Behavioral Risk Factor Surveillance System (BRFSS) Fact Sheet: Raking

Changing Weighting Methodology

In 2011, the BRFSS will begin using raking as the only source of data weighting. Raking represents an enhancement over previous post stratification weighting procedures.

Raking adjusts estimates within each state using:

- Telephone source
- Detailed race and ethnicity
- Regions within states
- Education level
- Marital status
- Age group by gender
- Gender by race and ethnicity
- Age group by race and ethnicity
- Renter/owner status

The Process of Raking (Iterative Proportional Fitting)

Once BRFSS data are collected, statistical procedures are undertaken to make sure the data are representative of the population for each state and/or local area. One method for accomplishing this goal is known as *iterative proportional fitting* or raking. Raking adjusts the data so that groups which are underrepresented in the sample can be accurately represented in the final dataset. Raking was first introduced for BRFSS data in 2007 and will be the primary weighting for BRFSS, beginning in 2011.

Raking allows for the incorporation of cell phone survey data, permits the introduction of additional demographic characteristics and more accurately matches sample distributions to known demographic characteristics of populations. The use of raking reduces nonresponse bias and has been shown to reduce error within estimates.

BRFSS raking includes categories of age by gender, detailed race and ethnicity groups, education levels, marital status, regions within states, gender by race and ethnicity, telephone source, renter/owner status, and age groups by race and ethnicity.

Raking is completed by adjusting for one demographic variable (or dimension) at a time. For example, when weighting by age and gender, weights would first be adjusted for gender groups, then those estimates would be adjusted by age groups. This procedure would continue in an iterative process until all group proportions in the sample approach those of the population, or after 75 iterations.

The new BRFSS weighting methodology is comprised of two sections:

- **Design Weights**
- **Raking**

Design Weight = _STRWT * (1/NUMPHON2) * NUMADULT

- **The stratum weight (_STRWT) is calculated using:**
  - Number of available records (NRECSTR) and the number of records selected (NRECSEL) within each geographic strata (_GEOSTR) and density strata (_DENSTR)
  - Geographic strata (entire state, counties, census tracts, etc.)
  - Density strata (1=listed numbers, 2=not listed numbers)

- **Within each _GEOSTR *_DENSTR combination:**
  The stratum weight (_STRWT) is calculated from the average of the NRECSTR and the sum of all sample records used to produce the NRECSEL.

- **_STRWT = NRECSTR / NRECSEL**

- **1/ NUMPHON2** is the inverse of the number of residential telephone numbers in the respondent's household.

- **NUMADULT** is the number of adults 18 years and older in the respondent's household.

FINAL WEIGHT = DesignWeight * Raking Adjustment

Weight Trimming in Raking

Weight trimming is used to increase the value of extremely low weights and decrease the value of extremely high weights. The objective of weight trimming is to reduce errors in the outcome estimates caused by unusually high or low weights in some categories.

Raking allows BRFSS to incorporate information from cell phone interviews and create estimates with smaller samples.