohol Consumption Questions in BRFSS. (Continued)

5. Drinking and Driving

During the past month, how many times have you driven when you've had perhaps too much to drink?

__ __=Number of times

88=None

77=DK/NS

99=Refused

(2000 - M, 1999 - C, 1998 - M, 1997 - C, 1996 - M, 1995 - C, 1994 - M, 1993 - C)

And during the past month, how many times have you driven when you've had perhaps too much to drink?

__ __=Number of times

88=None

77=DK/NS

99=Refused

(1992 - C, 1991 - C, 1990 - C, 1989 - C, 1988 - C, 1987 - C, 1986 - C, 1985 - C, 1984 - C)

Source: National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, U.S. Department of Health and Human Services. Behavioral Risk Factors Surveillance System (BRFSS): Historical Questions (<http://apps.nccd.cdc.gov/BRFSSQuest/>).

2.3 Data Availability

Although this data reference manual covers the time period from 1984 to 2001, alcohol consumption data are not available in BRFSS for all States for the entire period. As described earlier, the BRFSS participating States increased gradually from 15 in 1984 to all States plus the District of Columbia in 1994. However, beginning in 1994 the alcohol consumption section rotated between the core questionnaire (in odd-numbered years) and optional modules (in even-numbered years). As a result, all, or near all, States administered these questions in the odd-numbered years, while about a dozen States also chose to do so in the even-numbered years. Exhibit 2 lists the States for which alcohol consumption data were collected during the years 1984 to 2001.

3. Variable Definition and Calculation

3.1 Alcohol Variables

Prevalence data provided in this manual are based on responses to the BRFSS alcohol consumption questions. The definition and calculation of prevalence variables are described in the following sections.

3.1.1 Drinking Status and Drinking Level

Drinking status includes two categories, nondrinkers and current drinkers. Nondrinkers are defined as persons who reported no use of any alcoholic beverages in the past month. Current drinkers are defined as persons who reported that they drank 1 or more drinks of any alcoholic beverages in the past month.

Among current drinkers, three drinking levels are further defined by their total alcohol consumption. First, the total number of drinks consumed in the past month was calculated by multiplying the reported number of days drinking and the reported number of drinks per drinking day in the past month.¹ For respondents who reported weekly drinking frequencies, their monthly total consumption was converted using the factor of 4.35 weeks per month.² Based on the total consumption, the following cut-offs are used to define the three drinking levels:

¹ For years during 1984 to 1988, three beverage-specific total numbers of drinks consumed in the past month were calculated first. The total consumption was then obtained by summing of the three beverage-specific quantities.

² In the original data sets provided by CDC on CD-ROM, the recoded total number of drinks consumed in the last month was calculated using the factor of 4 weeks per month. For this manual, the total consumption was recalculated using the factor of 4.35 weeks per month. As a result, distributions of drinking levels in this manual may be slightly different from those based on the original recoded total consumption variable in the BRFSS data sets.

Exhibit 2. State Alcohol Consumption Data Availability in BRFSS, 1984–2001.

