# **/\* The SAS program (HEI-2010 Individual scores per day using NHANES 2003-2004 data (and MPED))**

# **PerDay.SAS \*/**

**/\*INSTRUCTIONS – complete tasks 1-4 in this section, and run these SAS codes before proceeding to the HEI-2010 scoring program that follows\*/**

/\*1. Create a folder on your computer “home folder”, and save the FPED data, NHANES data, Demographic data, and the required HEI-2010 macros in it. Specify the path to the folder. \*/

%let home = C:\Users\Documents\MPED\_NHANES; /\*In this Example, the “home” folder is in C Drive, within Documents, and is called MPED\_NHANES \*/

/\*2. Libnames here specify the input files. \*/

libname NH “&home\NH”;

libname MPED “&home\MPED”; /\*In this Example, the MPED data are in a folder called “MPED”, and the NHANES and Demographic data are in a folder called “NH, all saved within the “home” folder. These are SAS datasets. \*/

/\*3. Create a folder in the "home" folder, where the output file, containing HEI-2010 component and total scores for each respondent, for the intake day, are to be exported. Specify the name of the folder. \*/

filename RES “&home\RES”; /\*In this Example, the folder is called “RES”, within the “home” folder, and the exported results will be a csv file called “hei2010r”. \*/

/\*4. Read in required HEI-2010 scoring macros. These macros must be saved within the home folder. \*/

%include “&home\hei2010.beanspeas.allocation.macro.sas”;

%include “&home\hei2010.score.macro.sas”;

/\*NOTE: Once you have completed all the steps above, all you need to do is run the SAS program below. Unless you used different names for your datasets and folders, no other action is required from you. \*/

title 'HEI-2010 scores for NHANES 2003-2004 day 1, AGE >= 2, RELIABLE DIETS, Include Pregnant and Lactating Women';

/\*Step 1: locate the required datasets and variables and make necessary edits to the datasets\*/

\*part a: get MPED per 100 grams of food and perform edits and corrections;

**data** MPED;

set MPED.EQUIV0304;

/\*rename variables; \*/

FOODCODE=**1**\*DRDIFDCD;

MODCODE=**1**\*DRDIMC;

/\* Move soy beverages out of soybean products into dairy; \*/

/\*In the HEI-2010, soy beverages are counted as part of the Milk component. Convert the four soy beverage codes in the MPED from M\_SOY oz equivalents to D\_TOTAL cup equivalents using the following conversion process\*/

/\*FOODCODE=11310000, MILK, IMITATION, FLUID, SOY BASED (1 cup=244 grams)

FOODCODE=11320000, MILK, SOY, READY-TO-DRINK, NOT BABY (1 cup=245 grams)

FOODCODE=11321000, MILK, SOY, READY-TO-DRINK, NOT BABY'S, CHOCOLATE (1 cup=240 grams)

FOODCODE=11330000, MILK, SOY, DRY, RECONSTITUTED, NOT BABY (1 cup=245 grams)\*/

if FOODCODE=**11310000** then do;

M\_SOY=**0**;

D\_TOTAL=round(**100**\*(**1**/**244**),**.001**);

end;

else if FOODCODE=**11320000** then do;

M\_SOY=**0**;

D\_TOTAL=round (**100**\*(**1**/**245**),**.001**);

end;

else if FOODCODE=**11321000** then do;

M\_SOY=**0**;

D\_TOTAL=round (**100**\*(**1**/**240**),**.001**);

end;

else if FOODCODE=**11330000** then do;

M\_SOY=**0**;

D\_TOTAL=round (**100**\*(**1**/**245**),**.001**);

end;

/\*Replace some food codes with values to correct for previously identified errors in the database; \*/

**\*pizza (n=3) values from FPED 11/12 data;**

if FOODCODE **= 58106210** then do;

G\_TOTAL=1.88;

G\_WHL=0;

G\_NWHL=1.88;

V\_TOTAL=0.12;

V\_TOMATO=0.12;

D\_TOTAL=0.70;

D\_CHEESE=0.70;

DISCFAT\_OIL=0.44;

DISCFAT\_SOL=8.00;

ADD\_SUG=0.19;

end;

else if FOODCODE **= 58106220** then do;

G\_TOTAL=1.75;

G\_WHL=0;

G\_NWHL=1.75;

