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/*=====
| Covance Study Number   : COV- 106343
| Program Name           : d_2adex.sas
| Purpose                 : create ADEX
| Input Data              : ADAM.ADSL,SDTM.EX,SDTM.DX,SDTM.SU
| Output Data             : ADAM.ADEX
|
| Macros Called           :
|
| Originally Performed by : Serona Zheng
| Date/Time billed       : 10Apr2015
|
+=====
|
| Modification History   :
|
| Programmer             : Serona Zheng
| Date                   : 21May2015
| Reason for Change      : Change -dose to -dostxt for -9 or -1 values
|
| Programmer             : Serona Zheng
| Date                   : 05Jun2015
| Reason for Change      : Change svstdtc to svendtc based on John's email on 05Jun2015|
|
| Programmer             : Serona Zheng
| Date                   : 30Jun2015
| Reason for Change      : Fix the typo in param 'Daily Electronic Cigarette'
+=====*/
libname sdtm "/cvn/projects/prj/data/000000106343/datasets/sdtm/sdtmx";
/*libname sdtm "/cvn/projects/prj/data/000000106343/datasets/sdtm"; */

***Create log file;
proc printto new
log="/cvn/projects/prj/development/000000106343/dev/adam/log/d_2adex.log" ;
run;

***Create macro to assign apuper;
%macro apuper(dsin1=,dsout1=);
data &dsout1;
merge &dsin1(in=a) ds sv1;
by usubjid;
if a;
if . < astdt <=randdt then apuper = 0;
else if nmiss(randdt,astdt) = 0 and randdt < astdt and index(parcat2,"PRODUCT USE DIARY")=0 and avisitn < 130 then apuper = 1;
else if index(parcat2,"PRODUCT USE DIARY") and ((v30 ne . and . < astdt <= v30) or (v30 = . and /*6<=*/astday <=31)) then apuper =
2;
else if index(parcat2,"PRODUCT USE DIARY") and ((v60 ne . and v30 < astdt <= v60) or (v30 ne . and v60 = . and 31 < astday <=61) or
(v30 eq . and v60 = . and 31 < astday <=61)) then apuper = 3;
else if index(parcat2,"PRODUCT USE DIARY") and ((v60 > . and astdt > v60) or (v60 eq . and astday > 61)) then apuper = 4;
if nmiss(astdt,v91) eq 0 and astdt > v91 then put "User warning: " usubjid " take drug date is greate than study end date";
run;
%mend;

%macro cal_1(dsin2=,dsout2=,apuper=);

proc sql;
create table temp as
%if &apuper = 1 %then %do;
select usubjid,paramn,apuper,parcat1, sum(aval) as aval1
from &dsin2
where apuper >=2
group by usubjid,paramn,apuper,parcat1;
%end;
%else %do;
select usubjid,paramn,parcat1,sum(aval) as aval1
from &dsin2
where apuper >=2
group by usubjid,paramn,parcat1;
%end;
quit;

data &dsout2;
merge temp(in=a) sv_d(keep=usubjid d_2 d_3 d_4 d_dis);
by usubjid;
if a;
%if &apuper = 1 %then %do;
if apuper = 2 and nmiss(aval1,d_2) = 0 and d_2 > 0 then aval = aval1/d_2;
else if apuper = 3 and nmiss(aval1,d_3) = 0 and d_3 > 0 then aval = aval1/d_3;

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    else if apuper = 4 and nmiss(aval1,d_4) = 0 and d_4 > 0 then aval = aval1/d_4;
%end;
%else %do;
    if nmiss(aval1,d_dis) = 0 and d_dis > 0 then aval = aval1/d_dis;
%end;
run;
%mend;