Year	Number of States (n)	Name of States
2001	51	All States plus DC
2000	12	AK, ID, IL, IA, MN, NV, NM, OH, TN, TX, VT, WI.
1999	51	All States plus DC
1998	12	AK, DC, ID, IL, IA, MN, NV, NM, OK, TN, VT, WI
1997	51	All States plus DC
1996	17	AL, AK, AZ, CA, ID, IL, KY, MN, NV, NJ, NY, OK, PA, TN, VT, WI, WY
1995	50	All States
1994	12	AK, AZ, DC, ID, KS, MN, NM, OK, TN, WV, WI, WY
1993	50	All States plus DC, except WY
1992	49	All States plus DC, except AR, WY
1991	48	All States plus DC, except KS, NV, WY
1990	45	All States plus DC, except AK, AR, KS, NV, NJ, WY
1989	40	All States plus DC, except AK, AR, CO, DE, KS, LA, MS, NV, NJ, VT, WY
1988	37	AL, AZ, CA, CT, DC, FL, GA, HI, ID, IL, IN, IA, KY, ME, MD, MA, MI, MN, MO, MT, NE, NH, NM, NY, NC, ND, OH, OK, RI, SC, SD, TN, TX, UT, WA, WV, WI
1987	33	AL, AZ, CA, DC, FL, GA, HI, ID, IL, IN, KY, ME, MD, MA, MN, MO, MT, NE, NH, NM, NY, NC, ND, OH, RI, SC, SD, TN, TX, UT, WA, WV, WI
1986	26	AL, AZ, CA, DC, FL, GA, HI, ID, IL, IN, KY, MA, MN, MO, MT, NM, NY, NC, ND, OH, RI, SC, TN, UT, WV, WI
1985	22	AZ, CA, CT, DC, FL, GA, ID, IL, IN, KY, MN, MT, NY, NC, ND, OH, RI, SC, TN, UT, WV, WI
1984	15	AZ, CA, ID, IL, IN, MN, MT, NC, OH, RI, SC, TN, UT, WV, WI

Light drinkers: 3 or fewer drinks per week in the past month.
Moderate drinkers: more than 3 drinks per week, but no more than 1 drink per day for women and no more than 2 drinks per day for men in the past month.
Heavier drinkers: more than one drink per day for women and more than two drinks per day for men.

3.1.2 Five or More Drinks on an Occasion

This variable is defined as the reported consumption of 5 or more drinks on a single occasion one or more times in the past month.

3.1.3 Drinking and Driving

Drinking and driving is defined as the reported behavior of operating a motor vehicle after having too much to drink one or more times in the past month.

3.2 Demographic Information

The demographic variables used in this manual include sex, age, race, Hispanic origin, education, marital status, and employment status. Exhibit 3 displays these variables and the categories within each of the variables. Broad rather than detailed categories are used for race, education, and marital status for two reasons. First, broad categories help to maintain enough respondents within the subgroups to make reliable estimates. Second, broad categories are necessary to keep the manual from becoming too lengthy. Nonetheless, a special age category of 18–20 years was added to the conventional age breakdowns. The population in this age group is legally considered adults in many areas but still under the legal drinking age (21 years and older in all States since 1988). Data on this age group may be of special interest to readers who are concerned with under-age drinking, especially when existing publications rarely present drinking data for this group separately.

4. Data Analysis Procedures

All of the prevalence calculations for this manual have been processed consistently by State and year. Cases with missing values, refusal, and "don't know" are excluded from the calculations. Percentages are weighted to population characteristics.

Because of the complex survey design of the BRFSS in most States, variance estimation procedures that assume a simple random sample cannot be employed. Research has shown that clustering and stratification in sampling design may result in standard errors much larger than those that would be obtained with a simple random sample of equal size. To correct for this potential design effect, all standard errors presented in this manual were generated using SUDAAN, a computer software package that uses appropriate statistical techniques to adjust for sample design characteristics (Shah, Barnwell, and Bieler, 1997).

Exhibit 3. Selected Demographic Characteristics.

Sex

Male
Female

Age

18-20 years
21-29 years
30-44 years
45-64 years
65 years and older

Race

White
Black/African American
All other races

Ethnicity

Hispanic/Latino
Not Hispanic/Latino

Education

11 years or less (some high school or less)
12 years (high school graduate or GED)
13 or more years (some college, technical school, or higher)

Employment Status

Employed (wage worker or self-employed)
Out of work
Not in the labor force (homemaker, student, retired, or unable to work)

Marital status

Married
Not currently married (divorced, widowed, separated, never been married, or a member of an unmarried couple)

4. Data Tables

Three tables are presented in this manual, showing past month prevalence of drinking status and drinking level, drinking 5 or more drinks on at least one occasion, and driving after having too much to drink at least once, respectively. In each table, the prevalence data are shown as percent distributions for both sexes and all ages 18 years and older combined, separately for males and females 18 years and older, and separately for both sexes combined in each of four age categories (18–20 years, 21–44 years, 45–64 years, and 65 years and older).

