



AGENCY FOR HEALTHCARE RESEARCH AND QUALITY



Analyzing MEPS-HC Data with SAS® 9.4M6

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SAS® Programming Basics and Complex Survey Data Analysis



- SAS programs typically include any combination of the following:
 - ▶ DATA Step
 - ▶ PROC Step
 - ▶ Global Statements (e.g., [LIBNAME](#), [OPTIONS](#), and [TITLE/FOOTNOTE](#))
 - ▶ [Macro Variables, Macros](#), and [Macro Functions](#)
- [Base Procedures in SAS](#) (Examples)
 - ▶ PROC FREQ, PROC MEANS, PROC SUMMARY, PROC SORT, PROC DATASETS, PROC FORMAT, PROC PRINT, and PROC PRINTTO
- Complex Survey Procedures in SAS (Examples)
 - ▶ [PROC SURVEYMEANS](#)
 - ▶ [PROC SURVEYFREQ](#)
- Output Delivery Systems ([ODS](#))
 - ▶ [Controlling PROC output with ODS select/exclude](#)
 - ▶ Saving results to a SAS data set
- Interface: SAS Windowing Environment, [JupyterLab](#)
- Resources for MEPS/SAS programs, code explanations, and references
 - ▶ (Primary): <https://github.com/HHS-AHRQ/MEPS>
 - ▶ (Supplementary): <https://github.com/pkmedu/AnalyzeMEPS>

MEPS-HC SAS Transport Files on the Web




- SAS Transport (MEPS) Files

- ▶ best overall format
- ▶ machine-independent (data files can be moved between computers running different operating systems).
- ▶ can be directly imported into SAS, SPSS, BMDP, and STATA, etc.

How to create a transport file for one or more data sets


Working with MEPS-HC SAS Transport Files from the Web




- Objectives  [Download_Data_from_MEPS_Site_rev.sas](#)
 - ▶ Run SAS macro to automate the
 - downloading of any number of SAS Transport files from the MEPS website
 - unzipping the files
 - converting them into SAS data sets
- Macro that wraps the following:
 - ▶ [PROC HTTP for Data Downloads](#)
 - ▶ [How to Unzip/Read Data Files in SAS](#)
 - ▶ [CALL SYMPUTX Routine](#)
 - ▶ [PROC COPY - XPORT Engine](#)

[Here is a non-macro SAS program that handles one file at a time \(AnalyzeMEPS Repo on GitHub\).](#)


Exercise 1

- Objective  Exercise1.sas
 - ▶ Generate the following estimates
 - mean health care expenses per person
 - mean health expenses per person with an expense (overall, and by age group)
- Data and Analysis
 - ▶ [Use the 2017 MEPS Full-Year Consolidated File](#)
 - ▶ [Create a subpopulation variable for DOMAIN analysis](#)
 - ▶ Run PROC FREQ for data checks
 - ▶ Run PROC SURVEYMEANS for complex survey estimates


Exercise 2

- Objective  Exercise2.sas
 - ▶ Estimate the following parameters
 - Annual mean number of purchases of opioids (i.e., Narcotic analgesics or Narcotic analgesic combos) per person with one or more purchases of opioids
 - Annual mean total, out-of-pocket, and third-party payer expenses for purchases of opioids per person with one or more purchases of opioids
- Data and Analysis
 - ▶ [Aggregate 2017 MEPS prescribed medicines data at the person-level](#)
 - ▶ Merge aggregated prescribed medicine data with full-year person-level data for the same year
 - ▶ [Create a subpopulation variable for DOMAIN analysis](#)
 - ▶ Run PROC FREQ for data checks
 - ▶ Run PROC SURVEYMEANS for complex survey estimates

Exercise 3

- Objective  Exercise3.sas
 - ▶ Estimate annual mean out-of-pocket health care expenses for individuals who were aged 26-30 years with high income and uninsured for the whole year (averaged over two years)
- Data and Analysis
 - ▶ Combine data from 2016 and 2017 MEPS Full-Year Consolidated Files
 - ▶ Create a subpopulation variable for DOMAIN analysis
 - ▶ Create a new variable (i.e., pooled sample weight) for pooled data set (2016 and 2017 combined)
 - ▶ Run PROC FREQ and PROC MEANS for data checks
 - ▶ Run PROC SURVEYMEANS for complex survey estimates