V\_TOTAL=0.12;

V\_TOMATO=0.12;

D\_TOTAL=0.66;

D\_CHEESE=0.66;

DISCFAT\_OIL=0.44;

DISCFAT\_SOL=10.62;

ADD\_SUG=0.19;

end;

else if FOODCODE **= 58106230** then do;

G\_TOTAL=1.88;

G\_WHL=0;

G\_NWHL=1.88;

V\_TOTAL=0.12;

V\_TOMATO=0.12;

D\_TOTAL=0.66;

D\_CHEESE=0.66;

DISCFAT\_OIL=0.44;

DISCFAT\_SOL=8.82;

ADD\_SUG=0.19;

end;

**run**;

\*part b: get juice data per 100 grams of food;

**data** CNPPMPED\_WJFRT;

set MPED.cnppmyp\_v1nhanes0304\_wjfrt;

**run**;

\*part c: get individual food intake data for people with reliable dietary recall status;

**data** FOOD;

set NH.DR1IFF\_C;

FOODCODE=**1**\*DR1IFDCD; /\*convert variable name and type\*/

MODCODE=**1**\*DR1MC;

if DR1DRSTZ=**1**; /\*reliable dietary recall status\*/

**run**;

\*part d: get individual total food intake for people with reliable recall status;

**data** NUTRIENT (keep=SEQN WTDRD1 DR1TKCAL DR1TSFAT DR1TALCO DR1TSODI DR1DRSTZ DR1TMFAT DR1TPFAT);

set NH.DR1TOT\_C;

if DR1DRSTZ=**1**; /\*reliable dietary recall status\*/

**run**;

\*part e: get demographic data for persons aged two and older;

**data** DEMO (keep=SEQN RIDAGEYR RIAGENDR SDDSRVYR SDMVPSU SDMVSTRA);

set NH.DEMO\_C;

if RIDAGEYR >= **2**;

**run**;

/\*Step 2: combine the required datasets\*/

\*part a: combine MPED and WHOLE FRUIT data on a food level;

**proc sort data**=MPED;

by FOODCODE MODCODE;

**run**;

**proc sort data**=CNPPMPED\_WJFRT;

by FOODCODE MODCODE;

**run**;

**data** NEWMPED;

merge MPED CNPPMPED\_WJFRT;

by FOODCODE MODCODE;

**run**;

\*part b: combine food intake and MPED plus WHOLE FRUIT data on a food level;

**proc sort data**=FOOD;

by FOODCODE MODCODE;

**run**;

**data** FDPYR;

merge FOOD (in=S) NEWMPED (in=N);

by FOODCODE MODCODE;

if S and N;

**run**;

\*part c: convert individuals' food intake amounts from grams to

MyPyramid equivalents;

**data** FDPYR;

set FDPYR;

array PYRVAR G\_TOTAL--A\_BEV WHOLEFRT FRTJUICE;

do over PYRVAR;

PYRVAR=PYRVAR\*(DR1IGRMS/**100**);

end;

**run**;

\*part d: calculate individual food intake amounts for MyPyramid food groups for one day;

**proc sort data**=FDPYR;

by SEQN;

**run**;

**proc** **means** data=FDPYR noprint;

by SEQN;

var G\_TOTAL--A\_BEV WHOLEFRT FRTJUICE;

output out=PYRCALC sum= ;

**run**;

\*part e: combine nutrient and demographic data on a person level;

**proc sort data**=NUTRIENT;

by SEQN;

**run**;

**proc sort data**=DEMO;

by SEQN;

**run**;

**data** COHORT;

merge NUTRIENT (in=N) DEMO (in=D);

by SEQN;

if N and D;

**run**;

\*part f: combine all data on a person level;

**data** BOTH;

merge COHORT (in=C) PYRCALC(in=P);

by SEQN;

if C;

**run**;

/\*Please note: MyPyramid equivalent values for total vegetable intake (V\_TOTAL) in the HEI-2010may be different from V\_TOTAL in the MPED because legumes may be counted as vegetables or meat in the HEI-2010; and total dairy intake (D\_TOTAL) in the HEI-2010 may be different from D\_TOTAL in the MPED because soy beverages are counted as milk in the HEI-2010.\*/

\*part g: set pryvar to zero for people with zero cal who do not appear in iff data;

