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*****;
* Project          : ZRHM-REXA-07-JP
*
* Program name     : F15010202_□ZRHM_REXA_07_V1.sas
*
* Author           : L. Yan
*
* Date created     : 05/20/2015
*
* Purpose          : F15010202
*
* Revision History :
*
* Date            Author      Ref      Revision (Date in YYYYMMDD format)
*
*****;

options sasautos=("W:\pmp07\macros" sasautos) notes;
%init(delivery=9);

%let prgname=F15010202_ZRHM_REXA_07_JP_V1;

%titlecsv(prgname=&prgname., version=5);

%put &title1;
%put &title2;
%put &APPENDIX;
%put &endpoint;
%put &outname.;

options missing="";

%macro cal_sumary_pvalue(wher=, outnum=, method=, used=, var=, in=, pflg=, paramcd=, avisit=);

title2 h=10pt j=1 "&used";

proc sort data=&in. out=anadt_&outnum.;
by usubjid;
where &wher. ;
run;

proc sort data=anadt_&outnum.;
by trtcd;
run;

%if &method = 1 %then %do;
title3 h=10pt j=1 "Paramcd: &paramcd, &avisit. Model: GLM, Method: Log";
proc means data = anadt_&outnum. noprint;
by trtcd;
var &var.;
output out=xlab_&outnum. n=n mean=mean median=med std=sd min=min max=max q1=q1 q3=q3 lclm=lclm uclm=uclm;
run;
%end;

%if &method = 2 %then %do;
title3 h=10pt j=1 "Paramcd: &paramcd, &avisit. Model: GLM, Method: Normal";

proc means data = anadt_&outnum. noprint;
by trtcd;
var aval;
output out=xlab_&outnum. n=n mean=mean median=med std=sd min=min max=max q1=q1 q3=q3 lclm=lclm uclm=uclm;
run;
%end;

data xlab_&outnum.;
set xlab_&outnum.;
n1 = trim(left(compress(put(n, 8.))));
if sd > . then mean1 = (trim(left(compress(put(mean, 8.1))))||' ( '||trim(left(compress(put(ceil(sd*100)/100, 8.2))))||')');
else mean1 = (trim(left(compress(put(mean, 8.1))))||' (NA)');
ci1=trim(left(compress(put(floor(lclm*100)/100, 8.2))))||' , '||trim(left(compress(put(ceil(uclm*100)/100, 8.2)))));
median1 = trim(left(compress(put(med, 8.1))));
q1q3 = trim(left(compress(put(q1, 8.2))))||' , '||trim(left(compress(put(q3, 8.2))));
min1 = trim(left(compress(put(min, 8.))))||' , '||trim(left(compress(put(max, 8.0))));
run;

/*
proc mixed data=anadt_&outnum.;

Class trtcd sex UCPDGR1;

Model logaval = logbase sex UCPDGR1 trtcd / outp=pred;

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lsmeans trtcd / pdiff =control('mCC') alpha=0.05 cl;

ods output lsmeans=lsmeans_&outnum. (keep=trtcd lower upper estimate); *each arm;

ods output diffs=LSMeanDiffCL&outnum. (keep=trtcd lower upper probt estimate); * lsmean and C.I. for ratios;

ods output covparms=ROOTMSE&outnum.(rename=(estimate=mse)); *MSE;

run;
*/

proc glm data=anadt_&outnum.;
class trtp sex UCPDGR1;
%if &method = 1 %then %do;
model logaval = logbase sex UCPDGR1 trtp;
%end;
%if &method = 2 %then %do;
model aval = base sex UCPDGR1 trtp;
%end;
lsmeans trtp / pdiff =control('mCC') alpha=0.05 cl adjust=t;
lsmeans trtp / pdiff =control('SA') alpha=0.05 cl adjust=t;
ods output LSMeans=pval&outnum. (keep=ProbtDiff trtp where=(TRTP in ("THSm2.2"))); *p-value;
ods output LSMeanCL=lsmeans_&outnum. (keep=trtp lowercl uppercl lsmean); *lsmean, C.I. for each arm;
ods output LSMeanDiffCL=LSMeanDiffCL&outnum. (keep=trtp _trtp lowercl uppercl difference where=(TRTP in ("THSm2.2"))); *
lsmean and C.I. for ratios;
ods output FitStatistics=ROOTMSE&outnum. (keep=rootmse); *RootMSE;
run;quit;

ods output close;

data lsmeans_&outnum.;
set lsmeans_&outnum.;
if TRTP="THSm2.2" then trtcd=1;
else if TRTP="mCC" then trtcd=2;
else if TRTP="SA" then trtcd=3;

%if &method = 1 %then %do;
Estimate1 = exp(lsmean); /* Ratio of geometric mean */
LowerCL = exp(lowercl); /* 95% CI lower bound */
UpperCL = exp(uppercl); /* 95% CI upper bound */
%end;
%if &method = 2 %then %do;
Estimate1 = lsmean; /* Ratio of geometric mean */
LowerCL = lowercl; /* 95% CI lower bound */
UpperCL = uppercl; /* 95% CI upper bound */
%end;
run;

data ROOTMSE&outnum.;
set ROOTMSE&outnum.;
CVperc=100*sqrt(exp(rootmse**2)-1);
run;

proc sort data=lsmeans_&outnum. nodupkey;
by trtcd;
run;

data lsmeans_&outnum.;
length geomean geoci $100;
set lsmeans_&outnum.;
geomean=strip(put(ESTIMATE1, 8.2));
geoci=strip(put(floor(LowerCL*100)/100, 8.2)||", "||strip(put(ceil(UpperCL*100)/100, 8.2)));
keep trtcd geomean geoci;
run;

proc sort data=LSMeanDiffCL&outnum. nodup;
by TRTP _TRTP;
run;

data LSMeanDiffCL&outnum.;
set LSMeanDiffCL&outnum.;
myord=1;
run;

data ROOTMSE&outnum.;
set ROOTMSE&outnum.;
myord=1;
run;

data LSMeanDiffCL&outnum.;
merge LSMeanDiffCL&outnum. ROOTMSE&outnum.;
by myord;
run;

data LSMeanDiffCL&outnum.;
length geomean geoci $100;
set LSMeanDiffCL&outnum.;

