

Dietary Screener in the 2009 CHIS: Scoring Procedures

How Analytical Scoring Procedures Were Developed

Scoring procedures were developed to convert the individual respondent's screener responses to estimates of intake. We created variables for amount consumed of each food group queried, and for amount consumed of total fruits and vegetables (cup equivalents) and added sugars (teaspoons). To do so, we used 24-hour dietary recall data from the National Center for Health Statistics (NCHS) National Health and Nutrition Examination Survey (NHANES) 2003-2006.

Conversion of frequency category to times per day

Data collected on the 2009 California Health Interview Survey (CHIS) Dietary Screener consist of frequency response and time unit: times per day, week, or month. We converted these responses to daily frequency values, denoted as N_{FGk} and shown below.

Time Period Reported	N_{FGk} : Daily Frequency
Day	As reported
Week	Reported frequency divided by 7
Month	Reported frequency divided by 30

Exclusion of extreme values

We examined each variable's distribution of values for times per day. For each dietary variable, values discontinuous with the overall CHIS distribution were excluded. The maximum daily acceptable value and the number of cases excluded are shown below.

Food Group	Maximum Daily Acceptable Value	Number of Cases Excluded
Fruit	10	2
Fried potatoes	5	0
Other vegetables	10	0
Regular soda	8	7
Sports/energy drinks + Fruit drinks	11	1
Sugar in coffee and tea	12	5
Cookies, cake, pie, brownies	10	0
Ice cream	6	1

Estimation of median sex-age portion sizes

We estimated the median sex- and age-specific portion sizes for each food from 24-hour recall data in NHANES 2003-2006. The units used were specific to each food group: cup equivalents of fruits and vegetables for fruit, fried potatoes, and other vegetables, and teaspoons of added sugars for soda, energy/fruit drinks, coffee/tea, cookies/cake/pie/brownies, and ice cream. These portion sizes are denoted by P_k

For fruits and vegetables, cup equivalents are defined in the U.S. Department of Agriculture's (USDA) MyPyramid Equivalents Database (MPED; version 2.0 for USDA Survey Foods, 2003-2004) and cited in the U.S. Dietary Guidelines for Americans 2010 as:

- 1 cup raw or cooked vegetable or fruit
- ½ cup dried vegetable or fruit
- 1 cup vegetable or fruit juice
- 2 cups leafy salad greens.

Median portion sizes for fruits and vegetables are given as cup equivalents of fruits and vegetables:

Median Portion Size (P_k) in Cup Equivalents per Mention by Sex and Age for Fruits and Vegetables Analyses							
Food Group	Age Group (years)						
	18–27	28–37	38–47	48–57	58–67	68–77	78–99
Men							
Fruit (P_1)	0.867300	0.911790	0.867300	0.867300	0.813000	0.715500	0.713000
Fried potatoes (P_2)	0.622000	0.663435	0.548000	0.548055	0.545000	0.455000	0.444000
Other vegetables (P_3)	0.424210	0.475600	0.511000	0.537500	0.535714	0.515400	0.468600
Women							
Fruit (P_1)	0.764240	0.750000	0.739187	0.775915	0.742000	0.633000	0.632000
Fried potatoes (P_2)	0.480000	0.446660	0.444000	0.385000	0.455275	0.444000	0.320000
Other vegetables (P_3)	0.392600	0.440000	0.470974	0.481716	0.473689	0.447818	0.434007

For added sugars, median portion sizes are given as teaspoons of added sugars:

Median Portion Size (P_k) in Teaspoons per Mention by Sex and Age for Added Sugars Analyses							
Food Group	Age Group (years)						
	18–27	28–37	38–47	48–57	58–67	68–77	78+
Men							
Regular soda (P₁)	11.60137 7	10.480288	10.32730 0	9.428160	8.994700	8.994700	7.889000
Fruit drinks + sports drinks (P₂)	8.559500	8.232800	10.26407 7	8.141300	7.558200	5.439624	5.439624
Cookies, cake, pie (P₃)	3.761000	3.756900	4.387860	3.735000	3.192000	3.230824	2.667387
Ice cream (P₄)	5.052000	5.262000	5.052000	4.680000	4.508965	3.691000	3.849000
Sugars in coffee/tea (P₅)	2.000124	2.000124	2.500155	2.484333	1.500000	1.488188	1.653277
Women							
Regular soda (P₁)	9.336096	8.947000	7.953000	8.617500	7.865340	7.295500	5.917000
Fruit drinks (P₂)	7.258570	7.493000	6.451665	6.230040	6.798000	4.536750	4.113113
Cookies, cake, pie (P₃)	2.661000	3.340980	3.651000	3.208920	2.821134	2.729500	2.572640
Ice cream (P₄)	3.509870	3.875520	3.300180	3.094000	2.949000	3.350500	3.300180
Sugars in coffee/tea (P₅)	2.000000	2.000124	2.000000	1.666770	1.500000	1.382000	1.000062

