2002 SMART BRFSS MMSA Methodology

2002 Selected Metropolitan/Micropolitan Area Risk Trends from the BRFSS Creation of Metropolitan-level weights methodology

This documentation describing the Behavioral Risk Factor Surveillance System (BRFSS) Selected Metropolitan/Micropolitan Area Risk Trends (SMART) project is based on a report produced for CDC by RTI International. A documented and verified subset of the 2002 BRFSS has been produced to provide some local area estimates. These local areas are identified as metropolitan or micropolitan statistical areas (MMSA) as defined by the Office of Management and Budget. The data set was produced by adding new analysis weights designed to correspond to the 2002 population estimates for each eligible MMSA. The additional weights were post-stratified to the MMSA-level. The process by which these new weights were obtained is detailed in Appendix C, "Weight Class Collapsing Rules."

Selected Areas

Typically, BRFSS data are used to produce state-level estimates. However, for the SMART project, BRFSS data were used to produce small area-level estimates for MMSAs as defined by the Bureau of the Census. On June 6, 2003, the Office of Management and Budget (OMB) issued new definitions for metropolitan statistical areas, micropolitan statistical areas, and metropolitan divisions (http://www.whitehouse.gov/omb/bulletins/b03-04_attach.pdf). A respondent was associated with a particular MMSA on the basis of their county code. Missing county codes were imputed from a value included in the purchased telephone sample that represents the county most likely associated with the telephone number. MMSA-level estimates have been produced from the BRFSS data for 98 MMSAs that have met the analysis criteria for the 2002 data year.

Appendix A: List of Variables added to (2002 Data)

Data Documentation for the 15 New Variables Added to the 2002 BRFSS Data

ADJMMSA – MMSA-level post-stratification weight. This factor is multiplied by the design weight (_WT2) to get the final MMSA-level weight (_MMSAWT).

ADJMM_SS – MMSA-level post-stratification split-sample weight. This factor is multiplied by the design weight (_WT2) to get the final MMSA-level split sample weight (_MMSWTSS). This variable is missing for respondents who do not live in the Chicago-Naperville-Joliet, IL area, the only metropolitan division with adequate sample size to provide a split sample weight.

AGE_MMSA– age categories used to set up the initial weighting classes for the MMSA-level weights.

1 – 18-24
2 – 25-34
3 – 35-44
4 – 45-54
5 – 55-64
6 – 65+

AGE_M_F – age categories used in the final weighting classes for the MMSA-level weights.

1 – 18-24
2 – 25-34
3 – 35-44
4 – 45-54
5 – 55-64
6 – 65+
7 – 18-34
8 – 35-54
9 – 55+

AGE_FSS – age categories used in the final weighting classes for the split-sample MMSA-level weights. This variable is missing for respondents who do not live in the Chicago-Naperville-Joliet, IL metropolitan division.

1 – 18-24
2 – 25-34
3 – 35-44
4 – 45-54
5 – 55-64
6 – 65+
9 – 55+

ANLMMSA – indicates whether a respondent lives in a MMSA that was included in the reweighting.

0 – not in a MMSA that got reweighted
1 – in a MMSA that got reweighted

ANLMM_SS – indicates whether a respondent lives in a MMSA that was included in the split-sample reweighting (Chicago-Naperville-Joliet, IL metropolitan division only).

0 – not in Chicago-Naperville-Joliet, IL metropolitan division
1 – in Chicago-Naperville-Joliet, IL metropolitan division

RACE_MMS – race categories used to set up the initial weighting classes for the mmsa-level weights.

0 – Race not used
1 – White, non-Hispanic
2 – Nonwhite or Hispanic

RACE_M_F – race categories used in the final weighting classes for the MMSA-level weights.

0 – Race not used
1 – White, non-Hispanic
2 – Nonwhite or Hispanic

RACE_FSS – race categories used in the final weighting classes for the split-sample MMSA-level weights. This variable is missing for respondents who do not live in the Chicago-Naperville-Joliet, IL metropolitan division.

1 – White, non-Hispanic
2 – Nonwhite or Hispanic

SEX_MMSA – sex categories used to set up the initial and final weighting classes for the MMSA-level weights (weight classes are never collapsed across sex).

1 – Male
2 – Female

_MMSA – MMSA code of the metropolitan, micropolitan statistical area, or metropolitan division if appropriate, where the respondent lives. Metropolitan and micropolitan statistical areas and metropolitan divisions are defined by OMB in Bulletin No. 03-04 (http://www.whitehouse.gov/omb/bulletins/b03-04_attach.pdf).