***Get data from adsl;
proc sort data=adam.adsl out=adsl;by usubjid;run;

***Get randdt from ds;
data ds;
    set adsl(keep=usubjid randdt where=(randdt ne .));
run;

***Get visit date from SV;
data sv;
    set sdtm.sv;
/* if visitnum ne 191 then do;*/
/* svdt = input(svendtc, is8601da.);*/
/* end;*/
/* else if visitnum eq 191 then do;*/
/*   if svstdtc ne svendtc then svdt = input(svendtc, is8601da.);*/
/*   else svdt = input(svstdtc, is8601da.);*/
/* end;*/
    svdt = input(svendtc, is8601da.);

    format svdt date9.;
run;

proc transpose data=sv(where=(visitnum in (130 /*131 161*/ 160 190 191 106)))
    out=sv1(drop=_name_ rename=(v130=v30 /*v131=v31 v161=v61*/ v160=v60 v190=v90 v191=v91 v106=v6)) prefix=v;
    by usubjid;
    var svdt;
    id visitnum;
run;

***Get last visit;
data sv_l1;
    set adsl;
    lastdt =lvisdt;
    keep usubjid lastdt;
    format lastdt date9.;
run;

data sv_d;
    merge sv1(in=a) sv_l1;
    by usubjid;
    if a;
    if v30 ne . then d_2=v30-v6+1;
    if v30 = . and v91 ne . then d_2 = v91-v6;
    if v30 = . and v91 eq . then d_2 = lastdt-v6;

    if v60 = . and v30 ne . then do;
        if v91 ne . then d_3 = v91-1-v30;
        else if v91 eq . then d_3 = lastdt-1-v30;
    end;
    if v60 ne . and v30 = . then do;
        d_3 = v60-(v6+24);
    end;

    if v60 ne . and v30 ne . then d_3 = v60-v30;

    if nmiss(v91,v60) = 0 then d_4 = v91-v60-1;
    else if v91 = . and v60 ne . then d_4 = lastdt-v60 -1;
    else if v91 ne . and v60 = . then d_4 = v91-1-(v6+54);
    else if v91 = . and v60 = . then d_4 = lastdt-1-(v6+54);

    if nmiss(v6,v91) eq 0 then d_dis = v91-v6;
    if v6 ne . and v91 = . then d_dis=lastdt-v6;
run;

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*****Step1: Get data and create parameter from DX*****;

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***Get data from DX;
data dx;
  length srcdom $2 desc reasnd $200 parcat1 parcat2 $100 avalu status $20 lot $7 astdtc aendtc $16 epoch $25 avisit $40;
  set sdtm.dx(rename=(epoch=epoch1));
  if dxcat = "TOBACCO HEATING SYSTEM MENTHOL";
  srcdom = 'DX';
  srcseq = dxseq;
  desc = dxtrt;
  parcat1 = dxcat;
  parcat2 = dxscat;
  if dxдостxt = '-9' then aval = 0;
  else if dxдостxt = '-1' then aval = .;
  else aval = dxdose;
  avalu = dxdosu;
  status = dxstat;
  reasnd = dxreasnd;
  lot = dxlot;
  avisitn = visitnum;
  avisit = visit;
  astdtc = dxstdtc;
  aendtc = dxendtc;
  astdy = dxstdy;
  aendy = dxendy;
  epoch = epoch1;

  if ASTDTC^='' then astdt = input(scan(ASTDTC,1,"T"),yymmdd10.);
  if index(ASTDTC,"T") then do;
    if length(scan(ASTDTC,2,"T")) = 5 then do;
      astdtm = dhms(astdt,0,0,input(scan(ASTDTC,2,"T"),time5.))+0;
    end;
    else if length(scan(ASTDTC,2,"T")) = 8 then astdtm = dhms(astdt,0,0,input(scan(ASTDTC,2,"T"),time8.));
    else put "WAR" "NING: Unexpected time format " ASTDTC=;
  end;
/* else astdtm = dhms(astdt,0, 0, 0);*/
  if AENDTC^='' then aendtc = input(scan(AENDTC,1,"T"),yymmdd10.);
  if index(AENDTC,"T") then do;
    if length(scan(AENDTC,2,"T")) = 5 then do;
      aendtm = dhms(aendtc,0,0,input(scan(AENDTC,2,"T"),time5.))+0;
    end;
    else if length(scan(AENDTC,2,"T")) = 8 then aendtm = dhms(aendtc,0,0,input(scan(AENDTC,2,"T"),time8.));
    ELSE IF LENGTH(SCAN(AENDTC,2,"T")) = 2 THEN AENDTM = .;
    else put "WAR" "NING: Unexpected time format " AENDTC=;
  end;

  format astdtm aendtm datetime13. astdt aendtc date9.;
/* drop astdtc1 aendtc1;*/
run;