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if _TRTP eq "mCC" then trtcd=4;
if _TRTP eq "SA" then trtcd=5;
%if &method = 1 %then %do;

    difference = 100*exp(difference); /* Ratio of geometric mean */
    lowercl = 100*exp(lowercl); /* 95% CI lower bound */
    uppercl = 100*exp(uppercl); /* 95% CI upper bound */
%end;

%if &method = 2 %then %do;

    difference =difference; /* Ratio of geometric mean */
    lowercl = lowercl; /* 95% CI lower bound */
    uppercl = uppercl; /* 95% CI upper bound */
%end;

%if &method = 1 %then %do;
geomean=strip(put(round(difference, 0.01), 8.2))||" ("||strip(put(ceil(CVperc*100)/100, 8.2)) ||")";
%end;
%if &method = 2 %then %do;
geomean=strip(put(round(difference, 0.01), 8.2))/"|" ("||strip(put(CVperc, 8.1)) ||")"/";
%end;

geoci=strip(put(floor(lowercl*100)/100, 8.2))||", "||strip(put(ceil(uppercl*100)/100, 8.2));
keep trtcd geomean geoci difference;
run;

data pval&outnum.;
set pval&outnum.;
if _n_=1;
trtcd=4;
keep trtcd ProbtDiff;
format ProbtDiff PVALUE6.3;
run;

proc sort data=LSMeanDiffCL&outnum.;
by trtcd;
run;

data LSMeanDiffCL&outnum.;
merge LSMeanDiffCL&outnum. pval&outnum.;
by trtcd;
run;

data LSMeanDiffCL&outnum.;
set LSMeanDiffCL&outnum.;
%if &method = 1 %then %do;
if (difference < 100) then ProbtDiff=ProbtDiff/2;
else ProbtDiff=1-ProbtDiff/2;
%end;
%if &method = 2 %then %do;
if (difference < 0) then ProbtDiff=ProbtDiff/2;
else ProbtDiff=1-ProbtDiff/2;
%end;
run;

data mrep_&outnum.;
set lsmeans_&outnum. LSMeanDiffCL&outnum.;
run;

proc sort data=mrep_&outnum.;
by trtcd;
run;

proc sort data=xlab_&outnum.;
by trtcd;
run;

data xlab_&outnum.;
merge xlab_&outnum.(in=a) mrep_&outnum.;
by trtcd;
run;

data xlab_&outnum.;
set xlab_&outnum.;
if geoci ne "";
run;

proc transpose data = xlab_&outnum. out=xlab_1_&outnum.;
id trtcd;
var n1 geomean geoci ProbtDiff;
run;

data rep_&outnum.;
length _name_ _1 _2 _3 ord1 $100;
set xlab_1_&outnum.;

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ord1="&outnum";
ordnum=input(ord1, best.);
if upcase(_name_)="N1" then do; _name_="n"; sord=0; end;
%if &method = 1 %then %do;
if upcase(_name_)="GEOMEAN" then do; _name_="Geometric LS Mean (CV%)"; sord=1; end;
if upcase(_name_)="GEOCI" then do; _name_="95% CI of Geometric Mean"; sord=2; end;
if upcase(_name_)="CI1" then do; _name_="95% CI of Mean"; sord=4; end;
%end;
%if &method = 2 %then %do;
if upcase(_name_)="GEOMEAN" then do; _name_="LS Mean"; sord=1; end;
if upcase(_name_)="GEOCI" then do; _name_="95% CI"; sord=2; end;
if upcase(_name_)="CI1" then do; _name_="95% CI"; sord=4; end;
%end;

if upcase(_name_)="MEAN1" then do; _name_="Mean (SD)"; sord=3; end;
if upcase(_name_)="MEDIAN1" then do; _name_="Median"; sord=5; end;
if upcase(_name_)="Q1Q3" then do; _name_="Q25, Q75"; sord=6; end;
if upcase(_name_)="MIN1" then do; _name_="Min, Max"; sord=7; end;
if upcase(_name_)="PROBTDIFF" then do; _name_="p-value (one-sided)"; sord=9; end;
run;

data rep;
set rep rep_&outnum.;
run;

%mend;

%macro mainloop(where1=, outn=, where=);

proc sort data=adam.adsl out=trt;
by usubjid;
where PPROT1FL="Y";
run;

data trt;
set trt;
if TRT01A="THSm2.2" then trtcd=1;
else if TRT01A="mCC" then trtcd=2;
else if TRT01A="SA" then trtcd=3;
run;

/*
"Use PPROTxFL with xx in 1,2,3,4 for data at APUPER=1,2,3,4 respectively.