Creation of food-level variables

Food-level variables were created for each food queried by multiplying the individual's

standardized daily frequency of intake by his/her sex-age specific portion size, denoted by:

Estimated amount consumed daily of Food Group_k = $N_{FGk}P_k$

The following food-level variables are available:

Variable Name	Label
FRUIT	UNADJUSTED DAILY CUP EQUIVALENTS OF FRUITS
FRIED_PO	UNADJUSTED DAILY CUP EQUIVALENTS OF FRIED POTATOES
VEG_OTH	UNADJUSTED DAILY CUP EQUIVALENTS OF OTHER VEGETABLES
SUG_SODA	UNADJUSTED DAILY TEASPOONS OF ADDED SUGAR IN SODA
SUG_ENGD	UNADJUSTED DAILY TEASPOONS OF ADDED SUGAR IN FRUIT/ENERGY DRINKS
SUG_COFF	UNADJUSTED DAILY TEASPOONS OF ADDED SUGAR IN COFFEE AND TEA
SUG_BEV	UNADJUSTED DAILY TEASPOONS OF ADDED SUGAR IN ALL BEVERAGES
SUG_PAST	UNADJUSTED DAILY TEASPOONS OF ADDED SUGAR IN PASTRIES
SUG_ICRM	UNADJUSTED DAILY TEASPOONS OF ADDED SUGAR IN ICE CREAM

Creation of aggregate variables

A. Fruit and Vegetable Intake

For estimates of **fruits and vegetables** aggregated across all food questions:

$$E(\text{Fruits and Veg}^{1/2}) = b_0 + b_1(N_{FG1}P_1 + N_{FG2}P_2 + N_{FG3}P_3)^{1/2}$$

The cup equivalents of fruits and vegetables variable was square-root-transformed to approximate normality; N_{FGk} is the usual number of times per day an individual consumed food group k ; k indexes the three fruit and vegetable food groups. P_k is the median portion size of group k . We calculated weighted least-squares estimates of the regression coefficients b_0 and b_1 on the adults (aged 18 and above) in the NHANES 2003-2006 sample, stratifying by sex and excluding extreme exposure values.

Estimation of b_0 and b_1 : For cup equivalents of fruits and vegetables excluding dried beans and French fries, the sex-specific estimates of the parameters are:

Estimated Regression Coefficients for Sum of Foods Predicting Different

Versions of Daily Cup Equivalents of Fruits and Vegetables, by Sex		
Parameter	Men	Women
Summary Variable with French fries, excluding beans		
Intercept (b_0)	0.900416	0.763098
b_1	0.648026	0.673026
Summary Variable excluding French fries and beans		
Intercept (b_0)	0.907261	0.641925
b_1	0.774934	0.662708

B. Added Sugars Intake

For teaspoons of **added sugars**:

$$E(\text{Added sugars}^{\sqrt[3]{}}) = b_0 + b_1 (N_{FG1}P_1 + N_{FG2}P_2 + \dots + N_{FG5}P_5)^{1/3}$$

The teaspoons of added sugars variable was cube-root-transformed to approximate normality; N_{FGk} is the usual number of times per day an individual consumed food group k ; k indexes the five added sugars food groups. P_k is the median portion size of group k . We calculated weighted least-squares estimates of the regression coefficients b_0 and b_1 on the adults (aged 18 and above) in the NHANES 2003-2006 sample, stratifying by sex and excluding extreme exposure values.

Estimation of b_0 and b_1 : For teaspoons of added sugars, the sex-specific estimates of the parameters are:

Estimated Regression Coefficients for Sum of Foods Predicting Teaspoons of Added Sugars, by Sex		
Parameter	Men	Women
Intercept (b_0)	1.434353	1.436804
b_1	0.605576	0.547127

The following aggregated variables were created:

Variable Name	Label
FV_NOBNS	DAILY CUP EQUIVALENTS OF FRUITS & VEGETABLES EXCLUDING BEANS

FV_NOFBN	DAILY CUP EQUIVALENTS OF FRUITS/VEG EXCL FRENCH FRIES & BEANS
SUGAR2	DAILY TEASPOONS OF ADDED SUGAR

Variance adjustment factors

In addition to these variables, we applied variance adjustment factors to create variance-adjusted versions of each for use in many analytical situations.