***Calculate astday;
proc sort data=dx;by usubjid;run;
data dx;
  merge dx(in=a) adsl(keep=usubjid trtsdt);
  by usubjid;
  if a;
  if nmiss(astdt,trtsdt) = 0 then astday = astdt-trtsdt + 1;
run;

***Assign apuper;
%apuper(dsin1=dx,dsout1=dx)

***Derive param,paramcd,paramn from dx;
***create parameter 0;
data dx_p0;
  length param $100 paramcd $8;
  set dx;
  if index(dxscat,"PRODUCT USE DIARY")=0;
  paramn = 0;
  paramcd = "THS2_2";
  param = "THS 2.2";
run;
***create parameter 1;
data dx_1;
  set dx;
  if index(dxscat,"PRODUCT USE DIARY")=0 and avisitn not in (130 160 190);
  keep usubjid astdtc astdt aendtc aendtc astdy aendy dxdose apuper avisitn avisit parcat1 parcat2 astday epoch;
run;

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proc sql;
  create table dx_1_ as
    select usubjid,astdt,/"DERIVED" as paramtyp length=10,*/ sum(dxdose) as aval
    from dx_1
    group by usubjid,astdt;
quit;

proc sort data=dx_1(drop=dxdose) nodupkey;by usubjid astdt asdtc aendtc aendt astday aendy apuper epoch;run;

data dx_1;
  set dx_1;
  by usubjid astdt;
  if last.astdt;
  asdtc = scan(asdtc,1,'T');
  aendtc = scan(aendtc,1,'T');
run;

data dx_p1;
  length dtype $20;
  merge dx_1(in=a) dx_1_;
  by usubjid astdt;
  if a;
  dtype = "SUM";
run;

data dx_p1;
  length param $100 paramcd $8 parcat3 $100 dtype avalu $20;
  set dx(where=(index(dxscat,"PRODUCT USE DIARY")) dx_p1;
  param = "Daily THS 2.2 Administration";
  paramcd = "DTHS2_2";
  paramn = 1;
  avalu = "STICKS/DAY";
  parcat3 = "DAILY PRODUCT USE";
  parcat3n = 1;
run;

***create parameter 2;
%cal_1(ds1n2=dx_p1,dsout2=dx_p2,apuper=1)

data dx_p2;
  length param $100 paramcd $8 parcat3 $100 paramtyp $10 avalu $20;
  set dx_p2;
  param = "Average Daily THS 2.2 by Period";
  paramcd = "PDTHS2_2";
  paramn = 2;
  parcat3 = "AVERAGE DAILY PRODUCT USE BY PERIOD";
  parcat3n = 2;
  paramtyp = "DERIVED";
  avalu = "STICKS/DAY";
  dtype = "AVERAGE";
  keep usubjid aval apuper param paramcd paramn parcat3 parcat3n paramtyp avalu dtype parcat1 ;
run;

***create parameter 3;
%cal_1(ds1n2=dx_p1,dsout2=dx_p3,apuper=)

data dx_p3;
  length param $100 paramcd $8 parcat3 $100 paramtyp $10 avalu dtype $20;
  set dx_p3;
  param = "Average Daily THS 2.2 in Ambulatory";
  paramcd = "ADTHS2_2";
  paramn = 3;
  parcat3 = "AVERAGE DAILY PRODUCT USE IN AMBULATORY";
  parcat3n = 3;
  paramtyp = "DERIVED";
  avalu = "STICKS/DAY";
  dtype = "AVERAGE";
  keep usubjid aval param paramcd paramn parcat3 parcat3n paramtyp avalu dtype parcat1 ;
run;