* Set A) ADAM.ADBX; PARAMCD in
- UTXB2CRE, UPGF2CRE (Day 5, Day 30, Day 60, Day 90)
* Set B.1) ADAM.ADLB; PARAMCD in
- ICAM1 (Day 6, Day 30, Day 60, Day 90)
* Set B.2) ADAM.ADLB; PARAMCD in
- HBA1C (Day 90)
- LDL, HDL, TRIG, CHOL (Day 30, Day 60, Day 90)
- WBC, NEUT, EOS, BASO, LYMO, MONO (Day 6, Day 30, Day 60, Day 90)
* Set B.3) ADAM.ADLB; PARAMCD in
- CRP, FIBRINO, HOMOCY, GLUC (Day 30, Day 60, Day 90)
- PLAT (Day 6, Day 30, Day 60, Day 90)
* Set C) ADAM.ADVS; PARAMCD in
- SYSBP, DIABP (Day 6, Day 30, Day 60, Day 90)
- WEIGHT, WSTCIR (Day 90)
* Set D) ADAM.ADXP; PARAMCD=""FEVPCT""; PPROT4FL=""Y""; AVISIT=""DAY 91/DISCHARGE AMBULATORY""

*/

data indata1;
length group $4;
set adam.adbx;
group="A";
paramn=paramn+100;
if avisitn<=106 then used="The where clause used on the dataset adam.adbx: PPROT1FL=Y and ANL02FL=Y";
else if avisitn<=130 then used="The where clause used on the dataset adam.adbx: PPROT2FL=Y and ANL02FL=Y";
else if avisitn<=160 then used="The where clause used on the dataset adam.adbx: PPROT3FL=Y and ANL02FL=Y";
else if avisitn<=191 then used="The where clause used on the dataset adam.adbx: PPROT4FL=Y and ANL02FL=Y";

if PARAMCD in ("UTXB2CRE", "UPGF2CRE") and avisitn in (105, 130, 160, 190, 191) and ANL02FL="Y";
drop DTYPE ATPT;
run;

data indata2;
length group $4;
set adam.adlb;
group="B1";
paramn=paramn+200;
if avisitn<=106 then used="The where clause used on the dataset adam.adbx: PPROT1FL=Y and ANL01FL=Y";
else if avisitn<=130 then used="The where clause used on the dataset adam.adbx: PPROT2FL=Y and ANL01FL=Y";
else if avisitn<=160 then used="The where clause used on the dataset adam.adbx: PPROT3FL=Y and ANL01FL=Y";

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else if avisitn<=191 then used="The where clause used on the dataset adam.adbx: PPROT4FL=Y and ANL01FL=Y";

if paramcd in ("ICAM1") and avisitn in (106, 130, 160, 190, 191) and ANL01FL="Y";
drop DTYPE ATPT;
run;

data indata3;
length group $4;
set adam.adlb;
group="B2";
paramn=paramn+300;
if avisitn<=106 then used="The where clause used on the dataset adam.adbx: PPROT1FL=Y and ANL01FL=Y";
else if avisitn<=130 then used="The where clause used on the dataset adam.adbx: PPROT2FL=Y and ANL01FL=Y";
else if avisitn<=160 then used="The where clause used on the dataset adam.adbx: PPROT3FL=Y and ANL01FL=Y";
else if avisitn<=191 then used="The where clause used on the dataset adam.adbx: PPROT4FL=Y and ANL01FL=Y";

if (paramcd="HBA1C" and avisitn=190) or (paramcd in ("LDL", "HDL", "TRIG", "CHOL") and avisitn in (130, 160, 190, 191))
or (paramcd in ("WBC", "NEUT", "EOS", "BASO", "LYM", "MONO") and avisitn in (106, 130, 160, 190, 191)) and ANL01FL="Y";
drop DTYPE ATPT;
run;

data indata4;
length group $4;
set adam.adlb;
group="B3";
paramn=paramn+400;
if avisitn<=106 then used="The where clause used on the dataset adam.adbx: PPROT1FL=Y and ANL01FL=Y";
else if avisitn<=130 then used="The where clause used on the dataset adam.adbx: PPROT2FL=Y and ANL01FL=Y";
else if avisitn<=160 then used="The where clause used on the dataset adam.adbx: PPROT3FL=Y and ANL01FL=Y";
else if avisitn<=191 then used="The where clause used on the dataset adam.adbx: PPROT4FL=Y and ANL01FL=Y";
if (paramcd in ("CRP", "FIBRINO", "HOMOCY", "GLUC") and avisitn in (130, 160, 190, 191)) or (paramcd="PLAT" and avisitn
in (106, 130, 160, 190, 191)) and ANL01FL="Y";
drop DTYPE ATPT;
run;

data indata5;
length group $4;
set adam.advs;
group="C";
paramn=paramn+800;
if avisitn<=106 then used="The where clause used on the dataset adam.adbx: PPROT1FL=Y and ANL01FL=Y";
else if avisitn<=130 then used="The where clause used on the dataset adam.adbx: PPROT2FL=Y and ANL01FL=Y";
else if avisitn<=160 then used="The where clause used on the dataset adam.adbx: PPROT3FL=Y and ANL01FL=Y";
else if avisitn<=191 then used="The where clause used on the dataset adam.adbx: PPROT4FL=Y and ANL01FL=Y";

if (PARAMCD in ("SYSBP", "DIABP") and avisitn in (106, 130, 160, 190, 191)) or (paramcd in ("WEIGHT", "WSTCIR") and avis
itn=191) and ANL01FL="Y";
drop DTYPE ATPT;
run;

data indata6;
length group $4;
set adam.adxp;
group="D";
paramn=paramn+500;
if avisitn<=106 then used="The where clause used on the dataset adam.adbx: PPROT1FL=Y and ANL01FL=Y";
else if avisitn<=130 then used="The where clause used on the dataset adam.adbx: PPROT2FL=Y and ANL01FL=Y";
else if avisitn<=160 then used="The where clause used on the dataset adam.adbx: PPROT3FL=Y and ANL01FL=Y";
else if avisitn<=191 then used="The where clause used on the dataset adam.adbx: PPROT4FL=Y and ANL01FL=Y";

if paramcd="FEVPCT" and avisitn=191 and ANL01FL="Y";
drop DTYPE ATPT;
run;

