Logistic (RLOGIST) Example #3

SUDAAN Statements and Results Illustrated

- PREDMARG (predicted marginal proportion)
- CONDMARG (conditional marginal proportion)
- PRED_EFF pairwise comparison
- COND_EFF pairwise comparison
- SUBPOPX

Input Data Set(s): SAMADULTED.SAS7bdat

Example

Using 2006 NHIS data, determine for white adults the effects of age and sex on the occurrence of not being able to afford prescription medications in the past year, controlling for region of country, education, and marital status.

This example highlights the PREDMARG and CONDMARG statements and the PRED_EFF and COND_EFF statements in obtaining model-adjusted risks, risk ratios, and risk differences in the context of a main-effects logistic model. For the sake of generality, the terms marginal, prevalence, and risk will be used interchangeably.

This example also highlights the estimation of confidence intervals for predictive margins.

Solution

NHIS is an annual multipurpose health sample survey conducted by the National Center for Health Statistics (NCHS). For more information about the data used in this example, see ***Section 12.7***. The 2006 NHIS collected data on approximately 29,200 households; 29,900 families; 75,700 persons; 24,275 sample adults; and 9,800 sample children.

In the 2006 study, each sample adult was asked (variable AHCAFYR1):

"*During the PAST 12 MONTHS, was there any time when you needed prescription medicine but didn't get it because you couldn't afford it*?"

Possible answer codes are yes, no, don't know, refused, and not ascertained. Only 0.96% of sample adults were coded as something other than yes or no. The constructed variable CANTAFMEDS is created from AHCAFYR1 and is coded as 1=*yes* (could not afford at least once in the past 12 months) or 0=*no* (event did not happen). All other responses are coded to missing.

This example first uses the DESCRIPT procedure to estimate population parameters for each categorical covariate separately and the RLOGIST procedure (SAS-Callable SUDAAN) to model the probability that the dependent variable CANTAFMEDS is equal to 1 as a function of the set of independent variables. In RLOGIST, the response variable must be coded 1 or 0.

For variance estimation purposes, the complex sampling plan is described as 300 pseudo-strata with two pseudo-PSUs per stratum. Sampling at the first PSU stage is assumed to be with replacement. Each unit of analysis (sample adult, sample child, person, etc.) is clustered within his/her PSU, and lower level sampling units are not identified.

In this example (see ***Exhibit 1***), we use the sample adult (age 18 and older) data file with 24,275 observations. The stratification and primary sampling unit variables are named STRAT_P and PSU_P, respectively, and appear on the NEST statement. The weight variable for the sample adult file is WTFA_SA and appears on the WEIGHT statement. The PROC statements specify DESIGN=WR (*i.e.*, unequal probability sampling of PSUs with replacement), and Taylor Series linearization is used for variance estimation. The subpopulation is defined as white (MRACRPI2=1) and at least 25 years old (AGE_P >= 25).

The first DESCRIPT procedure (middle section of ***Exhibit 1***) investigates the univariate relationship between each of the five independent variables and the dependent variable CANTAFMEDS. The mean of the variable CANTAFMEDS is requested on the VAR statement below. The CATLEVEL statement specifies that we want to estimate totals and percentages for CANTAFMEDS=1. Here, the mean is the estimated percentage of adults incurring the event, and the total is the estimated number of adults incurring the event. The TABLES statement requests the estimated percentage by each of five independent variables:

- sex (SEX: 1=Male, 2=Female);
- categorical age at three levels (AGE25_3: 1=25-44, 2=45-64, 3=65+);
- categorical education at three levels (EDUC_3: 1=HS or Less, 2=Some College, 3=College Grad);
- region of the U.S. at four levels (REGION: 1=NE, 2=Midwest, 3=South, 4=West); and
- marital status at three levels (MARRY_3: 1=Married, 2=Widowed, 3=Unmarried).

These five variables are on the CLASS statement. The SUBPOPX statement restricts the DESCRIPT analysis to the same subjects who are included in the subsequent RLOGIST analysis. The PRINT statement (optional) is used to request specific statistics, change default labels for those statistics, and change the default formats for those statistics. Without the PRINT statement, a set of default statistics are produced, with default formats and labels. The RFORMAT statements associate the SAS formats with the variables used in the DESCRIPT procedure. The RLABEL statement defines variable labels for use in the current procedure only. Without the RLABEL statement, SAS variable labels would be produced if already defined.

The second DESCRIPT procedure (bottom half of ***Exhibit 1***) computes ***differences*** (DIFFVAR statement) in the percentage of people not able to afford prescription medication among the three age groups. All age-related estimates produced by DESCRIPT are unadjusted for other covariates.

This example was run in SAS-Callable SUDAAN, and the SAS program and *.LST files are provided.