***Combine all parameter together;
data dx_p;
  set dx_p0 dx_p1 dx_p2 dx_p3;
run;

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*****Step2: Get data and create parameter from EX*****;

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***Get data from EX;
data ex;
  length srcdom $2 desc reasnd $200 parcat1 parcat2 $100 avalu status $20 lot $7 astdtc aendtc $16 epoch $25 avisit $40;
  set sdtm.ex(rename=(epoch=epoch1));
  if excat = "MENTHOL CONVENTIONAL CIGARETTES";
  srcdom = 'EX';
  srcseq = exseq;
  desc = extrt;
  parcat1 = excat;
  parcat2 = exscat;
  if exdostxt = '-9' then aval = 0;
  else if exdostxt = '-1' then aval = .;
  else aval = exdose;
  avalu = exdosu;
  status = exstat;
  reasnd = exreasnd;
  lot = '';
  avisitn = visitnum;
  avisit = visit;
  astdtc = exstdtc;
  aendtc = exendtc;
  astdy = exstdy;
  aendy = exendy;
  epoch = epoch1;

  if ASTDTC^='' then astdt = input(scan(ASTDTC,1,"T"),yymmdd10.);
  if index(ASTDTC,"T") then do;
    if length(scan(ASTDTC,2,"T")) = 5 then do;
      astdtm = dhms(astdt,0,0,input(scan(ASTDTC,2,"T"),time5.))+0;
    end;
    else if length(scan(ASTDTC,2,"T")) = 8 then astdtm = dhms(astdt,0,0,input(scan(ASTDTC,2,"T"),time8.));
    else put "WAR" "NING: Unexpected time format " ASTDTC=;
  end;
/* else astdtm = dhms(astdt,0,0,0);*/
  if AENDTC^='' then aendt = input(scan(AENDTC,1,"T"),yymmdd10.);
  if index(AENDTC,"T") then do;
    if length(scan(AENDTC,2,"T")) = 5 then do;
      aendtm = dhms(aendt,0,0,input(scan(AENDTC,2,"T"),time5.))+0;
    end;
    else if length(scan(AENDTC,2,"T")) = 8 then aendtm = dhms(aendt,0,0,input(scan(AENDTC,2,"T"),time8.));
    ELSE IF LENGTH(SCAN(AENDTC,2,"T")) = 2 THEN AENDTM = .;
    else put "WAR" "NING: Unexpected time format " AENDTC=;
  end;

  format astdtm aendtm datetime13. astdt aendt date9.;
/* drop astdtc1 aendtc1;*/
run;

***Calculate astday;
data ex;
  merge ex(in=a) adsl(keep=usubjid trtsdt);
  by usubjid;
  if a;
  if nmiss(astdt,trtsdt) = 0 then astday = astdt-trtsdt + 1;
run;

***Assign apuper;
%apuper(dsin1=ex,dsout1=ex)

***Create parameter from EX;
***Create parameter 10;
data ex_p0;
  length param $100 paramcd $8;
  set ex;
  if index(exscat,"PRODUCT USE DIARY")=0;
  paramn = 10;
  paramcd = "MCC";
  param = "mCC";
run;

***Create parameter 11;
data ex_1;
  set ex;
  if index(exscat,"PRODUCT USE DIARY")=0 and avisitn not in (130 160 190);
  astdtc = put(astdt,yymmdd10.);