/*
Blood pressure, HbA1c, LDL, HDL, TG, TC, WBC, BASO, EOS, MONO, NEUT, LYM, ,body weight and waist circumference will be a
nalyzed in the regular scale.
8-epi-PGF2a, 11 DTX-B2, sICAM will be analyzed in the logarithmic scale.
Other risk markers will be logarithmically transformed prior to analysis if there is evidence of non-normality by means
of Shapiro-Wilks test using baseline
data from FAS population - if p-val <= 0.05 then analyze in log scale; otherwise, use regular scale.
*/

data anlndata1;
set indata1-indata6;
if paramcd="GLUC" then paramn=403;
if paramcd in ("SYSBP", "DIABP", "HBA1C", "LDL", "HDL", "TRIG", "CHOL", "WBC", "NEUT", "EOS", "BASO", "LYM", "MONO", "WEI
GHT", "WSTCIR", "FEVPCT") then method=2;
else if paramcd in ("UTXB2CRE", "UPGF2CRE", "ICAM1") then method=1;
else method=3;

if aval>0 then logaval=log(aval);
if base>0 then logbase=log(base);
run;

proc sort data=anlndata1 out=fmt(keep=paramn param) nodupkey;
by paramn param;

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run;

proc sort data=anldata1 out=check(keep=method paramcd) nodupkey;
by method paramcd;
run;

data indata1 indata2;
set anldata1;
if method=3 then output indata2;
else output indata1;
run;

data indata2;
set indata2;
drop method;
run;

proc sort data=indata2;
by paramcd;
run;

proc sort data=test;
by paramcd;
run;

data indata2;
merge indata2 test;
by paramcd;
run;

data anldata1;
set indata1 indata2;
run;

data anldata1;
set anldata1;
if &where.;
run;

proc sort data=anldata1 out=check(keep=paramn avisitn avisit method used param paramcd) nodupkey;
by paramn avisitn avisit method;
where &where1.;
run;

data trt_1;
set trt;
run;

data anldata1;
set anldata1;
if TRTP="THSm2.2" then trtcd=1;
else if TRTP="mCC" then trtcd=2;
else if TRTP="SA" then trtcd=3;
run;

data check;
set check;
ord=_n_;
run;

%*cal_sumary_pvalue(where=1, outnum=1, var=aval, in=anldata1, pflg=1);

data rep;
run;

data _null_;
set check;
call execute ('%cal_sumary_pvalue(where=%str(avisitn=||avisitn|| and paramn=||paramn|| ), outnum=||ord||, method=||method||, used=||used||, var=logaval, in=anldata1, paramcd=||paramcd||, avisit=||avisit||);');
run;

data frep;
set rep;
ord=ORDNUM;
run;

data frep;
merge frep(in=a) check;
by ord;
if a;
if avisitn>.;
run;

proc sort data=trt_1 nodupkey;
by trtcd usubjid;
run;

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proc freq data = trt_1 noprint;
  tables trtcd/ out= denom;
run;

data _null_;
  set denom end=eof;

  retain total 0;

  total = total+count;

  if trtcd= 1 then do;
    call symput('trt1', trim(left(put(count,8)))));
  end;
  if trtcd= 2 then do;
    call symput('trt2', trim(left(put(count,8)))));
  end;
  if trtcd= 3 then do;
    call symput('trt3', trim(left(put(count,8)))));
  end;
run;

%put trt1=&trt1 trt2=&trt2 trt3=&trt3;

%macro cal_part_main();

data frep;
set frep;

avisit=propcase(avisit);
if AVISIT="Day 0" then avisit="Baseline";

  %do i = 1 %to 100;
    if (&i-1)*3<ordnum<=&i*3 then pagen=&i;
  %end;

run;

%mend;

%cal_part_main();
data frep&outn.;
set frep;
space=" ";
if _name_="p-value (one-sided)" then delete;
run;

%mend;

%*trtrtfg(pgmname=&loutname., pgmid=1, new=0, style=, bookmark=%lowcase(&outname.));

title1 bold j=1 "&title1 &title2";
*footnote1 j=1 h=9pt "Study ID:ZRHM-REXA-07-JP          Program: &fprgname..sas          Status: &repversion./&fdate.";

title2 h=10pt j=1 "The where clause used on the dataset adam.adxp/adlb: FASFL=Y and avisitn=100";
title3 h=10pt j=1 "Shapiro-Wilk Test, Paramcd: CRP, FIBRINO, HOMOCY, GLUC, PLAT";

data base;
set adam.adxp (drop= ABLFL ATPT) adam.adlb(drop= ABLFL ATPT);
if paramcd in ("CRP", "FIBRINO", "HOMOCY", "GLUC", "PLAT") and avisitn =100 and fasfl="Y";
run;

proc sort data=base;
by paramcd;
run;

ods listing close;
ods output TestsForNormality=TestsForNormality;
proc univariate data=base normal;
by paramcd;
var aval;
run;
ods listing;
ods output close;

data test;
set testsfornormality;
if TEST="Shapiro-Wilk";
run;

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data test;
set test;
if PVALUE<=0.05 then method=1;
else method=2;
keep paramcd method;
run;

%mainloop(where1=%str(method=1), outn=1, where=%str((avisitn<=106 and APUPER=1 and PPROT1FL="Y") or
(avisitn=130 and APUPER=2 and PPROT2FL="Y") or (avisitn=160 and APUPER=3 and PPROT3FL="Y") or (avisitn in (190, 191) /*a
nd APUPER=4*/ and PPROT4FL="Y") ));

%mainloop(where1=%str(method=2), outn=2, where=%str((avisitn<=106 and APUPER=1 and PPROT1FL="Y") or
(avisitn=130 and APUPER=2 and PPROT2FL="Y") or (avisitn=160 and APUPER=3 and PPROT3FL="Y") or (avisitn in (190, 191) /*a
nd APUPER=4*/ and PPROT4FL="Y") ));