All three tables begin with aggregate data (under the heading “United States”) for all States that conducted the survey in the corresponding year, followed by data for each individual State. Readers are reminded that the aggregate data under the heading “United States” are not always representative of the entire country because, as noted earlier, the participating States varied over time (see Exhibit 2 for the total number and list of participating States).

Because the numbers presented are calculated from probability samples of respondents, they are labeled as estimates. Each estimate is accompanied by a value for the standard error of the estimate (labeled S.E. in the tables) which provides a margin of error above and below each estimate. If the standard error is multiplied by 1.96, it provides upper and lower bounds within which the true value being estimated will be found with 95 percent confidence. As discussed earlier in Data Analysis Procedures, all standard errors in this manual were calculated using the computer software package SUDAAN.

While overall estimates for each State in this manual were generally produced from relatively large samples, estimates for certain population subgroups may be based on very small numbers of respondents, which can be unreliable (as indicated by large standard errors) and misleading. CDC has recommended a general rule of not reporting or interpreting percentages based upon a denominator with fewer than 50 respondents (CDC, 2002b). In an effort to present as much data as possible, this manual only suppressed estimates generated from fewer than 10 respondents. Table cells suppressed under this arbitrary rule are marked by a “–” symbol. Estimates based upon 10 to 49 respondents are shown in the tables and marked with a “#” symbol. In any case, users are urged to pay attention to the associated standard errors while interpreting estimates presented in the tables.

In order to reduce the size of this document, one category is omitted in both Tables 2 and 3, because the percentage for this category can be derived from 100 minus the percentage in the presented category. For instance, the portion of Table 2 shown on the next page indicates that in 2001, among the total population ages 18 and older in the 12 surveyed States, 14.5 percent reported consumption of 5 or more alcoholic beverages on at least one occasion in the past month. Therefore, the percent of those who did not report such drinking behavior is 85.5 (i.e., 100 minus 14.5). Similarly, the omitted category (no reported event of driving after having too much to drink) in Table 3 can be easily derived from the presented data.

Table 2. (portion)

	Both Sexes ages 18 and older		Sex			
	Estimate	S.E.	Male		Female	
			Estimate	S.E.	Estimate	S.E.
United States						
<u>Total</u>						
2001	14.5	0.1	22.5	0.3	7.2	0.1
2000	17.7	0.3	26.8	0.6	9.3	0.3
1999	14.7	0.2	22.9	0.3	7.3	0.1
1998	15.2	0.3	22.5	0.6	8.4	0.3
1997	13.4	0.2	21.1	0.3	6.4	0.1
1996	15.0	0.3	23.1	0.5	7.5	0.2
1995	13.9	0.2	21.5	0.3	6.9	0.2
1994	15.6	0.4	23.0	0.6	8.7	0.4
1993	14.4	0.2	22.1	0.3	7.4	0.2
1992	14.6	0.2	22.8	0.3	7.2	0.2
1991	14.3	0.2	22.3	0.3	7.0	0.2
1990	14.8	0.2	23.1	0.4	7.1	0.2
1989	15.3	0.2	23.8	0.4	7.7	0.2
1988	15.8	0.3	24.7	0.5	7.7	0.3
1987	16.0	0.3	24.9	0.6	7.9	0.3
1986	16.5	0.3	25.6	0.6	8.3	0.3
1985	17.1	0.4	26.3	0.7	8.8	0.4
1984	19.1	0.6	29.4	1.1	9.7	0.6

References

National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, U.S. Department of Health and Human Services. Behavioral Risk Factors Surveillance System (BRFSS): Historical Questions (<http://apps.nccd.cdc.gov/BRFSSQuest/>), 2002a.

National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, U.S. Department of Health and Human Services. Behavioral Risk Factors Surveillance System (BRFSS). Comparability of Data: BRFSS 2001 (http://www.cdc.gov/brfss/surveydata/2001/compare_01.rtf), 2002b.