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aendtc = put(aendt,yymmdd10.);
keep usubjid astdtc astdt aendtc aendt astdy aendy exdose apuper avisit avisitn parcat1 parcat2 astday epoch;
run;

proc sql;
create table ex_1_ as
select usubjid,astdt, /*"DERIVED" as paramtyp length=10,*/ sum(exdose) as aval
from ex_1
group by usubjid,astdt;
quit;

proc sort data=ex_1(drop=exdose) nodupkey;by usubjid apuper parcat1 parcat2 astdt astdtc aendt aendtc astdy aendy epoch;run;
data ex_1;
set ex_1;
by usubjid apuper parcat1 parcat2 astdt astdtc aendt aendtc astdy aendy epoch;
if last.astdt;
run;
data ex_p1;
length dtype $20;
merge ex_1(in=a) ex_1_;
by usubjid astdt;
if a;
/* astdtm = .;*/
/* aendtm = .;*/
dtype = "SUM";
/* format astdtm aendtm datetime13.;*/
run;
data ex_p1;
length param $100 paramcd $8 parcat3 $100 avalu $20;
set ex(where=(index(exscat,"PRODUCT USE DIARY"))) ex_p1;
param = "Daily mCC Administration";
paramcd = "DMCC";
paramn = 11;
avalu = "CIGARETTES/DAY";
parcat3 = "DAILY PRODUCT USE";
parcat3n = 1;
run;

***Create parameter 12;
%cal_1(ds1n2=ex_p1,dsout2=ex_p2,apuper=1)

data ex_p2;
length param $100 paramcd $8 parcat3 $100 paramtyp $10 avalu $20;
set ex_p2;
param = "Average Daily mCC by Period";
paramcd = "PDMCC";
paramn = 12;
parcat3 = "AVERAGE DAILY PRODUCT USE BY PERIOD";
parcat3n = 2;
paramtyp = "DERIVED";
avalu = "CIGARETTES/DAY";
dtype = "AVERAGE";
keep usubjid aval apuper param paramcd paramn parcat3 parcat3n paramtyp avalu dtype parcat1 ;
run;

***create parameter 13;
%cal_1(ds1n2=ex_p1,dsout2=ex_p3,apuper=)

data ex_p3;
length param $100 paramcd $8 parcat3 $100 paramtyp $10 avalu dtype $20;
set ex_p3;
param = "Average Daily mCC in Ambulatory";
paramcd = "ADMCC";
paramn = 13;
parcat3 = "AVERAGE DAILY PRODUCT USE IN AMBULATORY";
parcat3n = 3;
paramtyp = "DERIVED";
avalu = "CIGARETTES/DAY";
dtype = "AVERAGE";
keep usubjid aval param paramcd paramn parcat3 parcat3n paramtyp avalu dtype parcat1 ;
run;

***Combine all parameter together;
data ex_p;
set ex_p0 ex_p1 ex_p2 ex_p3;
run;

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*****Step3: Get data and create parameter from SU*****;

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***Get data from SU;
data su;
  length srcdom $2 desc reasnd $200 parcat1 parcat2 $100 avalu status $20 lot $7 asdtc aendtc $16 epoch $25 avisit $40;
  set sdtm.su(rename=(epoch=epoch1));
  if sucat in ('NRT_USE' 'TOB_USE');
  srcdom = 'SU';
  srcseq = suseq;
  desc = sutrt;
  parcat1 = sucat;
  parcat2 = suscat;
  if sudostxt = '-9' then aval = 0;
  else if sudostxt = '-1' then aval = .;
  else aval = sudose;
  avalu = sudosu;
  status = '';
  reasnd = '';
  lot = '';
  avisitn = visitnum;
  avisit = visit;
  asdtc = sustdtc;
  aendtc = '';
  asddy = sustdy;
  aendy = .;
  epoch = epoch1;

  if ASTDTC^='' then asdt = input(scan(ASTDTC,1,"T"),yymmdd10.);
  if index(ASTDTC,"T") then do;
    if length(scan(ASTDTC,2,"T")) = 5 then do;
      asdtm = dhms(asdt,0,0,input(scan(ASTDTC,2,"T"),time5.))+0;
    end;
    else if length(scan(ASTDTC,2,"T")) = 8 then asdtm = dhms(asdt,0,0,input(scan(ASTDTC,2,"T"),time8.));
    else put "WAR" "NING: Unexpected time format " ASTDTC=;
  end;

  format asdtm datetime13. asdt date9.;
run;