_MMSANAM – MMSA name of the metropolitan/micropolitan statistical area, or metropolitan division if appropriate, where the respondent lives. Metropolitan/micropolitan statistical areas and metropolitan divisions are defined by OMB in Bulletin No. 03-04 (http://www.whitehouse.gov/omb/bulletins/b03-04_attach.pdf).

_MMSAWT – the new MMSA-level weight. This is the weight to use when generating MMSA-level estimates (metropolitan or micropolitan statistical areas or metropolitan divisions) for questions that were asked of the whole sample.

_MMSWTSS – the new MMSA-level weight for the split-sample questions. This is the weight to use when generating MMSA-level estimates (metropolitan or micropolitan statistical areas or metropolitan divisions) for the split-sample questions. This variable is missing for respondents who do not live in the Chicago-Naperville-Joliet, IL metropolitan division.

Appendix B: List of the 98 MMSAs that have MMSA-level Weights in 2002 BRFSS Data
Metropolitan/Micropolitan Statistical Area or Metropolitan Division Codes and Names

10420	Akron, OH Metropolitan Statistical Area
10740	Albuquerque, NM Metropolitan Statistical Area
11260	Anchorage, AK Metropolitan Statistical Area
11700	Asheville, NC Metropolitan Statistical Area
12060	Atlanta-Sandy Springs-Marietta, GA Metropolitan Statistical Area
12580	Baltimore-Towson, MD Metropolitan Statistical Area
12940	Baton Rouge, LA Metropolitan Statistical Area
13644	Bethesda-Frederick-Gaithersburg, MD Metropolitan Division
13820	Birmingham-Hoover, AL Metropolitan Statistical Area
14260	Boise City-Nampa, ID Metropolitan Statistical Area
14484	Boston-Quincy, MA Metropolitan Division
14860	Bridgeport-Stamford-Norwalk, CT Metropolitan Statistical Area
15540	Burlington-South Burlington, VT Metropolitan Statistical Area
15764	Cambridge-Newton-Framingham, MA Metropolitan Division
16540	Chambersburg, PA Micropolitan Statistical Area
16620	Charleston, WV Metropolitan Statistical Area
16940	Cheyenne, WY Metropolitan Statistical Area
16974	Chicago-Naperville-Joliet, IL Metropolitan Division
17140	Cincinnati-Middletown, OH-KY-IN Metropolitan Statistical Area
17900	Columbia, SC Metropolitan Statistical Area
18180	Concord, NH Micropolitan Statistical Area
19124	Dallas-Plano-Irving, TX Metropolitan Division
19380	Dayton, OH Metropolitan Statistical Area
19740	Denver-Aurora, CO Metropolitan Statistical Area
19780	Des Moines, IA Metropolitan Statistical Area
19804	Detroit-Livonia-Dearborn, MI Metropolitan Division
20100	Dover, DE Metropolitan Statistical Area
20500	Durham, NC Metropolitan Statistical Area
20764	Edison, NJ Metropolitan Division
21604	Essex County, MA Metropolitan Division
22020	Fargo, ND-MN Metropolitan Statistical Area
22500	Florence, SC Metropolitan Statistical Area
24660	Greensboro-High Point, NC Metropolitan Statistical Area
25540	Hartford-West Hartford-East Hartford, CT Metropolitan Statistical Area
25900	Hilo, HI Micropolitan Statistical Area
26180	Honolulu, HI Metropolitan Statistical Area
26420	Houston-Baytown-Sugar Land, TX Metropolitan Statistical Area
26580	Huntington-Ashland, WV-KY-OH Metropolitan Statistical Area
26900	Indianapolis, IN Metropolitan Statistical Area
27140	Jackson, MS Metropolitan Statistical Area
27260	Jacksonville, FL Metropolitan Statistical Area
27980	Kahului-Wailuku, HI Micropolitan Statistical Area

