BRFSS Statistic Brief #A2
2012 BRFSS Cognitive Impairment
Module Questions

December 2013

Background and Rationale: This document was written to provide guidance for BRFSS coordinators who would like to conduct analyses of the data collected from the Cognitive Impairment Module that was included in their 2012 BRFSS survey as state added questions. Because there are unique aspects with the weighting and analysis that are associated with the module, the goal for this guidance is to enable consistency in analytic methods and among results reported. The CDC Healthy Aging Program will be providing selected analyses for older adults once all data are available each year. BRFSS coordinators can contact the Healthy Aging Program at info@cdc.gov for technical assistance or additional analyses.

About the Cognitive Impairment Module: Recognizing the importance of cognitive impairment as a public health issue, the CDC Healthy Aging Program in collaboration with national experts developed a ten question BRFSS module to address cognitive impairment and its associated effect or burden. More information about the module, including information about its development is available at the **Behavioral Risk Factor Surveillance System (BRFSS) Cognitive Impairment Module Frequently Asked Questions**. The cognitive impairment module was offered for the first time in 2009 after extensive cognitive testing. Five states collected data in 2009 and **reports** have been written and distributed on the basis of those results. Results for adults aged 60 years and older in the 21 states that included the **Cognitive Impairment Module** in 2011 were published in the *MMWR* article "**Self-Reported Increased Confusion or Memory Loss and Associated Functional Difficulties Among Adults Aged ≥60 Years—21 States, 2011**."

I. Key Measures from the Module
Questions on the module address "confusion or memory loss in the past 12 months that is happening more often or is getting worse." This measure is being referred to as "increased confusion or memory loss." As is true of all BRFSS questions, this is self-reported. "Functional difficulties associated with increased confusion or memory loss" is defined for adults with increased confusion or memory loss as reporting that it "Always," "Usually," or "Sometimes" (as opposed to "Rarely" or "Never") interfered with their ability to work, volunteer, or engage in social activities, or "Always," "Usually," or "Sometimes" caused them to give up household activities or chores that they used to do. This measure is obtained by combining data for two questions, which can also be reported separately. Additional measures for adults with increased confusion or memory loss address the need for assistance, the frequency that assistance or care is received from a family member or friend, if the increased confusion or memory loss was discussed with a health care professional, if any treatment was received, and what, if any, diagnosis was made.

II. Cell Phone Surveys
At the time the Cognitive Impairment Module was developed, cell phone interviews were just beginning to be included on the BRFSS and such interviews were conducted in core BRFSS questions only. By 2012, many states included the entire BRFSS survey, including state added questions, on cell phone surveys. However, cell phone respondents are usually considered to be the only adult in the "household," so cell phone respondents may not be asked about other adults in the household. Because the household weight excludes cell phone surveys, other adults will be excluded automatically as long as the correct household weight is used. We understand that some states have added a question on their surveys about the number of adults in the household, but the CDC BRFSS Program is not expecting to create a household weight in those cases. For 2012, analysis of Cognitive Impairment state added questions by the CDC Healthy Aging Program is expected to include cell phone surveys for states in which they are available.

IV. Weighting

Respondent: The Cognitive Impairment Module contains questions that pertain to the respondent, the household, and that solicit proxy responses about another member of the household with increased confusion or memory loss. In 2012, all cognitive impairment questions are state added and will only be available from the states.

Also, starting from 2011, the BRFSS weighting methodology was changed. For 2011 and later, the weights that are available for data that pertain only to the respondents are _llcpwt (includes cell phones), _landwt (land line only), or the respective weight(s) for the "split" surveys. The effect of changing the weighting methodology between 2009 and 2011 will be difficult to determine, given that only a few states used the module before the change.

Household: Results for the module questions 1 and 2 that pertain to the household (e.g., household contains one or more adults with increased confusion or memory loss) should be analyzed using the household weight _hholdwt, which is not provided for split surveys or for cell phone surveys.

Proxy respondent: Because the other adult in the household with increased confusion or memory loss for whom proxy responses for questions 3–10 are supplied was not randomly selected, no specific weight is available for these responses.
In response to feedback from BRFSS coordinators about the length of time to administer the survey and challenges with weighting, the Healthy Aging Program has made proposed changes to the module to delete the household and proxy responses. After cognitive testing, the Healthy Aging Program is planning to present an updated module to coordinators for consideration as an official optional module on the 2015 BRFSS.