***Calculate asday;
data su;
  merge su(in=a) adsl(keep=usubjid trtsdt);
  by usubjid;
  if a;
  if nmiss(asdt,trtsdt) = 0 then asday = asdt-trtsdt + 1;
run;

***Assign apuper;
%apuper(dsin1=su,dsout1=su)

data su_p1;
  length param $100 paramcd $8 parcat3 $100;
  set su;

  parcat3 = "DAILY PRODUCT USE";
  parcat3n = 1;

  if upcase(sutrt) = "INHALER" then do;
    param = "Daily Inhaler";
    paramcd = "DINHALER";
    paramn = 20;
  end;
  else if upcase(sutrt) = "NASPRAY" then do;
    param = "Daily Nasal Spray";
    paramcd = "DNASPRAY";
    paramn = 21;
  end;
  else if upcase(sutrt) = "GUMS" then do;
    param = "Daily Gums";
    paramcd = "DGUMS";
    paramn = 22;
  end;
  else if upcase(sutrt) = "LOZENGES" then do;
    param = "Daily Lozenges";
    paramcd = "DLOZENGE";
    paramn = 23;
  end;

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end;
else if upcase(sutrt) = "PATCHES" then do;
  param = "Daily Patches";
  paramcd = "DPATCHES";
  paramn = 24;
end;
else if upcase(sutrt) = "OTHNRT" then do;
  param = "Daily Other NRT Products";
  paramcd = "DOTHNRT";
  paramn = 25;
end;
else if upcase(sutrt) = "CHWSMKLS" then do;
  param = "Daily Chewable/Smokeless Tobacco";
  paramcd = "DCHWMKL";
  paramn = 26;
end;
else if upcase(sutrt) = "CIGARS" then do;
  param = "Daily Cigars/Cigarillos";
  paramcd = "DCIGARS";
  paramn = 27;
end;
else if upcase(sutrt) = "PIPE" then do;
  param = "Daily Pipes";
  paramcd = "DPIPE";
  paramn = 28;
end;
else if upcase(sutrt) = "OTHTOB" then do;
  param = "Daily Tobacco Not Listed Previously";
  paramcd = "DOTHTOB";
  paramn = 29;
end;
else if upcase(sutrt) = "E_CIG" then do;
  param = "Daily Electronic Cigarette";
  paramcd = "DE_CIG";
  paramn = 30;
end;
run;

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%cal_1(dsin2=su_p1,dsout2=su_p2,apuper=1)
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data su_p2;
  length param $100 paramcd $8 parcat3 $100 paramtyp $10;
  set su_p2(rename=(paramn=paramn1));

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if paramn1 = 20 then do;
  param = "Average Daily Inhaler by Period";
  paramcd = "PDINHAL";
  paramn = 50;
end;
if paramn1 = 21 then do;
  param = "Average Daily Nasal Spray by Period";
  paramcd = "PDNASPR";
  paramn = 51;
end;
if paramn1 = 22 then do;
  param = "Average Daily Gums by Period";
  paramcd = "PDGUMS";
  paramn = 52;
end;
if paramn1 = 23 then do;
  param = "Average Daily Lozenges by Period";
  paramcd = "PDLOZENG";
  paramn = 53;
end;
if paramn1 = 24 then do;
  param = "Average Daily Patches by Period";
  paramcd = "PDPATCHE";
  paramn = 54;
end;
if paramn1 = 25 then do;
  param = "Average Daily Other NRT by Period";
  paramcd = "PDOTHNRT";
  paramn = 55;
end;
if paramn1 = 26 then do;
  param = "Ave. Daily Chew/Smokeless Tob. by Period";
  paramcd = "PDCHWMKL";
  paramn = 56;