28140	Kansas City, MO-KS Metropolitan Statistical Area
28180	Kapaa, HI Micropolitan Statistical Area
29540	Lancaster, PA Metropolitan Statistical Area
29820	Las Vegas-Paradise, NV Metropolitan Statistical Area
30100	Lebanon, NH-VT Micropolitan Statistical Area
30700	Lincoln, NE Metropolitan Statistical Area
30780	Little Rock-North Little Rock, AR Metropolitan Statistical Area
31084	Los Angeles-Long Beach-Glendale, CA Metropolitan Division
31140	Louisville, KY-IN Metropolitan Statistical Area
31700	Manchester-Nashua, NH Metropolitan Statistical Area
32820	Memphis, TN-MS-AR Metropolitan Statistical Area
33124	Miami-Miami Beach-Kendall, FL Metropolitan Division
33340	Milwaukee-Waukesha-West Allis, WI Metropolitan Statistical Area
33460	Minneapolis-St. Paul-Bloomington, MN-WI Metropolitan Statistical Area
34980	Nashville-Davidson--Murfreesboro, TN Metropolitan Statistical Area
35084	Newark-Union, NJ-PA Metropolitan Division
35300	New Haven-Milford, CT Metropolitan Statistical Area
35380	New Orleans-Metairie-Kenner, LA Metropolitan Statistical Area
35644	New York-Wayne-White Plains, NY-NJ Metropolitan Division
35980	Norwich-New London, CT Metropolitan Statistical Area
36260	Ogden-Clearfield, UT Metropolitan Statistical Area
36420	Oklahoma City, OK Metropolitan Statistical Area
36540	Omaha-Council Bluffs, NE-IA Metropolitan Statistical Area
36740	Orlando, FL Metropolitan Statistical Area
37964	Philadelphia, PA Metropolitan Division
38060	Phoenix-Mesa-Scottsdale, AZ Metropolitan Statistical Area
38300	Pittsburgh, PA Metropolitan Statistical Area
38860	Portland-South Portland, ME Metropolitan Statistical Area
38900	Portland-Vancouver-Beaverton, OR-WA Metropolitan Statistical Area
39300	Providence-New Bedford-Fall River, RI-MA Metropolitan Statistical Area
39660	Rapid City, SD Metropolitan Statistical Area
39900	Reno-Sparks, NV Metropolitan Statistical Area
40060	Richmond, VA Metropolitan Statistical Area
40484	Rockingham County-Strafford County, NH Metropolitan Division
41180	St. Louis, MO-IL Metropolitan Statistical Area
41620	Salt Lake City, UT Metropolitan Statistical Area
42580	Seaford, DE Micropolitan Statistical Area
42644	Seattle-Bellevue-Everett, WA Metropolitan Division
43620	Sioux Falls, SD Metropolitan Statistical Area
44140	Springfield, MA Metropolitan Statistical Area
44844	Suffolk County-Nassau County, NY Metropolitan Division
45104	Tacoma, WA Metropolitan Division
45300	Tampa-St. Petersburg-Clearwater, FL Metropolitan Statistical Area
45780	Toledo, OH Metropolitan Statistical Area
45820	Topeka, KS Metropolitan Statistical Area

46060	Tucson, AZ Metropolitan Statistical Area
46140	Tulsa, OK Metropolitan Statistical Area
47260	Virginia Beach-Norfolk-Newport News, VA-NC Metropolitan Statistical Area
47644	Warren-Farmington Hills-Troy, MI Metropolitan Division
47894	Washington-Arlington-Alexandria, DC-VA-MD-WV Metropolitan Division
48620	Wichita, KS Metropolitan Statistical Area
48740	Willimantic, CT Micropolitan Statistical Area
48864	Wilmington, DE-MD-NJ Metropolitan Division
49180	Winston-Salem, NC Metropolitan Statistical Area
49340	Worcester, MA Metropolitan Statistical Area
49660	Youngstown-Warren-Boardman, OH-PA Metropolitan Statistical Area

Appendix C: Weight Class Collapsing Rules

MMSA-level Weighting Methodology

On June 6, 2003, OMB issued new definitions for metropolitan statistical Areas, micropolitan statistical areas, and metropolitan divisions. See (http://www.whitehouse.gov/omb/bulletins/b03-04_attach.pdf). Respondents were assigned to an MMSA on the basis of their county codes. Missing county codes were imputed from a value included in the purchased telephone sample that represents the county most likely associated with the telephone number before the respondent identifies a county during data collection.

All respondents in cities were then assigned to age, race, and sex categories. If a respondent's age was missing, it was imputed by using the variable _IMPAGE available in the BRFSS public-use 2002 data file. If a respondent's race was missing, it was imputed by using the majority race for the MMSA in which the respondent lives. The six age categories were 18-24, 25-34, 35-44, 45-54, 55-64, and 65+. The two race categories were White, non-Hispanic, and Nonwhite or Hispanic.