V. Analysis Plan
A. Measures pertaining to the respondent.
Most measures should be reported as they relate to the randomly selected respondent, so **coding must limit the variable to respondents only**. All measures should be reported with unknowns (7, 9, 77, 99) removed and be determined using the respondent weight as noted above. Variable names noted in ( ) below are the recoded variables pertaining to the respondent used by the consultant analyzing the data for the CDC Healthy Aging Program. The other names are the CDC assigned variable names for each question. Recoded variable names are included if states would like a copy of the coded data files and are available in various file formats (SAS, Stata, SPSS).

Please note: Because questions were asked in 2012 as state-added questions, it cannot be assumed that the data have been cleaned. Before analyzing the data, please ensure the data are clean.

1. Q1. cimemlos (ci_respon) Respondent reports **increased confusion or memory loss**. Denominator is all respondents with non-missing data and includes cell phone surveys if available. This can be cross tabulated with other variables in the data set (e.g., demographics, disability, insurance status, risk factors, chronic disease status, falls) and can also be subset by age (i.e., adults aged 60 years or older or adults aged 45 years or older).

Stata code:
recode cimemlos (7 9=.), gen (ci_respon)

SAS code:
if cimemlos=1 then ci_respon=1;

if cimemlos=2 then ci_respon=2;
if cimemlos=7 then ci_respon=.;
if cimemlos=9 then ci_respon=.;

2. Q 4, 6, 7. (chores, work, get_care) Responses for Q4, Q6, and Q7 address how often increased confusion or memory loss causes the respondent to give up household chores (Q4:cihowoft), interferes with work, volunteering, etc. (Q6:ciintfer), or how often a family member or friend provided care or assistance (Q7:cifamcar). Data can initially be grouped into "always/usually," "sometimes," , and "rarely/never," and then dichotomized into "always/usually/sometimes" vs. "rarely/never." Other groupings also are possible and will vary with the data. Because the respondent may have provided proxy responses to these questions for another household member with increased confusion or memory loss, **coding must limit the measure to respondents and exclude any proxy responses**. Thus the denominator is respondents with increased confusion or memory loss.

Stata code:

```
gen chores =cihowoft if ci_respon==1
recode chores (2=1)(3=2)(4 5=3)(7 9=.)
gen work =ciintfer if ci_respon==1
 recode  work (2=1)(3=2)(4 5=3)(7 9=.)
 gen get_care =cifamcar if ci_respon==1
 recode  get_care (2=1)(3=2)(4 5=3)(7 9=.)
```

Note that getting care has been most often reported as "always" or "usually".

SAS code:

```
if cihowoft=1 and ci_respon=1 then chores=1;
if cihowoft=2 and ci_respon=1 then chores=1;
if cihowoft=3 and ci_respon=1 then chores=2;
if cihowoft=4 and ci_respon=1 then chores=3;
if cihowoft=5 and ci_respon=1 then chores=3;
if cihowoft=7 and ci_respon=1 then chores=.;
if cihowoft=9 and ci_respon=1 then chores=.;

if ciintfer=1 and ci_respon=1 then work=1;
if ciintfer=2 and ci_respon=1 then work=1;
if ciintfer=3 and ci_respon=1 then work=2;
if ciintfer=4 and ci_respon=1 then work=3;
if ciintfer=5 and ci_respon=1 then work=3;
if ciintfer=7 and ci_respon=1 then work=.;
if ciintfer=9 and ci_respon=1 then work=.;

if cifamcar=1 and ci_respon=1 then get_care=1;
if cifamcar=2 and ci_respon=1 then get_care=1;
if cifamcar=3 and ci_respon=1 then get_care=2;
if cifamcar=4 and ci_respon=1 then get_care=3;
if cifamcar=5 and ci_respon=1 then get_care=3;
if cifamcar=7 and ci_respon=1 then get_care=.;
if cifamcar=9 and ci_respon=1 then get_care=.;
```

3. **Functional difficulties** (impact). A measure of functional difficulties associated with increased confusion or memory loss (data limited to respondents reporting increased confusion or memory loss), is made from combining responses to Q4 (chores) and Q6 (work) and is defined as increased confusion or memory loss "Always," "Usually," or "Sometimes" (as opposed to "Rarely" or "Never") interfered with their ability to work, volunteer or engage in social activities, and/or "Always," "Usually," or "Sometimes" caused them to give up household activities or chores that they used to do. Data are included if either condition applies and unknowns are removed only if they are unknown for both measures or unknown for one and the other condition does not apply (i.e., is not always, usually, or sometimes). This measure can be cross tabulated with "get_care" and with later measures as indicated below. Versions of this measure using different cut-offs can also be created. Denominator is usually respondents with increased confusion or memory loss but can also be reported on a population basis, as for example, the "percentage of all adults aged 60 years and older who report functional difficulties due to increased confusion or memory loss."