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end;
if paramn1 = 27 then do;
    param = "Average Daily Cigar/Cigarillo by Period";
    paramcd = "PDCIGARS";
    paramn = 57;
end;
if paramn1 = 28 then do;
    param = "Average Daily Pipes by Period";
    paramcd = "PDPIPE";
    paramn = 58;
end;
if paramn1 = 29 then do;
    param = "Average Daily Tob. Not Listed by Period";
    paramcd = "PDOTHTOB";
    paramn = 59;
end;
if paramn1 = 30 then do;
    param = "Average Daily E-Cigarette by Period";
    paramcd = "PDE_CIG";
    paramn = 60;
end;
parcat3 = "AVERAGE DAILY PRODUCT USE BY PERIOD";
parcat3n = 2;
paramtyp = "DERIVED";
dtype = "AVERAGE";
keep usubjid aval apuper param paramcd paramn parcat3 parcat3n paramtyp dtype parcat1 ;
run;

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%cal_1(dsin2=su_p1,dsout2=su_p3,apuper=)

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data su_p3;
length param $100 paramcd $8 parcat3 $100 paramtyp $10;
set su_p3(rename=(paramn=paramn1));
if paramn1 = 20 then do;
    param = "Average Daily Inhaler in Ambulatory";
    paramcd = "ADINHAL";
    paramn = 70;
end;
if paramn1 = 21 then do;
    param = "Average Daily Nasal Spray in Ambulatory";
    paramcd = "ADNASPR";
    paramn = 71;
end;
if paramn1 = 22 then do;
    param = "Average Daily Gums in Ambulatory";
    paramcd = "ADGUMS";
    paramn = 72;
end;
if paramn1 = 23 then do;
    param = "Average Daily Lozenges in Ambulatory";
    paramcd = "ADLOZENG";
    paramn = 73;
end;
if paramn1 = 24 then do;
    param = "Average Daily Patches in Ambulatory";
    paramcd = "ADPATCHE";
    paramn = 74;
end;
if paramn1 = 25 then do;
    param = "Average Daily Other NRT in Ambulatory";
    paramcd = "ADOTHNRT";
    paramn = 75;
end;
if paramn1 = 26 then do;
    param = "Ave. Daily Chew/Smokeless Tob. in Ambulatory";
    paramcd = "ADCHWMKL";
    paramn = 76;
end;
if paramn1 = 27 then do;
    param = "Average Daily Cigar/Cigarillo in Ambulatory";
    paramcd = "ADCIGARS";
    paramn = 77;
end;
if paramn1 = 28 then do;
    param = "Average Daily Pipes in Ambulatory";
    paramcd = "ADPIPE";
    paramn = 78;
end;

```

```

if paramn1 = 29 then do;
  param = "Average Daily Tob. Not Listed in Ambulatory";
  paramcd = "ADOTHTOB";
  paramn = 79;
end;
if paramn1 = 30 then do;
  param = "Average Daily E-Cigarette in Ambulatory";
  paramcd = "ADE_CIG";
  paramn = 80;
end;
parcat3 = "AVERAGE DAILY PRODUCT USE IN AMBULATORY";
parcat3n = 3;
paramtyp = "DERIVED";
dtype = "AVERAGE";
keep usubjid aval param paramcd paramn parcat3 parcat3n paramtyp dtype parcat1 ;
run;

***Combine all parameter together;
data su_p;
  set su_p1 su_p2 su_p3;
run;

data su_p;
  length visit $27;
  set su_p(rename=(visit=visit1));
  visit = visit1;
run;