*ods listing;
*ods rtf close;

data frep;
set frep1 - frep2;
run;

proc sort data=frep;
by paramn;
run;

proc sort data=fmt;
by paramn;
run;

data frep;
merge frep fmt;
by paramn;
run;

data frep;
set frep;
if sord in (1, 2);
keep param paramn paramcd avisit avisitn _4 _5 sord ordnum METHOD;
run;

proc sort data=frep;
by ordnum paramn param paramcd avisitn avisit method;
run;

proc transpose data=frep out=frep_1 prefix=r1_;
by ordnum paramn param paramcd avisitn avisit method;
id sord;
var _4;
run;

proc transpose data=frep out=frep_2 prefix=r2_;
by ordnum paramn param paramcd avisitn avisit method;
id sord;
var _5;
run;

data final;
merge frep_1 frep_2;
by ordnum paramn param paramcd avisitn avisit;
run;

data final1;
set final;
rate1=input(scan(r1_1, 1, "("), best.);
rate2=input(scan(r2_1, 1, "("), best.);
low1=input(scan(r1_2, 1, ","), best.);
low2=input(scan(r2_2, 1, ","), best.);
up1=input(scan(r1_2, 2, ","), best.);
up2=input(scan(r2_2, 2, ","), best.);
run;

data final1;
set final1;
if index(r1_1, "(") then grp1d=1;
else grp1d=2;
run;

data odata.&prgname;
set final1;
run;

data final1;

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set final1;
if avisit="Day 91/Discharge Ambulatory" then avisit="Day 90";
if avisit="Day 6/Discharge Confinement" then avisit="Day 5";

if param="Systolic Blood Pressure" then param="Systolic Blood Pressure (mmHg)";
if param="Diastolic Blood Pressure" then param="Diastolic Blood Pressure (mmHg)";

if param="Weight" then param="Weight (kg)";
if param="Waist Circumference" then param="Waist Circumference (cm)";

run;

proc sort data=final1 out=repeat(keep=param paramcd paramn grpid) nodupkey;
by paramn param paramcd grpid;
where paramcd ne "FEVPCT";
run;

data fig1;
set final1;
if avisitn in (105, 106) and grpid=1;
run;

data fig2;
set final1;
if avisitn=160 and grpid=1;
run;

data fig3;
set final1;
if avisitn=130 and grpid=1;
run;

data fig4;
set final1;
if avisitn in (190, 191) and grpid=1;
run;

%macro mainloop(where=, innum=, outnum=, text=, upline=, indata=, sfact=, gtype=, ymin=, xmin=, xmax=);

proc sort data=final1 out= fig&innum.;
by avisitn;
where &where.;
run;

data fig&innum.;
length xord 8.;
set fig&innum.;
yord=_n_;
yord1=_n_;

yord=5-yord;
yord1=5-yord1;

/*
if avisitn in (105, 106) then do; yord=4; yord1=4; end;
if avisitn in (130) then do; yord=3; yord1=3; end;
if avisitn in (160) then do; yord=2; yord1=2; end;
if avisitn in (190, 191) then do; yord=1; yord1=1; end;
*/
xord=rate&indata;

/*
%if &outnum=1 %then %do;
yord+4;
yord1+4;
%end;
%if &outnum=5 %then %do;
yord+4;
yord1+4;
%end;
%if &outnum=12 %then %do;
yord+4;
yord1+4;
%end;
%if &outnum=13 %then %do;
yord+4;
yord1+4;
%end;
%if &outnum=16 %then %do;
yord+4;
yord1+4;
%end;
%if &outnum=17 %then %do;
yord+4;
yord1+4;
%end;*/

```

```

run;

proc sort data=fig&innum. out=fmt/*(keep=yord param)*/ nodupkey;
by yord avisit;
run;

data fmt;
length param $200;
set fmt;
avisit=strip(avisit)/"||": "||strip(put(RATE&indata., 8.2))||" ("||strip(put(LOW&indata., 8.2))||", "||strip(put(up&inda
ta., 8.2))||")"/;
keep yord avisit;
run;

data fmt;
length label $200;
set fmt;
fmtname="grp&innum&indata.f";
start=yord;
label=avisit;
run;

data top;
length label $200;
fmtname="grp&innum&indata.f";
start=0;
label="";
output;
start=1;
label="";
output;
start=2;
label="";
output;
start=3;
label="";
output;
start=4;
label="";
output;
start=5;
label="";
output;
start=6;
label="";
output;
start=7;
label="";
output;
start=8;
label="";
output;

output;
start=9;
label="";
output;
start=10;
label="";
output;
start=11;
label="";
output;
start=12;
label="";
output;
start=13;
label="";
output;
start=14;
label="";
output;
start=15;
label="";
output;
start=16;
label="";
output;
start=17;
label="";
output;

```

```

start=18;
label="";
output;
run;

data fmt;
set top fmt;
run;

proc sort data=fmt;
by start label;
run;

data fmt;
set fmt;
by start label;
if last.start;
run;

proc format cntlin=fmt;
run;

proc sort data=fig&innum. out=fmt_&innum./*(keep=yord param)*/ nodupkey;
by yord param;
run;

data fmt_&innum.;
length param $200;
set fmt_&innum.;
param1=strip(put(RATE&indata., 8.2))||" ("||strip(put(LOW&indata., 8.2))||", "||strip(put(up&indata., 8.2))||")";
keep yord param1;
run;

data fmt_&innum.;
length label $200;
set fmt_&innum.;
fmtname="lgrp&innum&indata.f";
start=yord;
label=param1;
run;

data top;
length label $200;
fmtname="lgrp&innum&indata.f";
start=0;
label="";
output;
start=1;
label="";
output;