Shah, B.V., Barnwell, B.G., and Bieler, G.S. SUDAAN: Software for the Statistical Analysis of Correlated Data User's Manual Release 7.5. Research Triangle Park, NC: Research Triangle Institute, 1997.

Williams, G.D., Proudfit, A.H., Quinn, E.A., and Campbell, K.E. Variations in quantity-frequency measures of alcohol consumption from a general population survey. *Addiction* 89:413-420, 1994.

Appendix A. Selected CDC Publications on the BRFSS

Behavioral Surveillance Branch, Division of Adult and Community Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention. 2001 BRFSS Summary Prevalence Report, August 8, 2002. (<http://www.cdc.gov/brfss/pdf/2001prvprt.pdf>)

Behavioral Surveillance Branch, Division of Adult and Community Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention. 1999 BRFSS Summary Prevalence Report, June 20, 2000. (<http://www.cdc.gov/brfss/pdf/99prvprt.pdf>)

Holtzman, D.; Powell-Griner, E.; Bolen, J.C.; Rhodes, L. State- and Sex-Specific Prevalence of Selected Characteristics-Behavioral Risk Factor Surveillance System, 1996 and 1997. In: CDC Surveillance Summaries, July 7, 2000. *MMWR* 49 (No. SS-6): 1-39.

Bolen, J.C.; Rhodes, L.; Powell-Griner, E.E.; Bland, S.D.; and Holtzman, D. State-Specific Prevalence of Selected Health Behaviors, by Race and Ethnicity-Behavioral Risk Factor Surveillance System, 1997. In: CDC Surveillance Summaries, March 24, 2000. *MMWR* 49 (No. SS-2): 1-60.

Powell-Griner, E.; Anderson, J.E.; Murphy, W. State-and Sex-Specific Prevalence of Selected Characteristics-Behavioral Risk Factor Surveillance System, 1994 and 1995. In: CDC Surveillance Summaries, August 1, 1997. *MMWR* 46 (No. SS-3): 1-31.

Frazier, E.L.; Okoro, C.A.; Smith, C.; McQueen, D.V. State- and Sex-Specific Prevalence of Selected Characteristics-Behavioral Risk Factor Surveillance System, 1992 and 1993. In: CDC Surveillance Summaries. December 27, 1996. *MMWR* 45 (No. SS-6): 1-36.

Siegel, P.Z.; Waller, M.N.; Frazier, E.L.; Mariolis, P. Behavioral Risk Factor Surveillance System: Summary of Data for 1991. In: CDC Surveillance Summaries. August 27, 1993. *MMWR* 42 (No. SS-4): 23-30.

Siegel, P.Z.; Brackbill, R.M.; Frazier, E.L.; Mariolis, P.; Sanderson, L.M.; Waller, M.N. Behavioral Risk Factor Surveillance, 1986-1990. In: CDC Surveillance Summaries, December 1991. *MMWR* 40 (No. SS-4): 1-23.

Anda, R.F.; Waller, M.N.; Wooten, K.G.; Mast, E.E.; Escobedo, L.G.; Sanderson, L.M. Behavioral Risk Factor Surveillance, 1988. In: CDC Surveillance Summaries, June 1990. *MMWR* 39 (No. SS-2): 1-21.

Centers for Disease Control. Behavioral Risk Factor Surveillance, Selected States, 1987. July 14, 1989. *MMWR* 38(27): 469-473.

Centers for Disease Control. Behavioral Risk Factor Surveillance, Selected States, 1986. May 1, 1987. *MMWR* 36(16): 252-254.

Centers for Disease Control. Behavioral Risk Factor Surveillance, Selected States, 1985. July 11, 1986. *MMWR* 35(27): 441-444.

Centers for Disease Control. Behavioral Risk Factor Surveillance, Selected States, 1984. April 25, 1986. *MMWR* 35(16): 253-254.