*****;

*****Step4: Prepare and output dataset*****;

*****;

***Combine all data together;
data adex1;
  length aperiodc $10 apuperc $40;
  set dx_p ex_p su_p;

  if upcase(parcat1) = "TOBACCO HEATING SYSTEM MENTHOL" then parcat1n = 1;
  else if upcase(parcat1) = "MENTHOL CONVENTIONAL CIGARETTES" then parcat1n = 2;
  else if upcase(parcat1) = "NRT_USE" then parcat1n = 3;
  else if upcase(parcat1) = "TOB_USE" then parcat1n = 4;

  if upcase(parcat2) = "PRODUCT USE CONFINEMENT" then parcat2n = 1;
  else if upcase(parcat2) = "PRODUCT USE DIARY - ELECTRONIC" then parcat2n = 2;
  else if upcase(parcat2) = "PRODUCT USE DIARY - PAPER" then parcat2n = 3;

  aperiod = 1;
  aperiodc = "Period 1";

  if apuper = 0 then apuperc = "Pre-Randomization Period";
  else if apuper = 1 then apuperc = "Period 1";
  else if apuper = 2 then apuperc = "Period 2";
  else if apuper = 3 then apuperc = "Period 3";
  else if apuper = 4 then apuperc = "Period 4";

run;

***Assign analysis flag - anl01f1;
proc sort data=adex1 out=adex1_p;where APUPER >=2 and PARCAT3 = "DAILY PRODUCT USE" and avisit = ''; by usubjid paramcd apuper desce
nding aval srcseq;run;
data adex1_p;
  set adex1_p;
  by usubjid paramcd apuper descending aval srcseq;
  if first.apuper then anl01f1 = 'Y';
run;

***Assign analysis flag - anl02f1;
proc sort data=adex1_p;by usubjid paramcd descending aval srcseq;run;
data adex1_p;
  set adex1_p;
  by usubjid paramcd descending aval srcseq;
  if first.paramcd then anl02f1 = 'Y';
run;

data adex2;
  set adex1(where=(apuper < 2 or (apuper >=2 and ((parcat3 ne "DAILY PRODUCT USE") or (parcat3 = 'DAILY PRODUCT USE' and avisit ne ''

```

```

)))) adex1_p;
run;

***Get data from suppdx and suppex domain;
data suppdx;
  length other_dx $20;
  set sdtm.suppdx(where=(qnam = "DXOTH"));
  other_dx = qval;
  dxseq = input(idvarval,best.);
  keep usubjid other_dx dxseq;
run;
data suppex;
  length other_ex $20;
  set sdtm.suppex(where=(qnam="OTHER"));
  other_ex = qval;
  exseq = input(idvarval,best.);
  keep usubjid other_ex exseq;
run;

proc sort data=suppdx;by usubjid dxseq;run;
proc sort data=adex2;by usubjid dxseq;run;
data adex2;
  merge adex2(in=a) suppdx;
  by usubjid dxseq;
  if a;
run;

proc sort data=suppex;by usubjid exseq;run;
proc sort data=adex2;by usubjid exseq;run;
data adex2;
  merge adex2(in=a) suppex;
  by usubjid exseq;
  if a;
run;

data adex2;
  length other $20;
  set adex2;
  if other_dx ne '' then other = other_dx;
  if other_ex ne '' then other = other_ex;
run;

proc sort data=adex2;by usubjid;run;
proc sort data=adsl;by usubjid;run;
data adex;
  length trtp trta $40;
  merge adex2(in=a drop=studyid randdt trtsdt) adsl(in=b);
  by usubjid;
  if a;
  trtp = trt01p;
  trtpn = trt01pn;
  trta = trt01a;
  trtan = trt01an;
  avisit = propcase(avisit);
  if trtpn in (97 98) then do;
    apuper = .;
    apuperc = '';
  end;
run;

***Add variable attribute;
%m_attrib_adam(dset=adex);

proc sort data=adex;
by USUBJID AVISITN PARAMCD APUPER ASTDTC AENDTC SRCDOM SRCSEQ ;
run;

*** Output dataset;
data adam.adex(label = "Exposure Analysis Dataset" );
  set adex;
run;

***Deletes all SAS files in the WORK library that are available for processing;
/*proc datasets library=work kill;*/
/*run;*/

proc printto ;

```

```
run;

    ***check the log, if there is any findings, please make sure to resolve;
%m_chklog(TFL_part=dev,pgm_type=adam,pgm_name=d_2adex,serv=dev,covstudyid=000000106343);
```