Stata code:
```
gen impact=work
recode impact (1 2=1)(3=2)
replace impact=1 if chores==1 |chores==2
replace impact=. if cihowoft>5 & ci_respon==1 & impact==2
```

SAS code:
```
if work=3 then impact=2;
if chores=3 then impact=2;
if 1<=work<=2 then impact=1;
if 1<=chores<=2 then impact=1;
if work=. and chores=. then impact=.;
if work=3 and chores=. then impact=.;
if work=. and chores=3 then impact=.;
```

4. Q5. (q5res, need_help) Responses to Q5 (ciassist) can be tabulated for the respondent only, to indicate what areas they need the most assistance (if any) because of increased confusion or memory loss. The response categories are safety, transportation, household activities, personal care, other assistance, or no assistance. This measure seems to be most useful when dichotomized to those needing assistance in any area and those not needing assistance (need_help). This measure can also be cross tabulated with get_care, remembering that only care from a friend or family member is included.

Stata code:
```
gen q5res=ciassist if ci_respon==1
recode q5res (1/5=1)(6=2)(7  9=.), gen(need_help)
```

SAS code:
```
if ciassist=1 and ci_respon=1 then q5res=1;
if ciassist=2 and ci_respon=1 then q5res=2;
if ciassist=3 and ci_respon=1 then q5res=3;
if ciassist=4 and ci_respon=1 then q5res=4;
if ciassist=5 and ci_respon=1 then q5res=5;
if ciassist=6 and ci_respon=1 then q5res=6;
if ciassist=7 and ci_respon=1 then q5res=7;
```

if ciassist=9 and ci_respon=1 then q5res=9;

if (1<=ciassist<=5) and ci_respon=1 then need_help=1;
if ciassist=6 and ci_respon=1 then need_help=2;
if ciassist=7 and ci_respon=1 then need_help=.;
if ciassist=9 and ci_respon=1 then need_help=.;

5. Q8. (talk_MD) Responses to Q8 (cihcprof) address whether or not the respondent (only) has discussed their confusion or memory loss with a health care professional. This can be cross tabulated with the measure of functional difficulties or its component measures, or both, and with get_care and need_help. Denominator is respondents with increased confusion or memory loss.

Stata code:
gen talk_MD =cihcprof if ci_respon==1
 recode talk_MD (7 9=.)

SAS code:
if cihcprof=1 and ci_respon=1 then talk_MD=1;
if cihcprof=2 and ci_respon=1 then talk_MD=2;
if cihcprof=7 and ci_respon=1 then talk_MD=.;
if cihcprof=9 and ci_respon=1 then talk_MD=.;

6. Q9. (tmnt and tmnt1) Respondents who have received treatment such as therapy or medications for their confusion or memory loss are addressed in Q9 (cifmeds, limited to respondents only). The denominator for the first measure (tmnt) is respondents with increased confusion or memory loss who have seen a health care professional and the denominator for the second (tmnt1) is for all respondents with increased confusion or memory loss. This measure (depending on its n) can be cross tabulated with other measures on the BRFSS and with measures such as need_help, and get_care.

Stata code:
gen tmnt =cifmeds if ci_respon==1
 recode tmnt (7 9=.)
gen tmnt1=tmnt
 replace tmnt1=2 if talk_MD==2

SAS code:
if cimeds=1 and ci_respon=1 then tmnt=1;
if cimeds=2 and ci_respon=1 then tmnt=2;
if cimeds=7 and ci_respon=1 then tmnt=.;
if cimeds=9 and ci_respon=1 then tmnt=.;

if tmnt=1 then tmnt1=1;
if tmnt=2 then tmnt1=2;
if talk_MD=2 then tmnt1=2;

7. Q10. (ci_dx or ci_dx_all or dem_dx_all) It is expected that the responses for Q10 (cidiagaz) will include such small numbers of people diagnosed with Alzheimer's disease or other dementia in each state that

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only a simple weighted frequency will be done. The denominator can be respondents with increased confusion or memory loss who have seen a health care professional or can be reported in terms of all adults. Alzheimer's and other dementia can be combined for a possibly more useful measure for states.
Stata code:
gen ci_dx =cidiagaz if ci_respon==1
 recode ci_dx (7 9=.)
gen ci_dx_all=ci_dx
 replace ci_dx_all=3 if talk_MD==2
recode ci_dx_all (2=1), gen(dem_dx_all)