start=2;
label="";
output;
output;
start=3;
label="";
output;
output;
output;
start=4;
label="";
output;
output;
output;
start=5;
label="";
output;
output;
output;
start=6;
label="";
output;
output;
output;
start=7;
label="";
output;
output;
output;
start=8;
label="";
output;

output;
start=9;
label="";
output;
start=10;

```

```

label="
output;
start=11;
label="
output;
start=12;
label="
output;
start=13;
label="
output;
start=14;
label="
output;
start=15;
label="
output;
start=16;
label="
output;
start=17;
label="
output;
start=18;
label="
output;
run;

data fmt_innum.;
set top fmt_innum.;
run;

proc sort data=fmt_innum.;
by start label;
run;

data fmt_innum.;
set fmt_innum.;
by start label;
if last.start;
run;

proc format cntlin=fmt_innum.;
run;

data anno3;
set fig_innum.;
length function color $ 8;
retain xsys hsys '2';
ysys="2"; hsys="3"; size=0.4;
color="black"; function='move'; x=low&indata; y=yord; line=1; output;
color="black"; function='draw'; x=up&indata; y=yord; line=1; output;

run;

data anno3;
set anno3;
if function='draw' and x>&xmax. then do;
x=&xmax.;
output;
color="black"; function='draw'; x=&xmax.; y=yord; line=1; output;
color="black"; function='move'; x=&xmax.-0.075*(&xmax.-&xmin.)/2.0; y=yord+0.2; line=1; output;
color="black"; function='draw'; x=&xmax.; y=yord; line=1; output;
color="black"; function='draw'; x=&xmax.-0.075*(&xmax.-&xmin.)/2.0; y=yord-0.2; line=1; output;
color="black"; function='draw'; x=&xmax.; y=yord; line=1; output;
end;
else do;
output;
end;
run;

data anno3;
set anno3;
if function='move' and x<&xmin. then do;
x=&xmin.;
output;
color="black"; function='move'; x=&xmin.-0.15*&xmin.; y=yord+0.2; line=1; output;
color="black"; function='draw'; x=&xmin.; y=yord; line=1; output;
color="black"; function='draw'; x=&xmin.-0.15*&xmin.; y=yord-0.2; line=1; output;
color="black"; function='draw'; x=&xmin.; y=yord; line=1; output;
end;
else do;
output;
end;
run;

```

```

data anno2;
length function color $ 8;
retain hsys '2';
ysys="2"; hsys="3"; size=0.3;
xsys="3";
color="black"; function='move'; x=0; y=5; line=1; output;
color="black"; function='draw'; x=98; y=5; line=1; output;
color="black"; function='move'; x=0; y="&ymin."; line=1; output;
color="black"; function='draw'; x=98; y="&ymin."; line=1; output;
/*
xsys="2";
size=0.4;
%if &outnum=1 %then %do;
color="black"; function='move'; x=50; y=0; line=2; output;
color="black"; function='draw'; x=50; y="&upline."; line=2; output;
%end;
%if &outnum=2 %then %do;
color="black"; function='move'; x=50; y=0; line=2; output;
color="black"; function='draw'; x=50; y="&upline."; line=2; output;
%end;
%if &outnum=3 %then %do;
color="black"; function='move'; x=50; y=0; line=2; output;
color="black"; function='draw'; x=50; y="&upline."; line=2; output;
%end;
%if &outnum=4 %then %do;
color="black"; function='move'; x=50; y=0; line=2; output;
color="black"; function='draw'; x=50; y="&upline."; line=2; output;
%end;
*/
run;

data anno1;
length function color $ 8 text $100;
retain xsys '2';
hsys="3"; size=3;
position="6";
ysys="3"; xsys="3";
function='label'; x=2; y=96; color="black"; text="Visit"; output;
function='label'; x=20; y=96; color="black"; text="&text."; output;

%if &gtype =1 %then %do;
function='label'; x=73; y=98.9; color="black"; text="Geometric LS Mean"; output;
function='label'; x=75; y=96; color="black"; text="Ratio (95% CI)"; output;
%end;
%if &gtype =2 %then %do;

function='label'; x=73; y=98.9; color="black"; text="LS Mean Difference"; output;
function='label'; x=77; y=96; color="black"; text="(95% CI)"; output;

%end;

run;

data anno1;
set anno1;
myord=_n_;
leng=length(text);
if myord=2 and leng<30 then x=x+(30-leng);
run;

data anno4;
set fig1;
length function color $ 8;
retain xsys hsys '2';
hsys="3"; size=0.6;
position="6";
ysys="2"; xsys="3"; size=0.5;
function='label'; x=2; y=yord; color="black"; text=strip(param); output;
run;

data anno_&outnum.;
set anno3 anno2 anno1/*anno4*/;
run;

proc format;
value vvvvf
-200=" "
-150=" "
-100=" "
run;

%mend;

```

```

data repeat1;
set repeat;
indata=1;
output;
indata=2;
output;
run;

data repeat1;
set repeat1;
nord=_n_;
run;