Exercise 4

- Objective  Exercise4.sas
 - ▶ Estimate the percentage distribution of insurance status (in the second year) of individuals who were aged 26-30 with high income and uninsured for the whole (first) year (averaged over three panels)
- Data and Analysis
 - ▶ [Combine data from MEPS Longitudinal Files \(Panels 19, 20, and 21\)](#)
 - ▶ [Create a subpopulation variable for DOMAIN analysis](#)
 - ▶ Create a new variable (i.e., pooled sample weight) for pooled data set (3 panels combined)
 - ▶ Run PROC FREQ and PROC MEANS for data checks
 - ▶ Run PROC SURVEYMEANS for complex survey estimates

PROC SURVEYFREQ vs. PROC SURVEYMEANS



- PROC SURVEYFREQ and PROC SURVEYMEANS with a CLASS statement produce identical results (percentage vs. proportion).
- PROC SURVEYFREQ treats the variable in the TABLES statement as categorical and estimate the percentage in each category or level.
- The CLASS statement in PROC SURVEYMEANS treats the variable in the VAR statement as categorical and estimate the proportion in each category or level.

[See the SAS program and output here \(AnalyzeMEPS Repo on GitHub\)](#)

PROC SURVEYMEANS vs. PROC MEANS



- PROC SURVEYMEANS and PROC MEANS with a WEIGHT statement produce the same results for the mean, not the confidence interval of the mean.

[See the SAS program and output here \(AnalyzeMEPS Repo on GitHub\)](#)

PROC SURVEYMEANS Output Objects



- Use ODS TRACE statements that produces the record containing at least the following items for PROC SURVEYMEANS
 - ▶ Name
 - ▶ Label
 - ▶ Template
 - ▶ Path

[Controlling PROC output with ODS select/exclude](#)

[See the SAS program and SAS Log here \(AnalyzeMEPS Repo on GitHub\)](#)

ODS SELECT/EXCLUDE

- SAS Procedures like PROC SURVEYMEANS produces lot of output
 - ▶ Summary
 - ▶ Statistics
 - ▶ Quantiles
 - ▶ Domain
 - ▶ DomainQuantiles
- ODS SELECT or EXCLUDE statement tells SAS
 - ▶ What output to print
 - ▶ What output not to print

[See the SAS program and output here \(AnalyzeMEPS Repo on GitHub\)](#)

SAVING PROC SURVEYMEANS Output



- Estimate descriptive statistics including Q1, Median, and Q3
- Save specific output tables to separate SAS data sets for the
 - ▶ overall population
 - ▶ DOMAIN of interest
 - ▶ multiple table names and data sets names allowed in the following statement

ODS OUTPUT <table-name>= <data-set-name>;

[See the SAS program and output here \(AnalyzeMEPS Repo on GitHub\)](#)

Comparing Domain Means with PROC SURVEYMEANS



- Pairwise comparisons of the estimate among domain levels
- Bonferroni multiple comparison adjustment for the p-values for testing differences in the analysis variable among domain levels

[See the SAS program and output here
\(AnalyzeMEPS Repo on GitHub\)](#)

Sample SAS Macro – Generate Estimates from 2009 to 2019



```
%macro runit (byvar, fmt, first=, last=);  
%do yr=&first %to &last;  
title "MEPS, 20%sysfunc(putn(&yr,z2.))";  
ods graphics off;  
ods exclude statistics;  
    proc surveymeans data=new.summary_person_%sysfunc(putn(&yr,z2.));  
    stratum varstr;  
    cluster varpsu;  
    weight perwtf;  
    var hd;  
    domain age_18p('1') ;  
        format &byvar &fmt;  
        ods output domain=domainl_%sysfunc(putn(&yr,z2.));  
    run;  
%end ;  
%mend runit;  
%runit(age_grp, ageF., first=09, last=15)
```

Questions



Any Questions?
Thanks!!!