SAS code:
if cidiagaz=1 and ci_respon=1 then ci_dx=1;
if cidiagaz=2 and ci_respon=1 then ci_dx=2;
if cidiagaz=3 and ci_respon=1 then ci_dx=3;
if cidiagaz=7 and ci_respon=1 then ci_dx=.;
if cidiagaz=9 and ci_respon=1 then ci_dx=.;

if ci_dx=1 then ci_dx_all=1;
if ci_dx=2 then ci_dx_all=2;
if ci_dx=3 then ci_dx_all=3;
if talk_MD=2 then ci_dx_all=3;

if cidiagaz=1 and ci_respon=1 then dem_dx_all=1;
if cidiagaz=2 and ci_respon=1 then dem_dx_all=1;
if cidiagaz=3 and ci_respon=1 then dem_dx_all=2;
if cidiagaz=7 and ci_respon=1 then dem_dx_all=.;
if cidiagaz=9 and ci_respon=1 then dem_dx_all=.;
if talk_MD=2 then dem_dx_all=2;

B. Measures pertaining to the household.
Results for Q1 and Q2 can be combined to report increased confusion or memory loss in terms of the household for data sets that include _hholdwt. For example, the percentage of households in which any adults report increased confusion or memory loss or the percentage of households in which all adults have increased confusion or memory loss can be reported. Because cell phone respondents are considered to be one-adult households, cell phone data must be excluded, as noted previously under Weighting issues, and use of _hholdwt will take care of this. Again, the first variable name noted in ( ) is the name of the recoded variable used by the consultant and the other names are the CDC assigned variable names for each question. Because there are few variables on the BRFSS set that pertain to the household (region, income, number of adults, number of children, etc.) it is unlikely that many cross tabulations would be done for these measures.

1. Q2.The number of other adults in the household with increased confusion or memory loss (ci_other) is obtained in Q2 (cinoadult) and should be cross checked with the number of adults determined during the random selection process to make sure this number does not exceed the number of **adults reported minus 1**. If it does, the record should be dropped from the analysis of this measure, because it indicates a mismatch. Also, a response of "8" is recoded to "0" and households with only one adult (who were not asked this question) need to be assigned a value of 0.Then this value for Q2 is combined with the result for Q1 to determine the total number of adults in the household with increased confusion or memory

loss by adding one to the number of adults reported in Q2 if the respondent reported increased confusion or memory loss. The resulting value can be dichotomized for any or no adults with increased confusion or memory loss in the household. Denominator is all households, with missing values removed if missing for either Q1 or Q2 (taking into account those not asked in one adult households).

Stata code:
```
recode cinoadlt (8=0)(7 9=.), gen (ci_other)
gen ci_o_new=ci_other
gen adultck=numadult-1
replace ci_o_new=. if ci_other>adultck  *** dropped if too many adults reported ICML
replace ci_o_new =0 if numadult==1 & dummy==1  assigned value of zero for one adult household,
where dummy represents records with valid responses to Q1.
*** next this is combined with results for Q1
gen ci_h_new=0 if dummy==1
replace ci_h_new=ci_h_new + 1 if ci_respon==1
replace ci_h_new=ci_h_new+ ci_o_new
replace ci_h_new=. if ci_respon==.|ci_o_new==.
*** use above to get any adults in HH
recode ci_h_new (1/max=1)(0=0), gen(any_h_new)
```

SAS code:
```
if 1<=cinoadlt<=6 then ci_other=cinoadlt;
if cinoadlt=8 then ci_other=0;
if cinoadlt=7 then ci_other=.;
if cinoadlt=9 then ci_other=.;

adultck=(numadult-1);

if 1<=cimemlos<=9 then dummy=1;

if 0<=ci_other<=6 then ci_o_new=ci_other;
if ci_other>adultck  then ci_o_new=.;
if numadult=1 and dummy=1 then ci_o_new=0;

if dummy=1 then do;
  if cimemlos=1 then ci_h_new=ci_o_new+1;
  if cimemlos=2 then ci_h_new=ci_o_new;
 if ci_o_new=. then ci_h_new=.;
end;

if 1<=ci_h_new<=99 then any_h_new=1;
if ci_h_new=0 then any_h_new=0;
```

2. All adults in the household report increased confusion or memory loss. The total number of adults in the household (numadult) can be compared with the total number of adults in the household with increased confusion or memory loss to create a measure indicating all (or not all) adults in the household have increased confusion or memory loss. Denominator is all households, as above.
Stata code:

```
gen all_h_new=0
replace all_h_new=1 if ci_h_new==numadult
replace all_h_new=2 if ci_h_new<numadult
replace all_h_new=. if any_h_new==.
```

SAS code:
```
if ci_h_new=numadult then all_h_new=1;
if ci_h_new<numadult then all_h_new=2;
if any_h_new=. then all_h_new=.;
```