data repeat1;
set repeat1;
if nord=1 then do; ymin=0; ymax=5; xmin=50; xmax=150; by=50; end;
if nord=2 then do; ymin=0; ymax=5; xmin=50; xmax=150; by=50; end;
if nord=3 then do; ymin=0; ymax=5; xmin=50; xmax=150; by=50; end;
if nord=4 then do; ymin=0; ymax=5; xmin=50; xmax=150; by=50; end;
if nord=5 then do; ymin=0; ymax=5; xmin=50; xmax=150; by=50; end;
if nord=6 then do; ymin=0; ymax=5; xmin=50; xmax=150; by=50; end;
if nord=7 then do; ymin=1; ymax=5; xmin=-50; xmax=50; by=50; end;
if nord=8 then do; ymin=1; ymax=5; xmin=-50; xmax=50; by=50; end;
if nord=9 then do; ymin=1; ymax=5; xmin=-50; xmax=50; by=50; end;
if nord=10 then do; ymin=1; ymax=5; xmin=-50; xmax=50; by=50; end;
if nord=11 then do; ymin=3; ymax=5; xmin=-1; xmax=1; by=1; end;
if nord=12 then do; ymin=3; ymax=5; xmin=-1; xmax=1; by=1; end;
if nord=13 then do; ymin=1; ymax=5; xmin=-10; xmax=10; by=10; end;
if nord=14 then do; ymin=1; ymax=5; xmin=-10; xmax=10; by=10; end;
if nord=15 then do; ymin=1; ymax=5; xmin=-10; xmax=10; by=10; end;
if nord=16 then do; ymin=1; ymax=5; xmin=-20; xmax=20; by=20; end;
if nord=17 then do; ymin=1; ymax=5; xmin=50; xmax=150; by=50; end;
if nord=18 then do; ymin=1; ymax=5; xmin=50; xmax=150; by=50; end;
if nord=19 then do; ymin=0; ymax=5; xmin=-2; xmax=2; by=2; end;
if nord=20 then do; ymin=0; ymax=5; xmin=-2; xmax=2; by=2; end;
if nord=21 then do; ymin=0; ymax=5; xmin=-2; xmax=2; by=2; end;
if nord=22 then do; ymin=0; ymax=5; xmin=-2; xmax=2; by=2; end;
if nord=23 then do; ymin=0; ymax=5; xmin=-2; xmax=2; by=2; end;
if nord=24 then do; ymin=0; ymax=5; xmin=-2; xmax=2; by=2; end;
if nord=25 then do; ymin=0; ymax=5; xmin=-0.1; xmax=0.1; by=0.1; end;
if nord=26 then do; ymin=0; ymax=5; xmin=-0.1; xmax=0.1; by=0.1; end;
if nord=27 then do; ymin=0; ymax=5; xmin=-0.1; xmax=0.1; by=0.1; end;
if nord=28 then do; ymin=0; ymax=5; xmin=-0.1; xmax=0.1; by=0.1; end;
if nord=29 then do; ymin=0; ymax=5; xmin=-0.1; xmax=0.1; by=0.1; end;
if nord=30 then do; ymin=0; ymax=5; xmin=-0.1; xmax=0.1; by=0.1; end;
if nord=31 then do; ymin=1; ymax=5; xmin=50; xmax=150; by=50; end;
if nord=32 then do; ymin=1; ymax=5; xmin=50; xmax=150; by=50; end;
if nord=33 then do; ymin=1; ymax=5; xmin=50; xmax=150; by=50; end;
if nord=34 then do; ymin=1; ymax=5; xmin=50; xmax=150; by=50; end;
if nord=35 then do; ymin=1; ymax=5; xmin=50; xmax=150; by=50; end;
if nord=36 then do; ymin=1; ymax=5; xmin=50; xmax=150; by=50; end;
if nord=37 then do; ymin=0; ymax=5; xmin=50; xmax=150; by=50; end;
if nord=38 then do; ymin=0; ymax=5; xmin=50; xmax=150; by=50; end;
if nord=39 then do; ymin=0; ymax=5; xmin=-10; xmax=10; by=10; end;
if nord=40 then do; ymin=0; ymax=5; xmin=-10; xmax=10; by=10; end;
if nord=41 then do; ymin=0; ymax=5; xmin=-10; xmax=10; by=10; end;
if nord=42 then do; ymin=0; ymax=5; xmin=-10; xmax=10; by=10; end;
if nord=43 then do; ymin=3; ymax=5; xmin=-2; xmax=2; by=2; end;
if nord=44 then do; ymin=3; ymax=5; xmin=-2; xmax=2; by=2; end;
if nord=45 then do; ymin=3; ymax=5; xmin=-10; xmax=10; by=10; end;
if nord=46 then do; ymin=3; ymax=5; xmin=-10; xmax=10; by=10; end;
run;

data _null_;
set repeat1;
call execute ('%mainloop(where=%str(paramn=||paramn||), innum=||nord||, outnum=||nord||, text=||param||, up
line=5, indata=||indata||, gtype=||grpid||, ymin=||ymin||, xmin=||xmin||, xmax=||xmax||);');
run;

ods tagsets.ExcelXP path="%csvdata." file="%outname..xml" style=Printer;

%macro excelloop(pagen=, indata=);
ods tagsets.ExcelXP options(sheet_name="Page &pagen.");

proc print data=fig&pagen.;
var param paramcd avisitn avisit rate&indata. low&indata. up&indata.;
run;
quit;

%mend;

data _null_;
set repeat1;
call execute ('%excelloop(pagen=||nord||, indata=||indata||);');
run;

```

```

ods tagsets.ExcelXP close;

%macro call1(hsize=, vsize=, innum=, innum1=, outn=, xlabel=, xmin=, xmax=, ymin=, ymax=, type=, grpid=, ref=, by=);

options /*leftmargin=0.2cm topmargin=0.1cm rightmargin=0.2cm bottommargin=1cm*/
nodate nonumber nobyline;
ods results off;

%let startobs = 1;
%let eof       = 0;
%let imageCnt = 1;