Within each MMSA, respondents were assigned to weighting classes on the basis of the age, race, and sex categories described above. Some states do not use race in post-stratification. For the MMSA in states that do not use race, only the age and sex groups were used to set up weighting classes. For the MMSA in states that do use race, all three groups were used to set up weighting classes. For the MMSA that cross state lines, the post-stratification variables used by the state in which the majority of the MMSA's population lives were used to set up weighting classes. Thus, MMSA that use race had 24 initial weighting classes and MMSA that do not use race had 12 initial weighting classes.

Weighting classes with fewer than 19 sample members were collapsed in accordance with the following rules:

1. For those MMSA that used race in post-stratification, the race categories within a sex category collapse if at least 80% of the age categories in that race /sex cross-classification (*i.e.* 5 out of 6 the age categories) have fewer than 19 members. In MMSA that used race to create the initial weighting classes, the number of weighting classes was thus reduced from 24 to 12 if race was collapsed for both sexes and from 24 to 18 if race was collapsed for only one sex.

2. Collapse the two youngest age categories in any age/sex or age/sex/race weighing class if either contains fewer than 19 members. Do the same for the two middle and the two oldest age categories in each remaining weighting class.

3. Do not collapse weighting classes across sex.

4. Do not include an MMSA in the reweighting that still has weighting classes with fewer than 19 sample members after all collapsing rules have been applied.

There were 98 MMSA that had at least 500 respondents in the 2002 BRFSS and at least 19 sample members in all final weighting classes. See Appendix B in the Data Documentation for a list of these MMSA. Only the respondents in these MMSA were given a MMSA-level weight. To calculate the new MMSA-level weight, we applied a post-stratification adjustment factor to the design weight (_WT2) and created the adjustment factor by taking the ratio of the total population over the sum of the design weights for each weighting class within each MMSA. The new MMSA-level weight (_MMSAWT) should be used to generate estimates in these 98 MMSA.

Example SUDAAN Code:

For example, suppose we want an estimate for the Atlanta-Sandy Springs-Marietta, GA Metropolitan Statistical Area (MMSA code = 12060). Here's SAS/SUDAAN code that could be used to do this:

```
proc sort data=xxxx;
by _STSTR _PSU;
run;

proc descript data=xxxx filetype=sas design=wr;
nest _STSTR _PSU / missunit;
weight _MMSAWT;
subpopn _MMSA=12060 / name=" Atlanta-Sandy Springs-Marietta, GA";
var (your analysis variable);
catlevel (the level of your analysis variable for which you want an estimate);
run;
```

MMSA-Level Split-Sample Weighting Methodology

In 2002, Illinois used a split sample. This means they divided their sample in half to ask two different versions of their questionnaire. One version of their questionnaire was asked of half the sample and the second version was asked of the other half of the sample. The _MMSAWT is appropriate to use for analysis of the questions asked on both versions of their questionnaire. An additional weight was created to use with questions that were asked on only one version of their questionnaire. The MMSA-level split-sample weight (_MMSWTSS was created using the same methodology described above. The only difference was that respondents in the Illinois MMSA were separated according to what questionnaire version they received. Weighting classes were created for each questionnaire version within each MMSA. Adjustment factors were applied to the design weight (_WT2) that forced the sum of the weights for each half of the sample to sum to population totals. Chicago-Naperville-Joliet, IL metropolitan division was the only MMSA with adequate split-sample sizes to provide MMSA-level split-sample weight.

Example SUDAAN Code:

For example, suppose we want an estimate for a split-sample question for the Chicago-Naperville-Joliet, IL metropolitan division (MMSA code = 16974). Assume the question comes from questionnaire version 1 (_QSTVER). Here's SAS/SUDAAN code that could be used to do this:

```
Data xxxx;
Set yyyy;

If (_MMSA=16974 & _QSTVER=1) then DUMMY = 1;

Run;

proc sort data=xxxx;
by _STSTR _PSU;
run;

proc descript data=xxxx filetype=sas design=wr;
nest _STSTR _PSU / missunit;
weight _MMSWTSS;
subpopn DUMMY=1 / name=" Chicago-Naperville-Joliet, IL – questionnaire version 1";
var (your analysis variable);
catlevel (the level of your analysis variable for which you want an estimate);
run;
```

Note: In general, estimates for split-sample questions can only be generated for MMSA that do not cross state lines. For example, the St. Louis, MO-IL metropolitan statistical area lies in both Illinois and Missouri. These new MMSA-level weights can not be used to generate a prevalence estimate for a question that was asked of only half of the Illinois residents in their sample but was asked of all of the Missouri residents in their sample. For MMSA that cross state boundaries, estimates can only be generated for questions asked of the entire sample population in each state.