**data** BOTH;

set BOTH;

by SEQN;

array PYRVAR G\_TOTAL--A\_BEV WHOLEFRT FRTJUICE;

do over PYRVAR;

if PYRVAR < **0** then PYRVAR =**0**;

end;

**run**;

/\*Step 3: Creates additional required variables: MONOPOLY, ALLMEAT, SEAPLANT, ADDSUGC, SOLFATC, EXALCCAL, and EMPTYCAL10. \*/

**data** BOTH;

set BOTH;

by SEQN;

MONOPOLY=DR1TMFAT+DR1TPFAT;

ALLMEAT=M\_MPF+M\_EGG+M\_NUTSD+M\_SOY;

SEAPLANT=M\_FISH\_HI+M\_FISH\_LO+M\_SOY+M\_NUTSD;

/\*\*Calculate intake of Empty Calories\*\*/

ADDSUGC=**16**\*ADD\_SUG; /\*calories from added sugars\*/

SOLFATC=DISCFAT\_SOL\***9**; /\*calories from solid fat\*/

MAXALCGR=**13**\*(DR1TKCAL/**1000**); /\*max grams of alcohol based on kcal intake\*/

if DR1TALCO <= MAXALCGR then EXALCCAL=**0**; /\*consumed less than max\*/

else if DR1TALCO > MAXALCGR then EXALCCAL=**7**\*( DR1TALCO - MAXALCGR); /\*get cal from extra alc grams\*/

EMPTYCAL10=ADDSUGC+SOLFATC+EXALCCAL; /\*total empty calories in hei2010 definition\*/

**run**;

/\*Step 4: Run the macro to properly allocate the intakes of the MPED variable Legumes (LEGUMES) to either Total Protein Foods and Seafood and Plant Proteins (ALLMEAT and SEAPLANT) or Total Vegetables and Greens and Beans (V\_TOTAL and V\_DRKGR). The four resulting variables from this step, named LEGUME\_ADDED\_V\_TOTAL, LEGUME\_ADDED\_BEANGRN, LEGUME\_ADDED\_ALLMEAT, and LEGUME\_ADDED\_SEAPLANT are all used in the HEI scoring macro in Step 5\*/

%***LEG2010A*** (indat=BOTH,

kcal= DR1TKCAL,

allmeat=ALLMEAT,

seaplant=SEAPLANT,

v\_total=V\_TOTAL,

v\_drkgr=V\_DRKGR,

legumes=LEGUMES,

outdat=AFTERLEG);

/\*Step 5: Apply the HEI-2010 scoring macro. \*/

%***HEI2010*** (indat= AFTERLEG,

kcal= DR1TKCAL,

lv\_total=LEGUME\_ADDED\_V\_TOTAL,

lbeangrn=LEGUME\_ADDED\_BEANGRN,

f\_total=F\_TOTAL,

wholefrt=WHOLEFRT,

g\_whl=G\_WHL,

d\_total=D\_TOTAL,

lallmeat=LEGUME\_ADDED\_ALLMEAT,

lseaplant=LEGUME\_ADDED\_SEAPLANT,

monopoly=MONOPOLY,

sfat=DR1TSFAT,

sodi=DR1TSODI,

g\_nwhl=G\_NWHL,

Emptycal10=EMPTYCAL10,

outdat=HEI2010);

/\*Step 6: Displays and saves the results. \*/

\*part a: this program saves one HEI-2010 score for each individual, based on one 24HR;

**data** HEI2010R (keep=SEQN DR1TKCAL HEIX1\_TOTALVEG HEIX2\_GREEN\_AND\_BEAN HEIX3\_TOTALFRUIT

HEIX4\_WHOLEFRUIT HEIX5\_WHOLEGRAIN HEIX6\_TOTALDAIRY HEIX7\_TOTPROT HEIX8\_SEAPLANT\_PROT

HEIX9\_FATTYACID HEIX10\_SODIUM HEIX11\_REFINEDGRAIN HEIX12\_SOFAAS

HEI2010\_TOTAL\_SCORE);

set HEI2010;

**run**;

\*part b: calculates an unweighted mean across all individuals in group;

**proc** **means** n nmiss min max mean data=HEI2010R;

**run**;

\*part c: saves results as CSV file;

**proc** **export** data=HEI2010R

file=RES

dbms=csv

replace;

**run**;