/*****

* handle graph size -> transform to cm when inches are specified

*****/;

%let vunit=%upcase(%scan(&vsize,-1,' 0123456789. '));
%let hunit=%upcase(%scan(&hsize,-1,' 0123456789. '));
%if &vunit=IN or &vunit=INCH %then %let vsize=%sysevalf(%scan(&vsize,1,%str( icIC))*2.58);
%if &hunit=IN or &hunit=INCH %then %let hsize=%sysevalf(%scan(&hsize,1,%str( icIC))*2.58);
%if &vunit=CM %then %let vsize=%sysevalf(%scan(&vsize,1,%str( icIC))*1);
%if &hunit=CM %then %let hsize=%sysevalf(%scan(&hsize,1,%str( icIC))*1);

ods listing /*image_dpi=50*/ gpath="&opath";
ods graphics on / imageName = "figurename"
imagefmt = png
border = off
scale = no
reset = index
width = 6 cm
height = 4 cm;
ods escapechar="é";

filename graphout "&opath\&outname._&outn..png";
goptions reset=all device=png gsfname=graphout ftext="Arial/bold" htext=2 hsize=6.25 in vsize=4.9 in;
%if &grpid=1 and &type=1 %then %do;
axis1 offset=(0, 0) label=("THSm2.2/mCC(%)" font="Arial/bold")
width=1 minor=none major=none order=&xmin. to &xmax. by &by. /*origin=(0, 0)*/
;
/* rellabel=(angle=270 j=r ' xxxxxx ') */
%end;

%if &grpid=1 and &type=2 %then %do;
axis1 offset=(0, 0) label=("THSm2.2/SA(%)" font="Arial/bold")
width=1 minor=none major=none order=&xmin. to &xmax. by &by. /*origin=(0, 0)*/
;
/* rellabel=(angle=270 j=r ' xxxxxx ') */
%end;

%if &grpid=2 and &type=1 %then %do;
axis1 offset=(0, 0) label=("THSm2.2 - mCC" font="Arial/bold")
width=1 minor=none major=none order=&xmin. to &xmax. by &by. /*origin=(0, 0)*/
;
/* rellabel=(angle=270 j=r ' xxxxxx ') */
%end;

%if &grpid=2 and &type=2 %then %do;
axis1 offset=(0, 0) label=("THSm2.2 - SA" font="Arial/bold")
width=1 minor=none major=none order=&xmin. to &xmax. by &by. /*origin=(0, 0)*/
;
/* rellabel=(angle=270 j=r ' xxxxxx ') */
%end;

axis2 offset=(0, 0) length=3.8 in label=(angle=90 " " justify=left) value=(justify=left font="Arial")
width=1 minor=none major=none order=&ymin. to &ymax. by 1
;
axis3 offset=(0, 0) /*length=4 in */ label=(angle=90 " ") value=(justify=left font="Arial")
width=1 minor=none major=none order=&ymin. to &ymax. by 1
;

/*rellabel=(j=1 " &title. = &refline. ")*/

/* Define the symbol characteristics */
symbol1 interpol=none color=black w=4 value=circle;
symbol2 interpol=none color=black w=4 value=circle;

/* Plot the error bars using the HILOCTJ interpolation */
/* and overlay symbols at the means. */

proc gplot data=fig&innum.;
plot

```

```

        yord*xord
        /haxis=axis1 vaxis=axis2 anno=anno_&inum1. vref=&yymax. href=&ref. nolegend;
format rate1 vvvvf. yord grp&inum.&type.f.;
plot2
        yord1*xord
        /vaxis=axis3;
format rate1 vvvvf. yord1 lgrp&inum.&type.f.;

run;
quit;

proc greplay igout=work.gseg nofs;
delete _all_;
run;
quit;

ods listing close;
ods graphics off;
%mend;

data repeat2;
set repeat1;
if grp1=1 and indata=1 then do; ref=100; end;
if grp1=1 and indata=2 then do; ref=100; end;
if grp2=1 and indata=1 then do; ref=0; end;
if grp2=1 and indata=2 then do; ref=0; end;
run;

data _null_;
set repeat2;
call execute ('%cal1(hsize=4 in, vsize=6 in, innum=||nord||, innum1=||nord||, outn=||nord||, xmin=||xmin||,
xmax=||xmax||, ymin=||ymin||, ymax=||ymax||, type=||indata||, grp1=||grp1||, ref=||ref||, by=||by||);');
run;

%macro rtfoutput;
option nobyline nodate nonumber orientation=portrait;

ods listing close;
%trtrtf_fig(pgmname=&outname., pgmid=1, new=0, style=, bookmark=%lowercase(&outname.));
ods escapechar="é";

title;

%let n_plots=46;
%let orient=portrait;

data _rmtxt;
format text $12.;
text = 'éR"par\ "';
%do i = 1 %to &n_plots;
output;
%end;
run;

data _rmtxt;
set _rmtxt;
pagen=_n_;
run;

%local tblwidth;
%let tblwidth = 6.25;

%do i = 1 %to &n_plots;

proc report data = _rmtxt nowd;
column pagen text;
where pagen = &i;
define pagen /order order=internal noprint;
define text / display style(column)=[cellwidth=&tblwidth.in] ' ';
compute text;
*line_count + 1;
* if line_count = &i then do;
call define(_row_, 'STYLE', %str(%')STYLE=[just=center postimage="&opath\&&outname._&i..png"%str(%'));
* end;
endcomp;

compute before pagen /style=[fontweight=bold fontsize=3.75];
line @1 "&title1 &title2";
endcomp;

compute after pagen /style=[fontsize=1.75];
line @1 "Note: mCC = Conventional menthol cigarettes; SA = Smoking abstinence; THSm2.2 = Tobacco Heating System 2.2 Ment
hol.";

```



```
line @1 "Note: Where symbols < or > appear the estimate or CI is outside of the reporting scale.";
line @1 " ";
line @1 "&APPENDIX.";
line @1 "Study ID: ZRHM-REXA-07-JP";
line @1 "Program: &fprgname..sas      Status: &repversion./&fdate.      Page &i. of 46";
endcomp;

run;

%end;

/*
proc datasets nolist;
    delete _rmttext;
quit;
*/
ods rtf close;
ods listing;

%mend;
%rtfoutput;
```