Exhibit 1. SAS-Callable SUDAAN Code (PROC DESCRIPT)

```
libname in "c:\10winbetatest\AmJEpid";

options nocenter pagesize=70 linesize=95;
proc format;
 value educ 1="1=HS or Less"
            2="2=Some College"
            3="3=College+";
 value age 1="25-44"
           2="45-64"
           3="65+";
 value sex 1="1=Male"
           2="2=Female";
 value region 1="1=N.E."
              2="2=Midwest"
              3="3=South"
              4="4=West";
 value marry 1="1=Married"
             2="2=Widowed"
             3="3=Unmarried";
 value yesno 1="Yes"
             0="No";

Data samadult; set in.samadulted;
 if 0 le educ1 le 14 then educ_3=1;
 else if educ1=15 then educ_3=2;
 else if 16 le educ1 le 21 then educ_3=3;
 else educ_3=.;

 if 25 le age_p le 44 then age25_3=1;
 else if 45 le age_p le 64 then age25_3=2;
 else if age_p ge 65 then age25_3=3;

 if r_maritl in (1,2,3) then marry_3=1;
 else if r_maritl=4 then marry_3=2;
 else if r_maritl in (5,6,7,8) then marry_3=3;
 else marry_3=.;

 if ahcafyr1=1 then cantafmeds=1;
 else if ahcafyr1=2 then cantafmeds=0;
 else if ahcafyr1 in (7,8,9) then cantafmeds=.;

proc sort data=samadult; by strat_p psu_p;

PROC DESCRIPT DATA=samadult DESIGN=WR FILETYPE=SAS;
  NEST STRAT_P PSU_P;
  WEIGHT WTFA_SA;

  /* Subset to subjects used in logistic regression analysis:
     Age 25+, Race=White, No missing values on variables */

  SUBPOPX AGE_P >= 25 AND MRACRPI2=1 AND CANTAFMEDS in (0,1)
          AND EDUC_3 in (1,2,3) AND MARRY_3 in (1,2,3)
          / NAME="Sample Adults in Logistic Regression Analysis";

  CLASS SEX AGE25_3 EDUC_3 REGION MARRY_3;
  VAR CANTAFMEDS; /* coded 1 or 0 */
  CATLEVEL 1;    /* Calc percentage with CANTAFMEDS=1 */
  TABLES SEX AGE25_3 EDUC_3 REGION MARRY_3;

  SETENV labwidth=20;
  PRINT NSUM="Sample Size" WSUM="Weighted Size" TOTAL="Number Can't Afford"
        PERCENT="Pct Can't Afford" SEPERCENT="SE(Pct)" /
        NSUMFMT=F6.0 WSUMFMT=F9.0 TOTALFMT=F12.0 PERCENTFMT=F9.2
        SEPERCENTFMT=F10.2 STYLE=NCHS;
  RLABEL CANTAFMEDS="Can't Afford Meds Past 12m";
  RLABEL age25_3="Age Group";
  RFORMAT age25_3 age.;
  RFORMAT CANTAFMEDS yesno.;
  RFORMAT sex sex.;
```

```
  RFORMAT educ_3 educ.;
  RFORMAT region region.;
  RFORMAT marry_3 marry.;
  RTITLE "Effect of Demographics on Can't Afford Meds, Past 12 Months"
         "Whites Age 25+";
  RFOOTNOTE "Data Source: NCHS National Health Interview Survey (2006)";


PROC DESCRIPT DATA=samadult DESIGN=WR FILETYPE=SAS nomarg;
  NEST STRAT_P PSU_P;
  WEIGHT WTFA_SA;

  SUBPOPX AGE_P >= 25
          AND MRACRPI2=1
          AND CANTAFMEDS in (0,1)
          AND EDUC_3 in (1,2,3)
          AND MARRY_3 in (1,2,3)
          / NAME="Sample Adults in Logistic Regression Analysis";

  CLASS AGE25_3;
  VAR CANTAFMEDS;
  CATLEVEL 1;
  TABLES _one_;

  DIFFVAR AGE25_3=(1 3) / NAME = "25-44 vs. 65+";
  DIFFVAR AGE25_3=(2 3) / NAME = "45-64 vs. 65+";
  DIFFVAR AGE25_3=(1 2) / NAME = "25-44 vs. 45-64";

  SETENV labwidth=24;
  PRINT NSUM="Sample Size" PERCENT="DiffPct"
        SEPERCENT="SE" T_PCT="T:Diff=0" P_PCT="P:Diff=0"/
        NSUMFMT=F6.0 PERCENTFMT=F8.2 SEPERCENTFMT=F10.2 T_PCTFMT=F8.2
        P_PCTFMT=F8.4 STYLE=NCHS;
  RLABEL CANTAFMEDS="Can't Afford Meds Past 12m";
  RLABEL age25_3="Age Group";
  RFORMAT age25_3 age.;
  RFORMAT CANTAFMEDS yesno.;
  RTITLE "Effect of Age on Can't Afford Meds, Past 12 Months"
         "Whites Age 25+";
  RFOOTNOTE "Data Source: NCHS National Health Interview Survey (2006)";
```

Exhibit 2. First Page of SUDAAN Output (PROC DESCRIPT)

```
                              S U D A A N
            Software for the Statistical Analysis of Correlated Data
          Copyright      Research Triangle Institute     February 2011
                            Release 11.0.0


DESIGN SUMMARY: Variances will be computed using the Taylor Linearization Method, Assuming a
With Replacement (WR) Design
    Sample Weight: WTFA_SA
    Stratification Variables(s): STRAT_P
    Primary Sampling Unit: PSU_P


Number of observations read    :  24275    Weighted count :220266693
Observations in subpopulation  :  16042    Weighted count :154637709
Denominator degrees of freedom :    300
```

The number of subjects defined by the SUBPOPX statement is 16,042 (see ***Exhibit 2***); they make inference to 154,637,709 white adults in the population aged 25 and older. The denominator degrees of freedom is 300 (*i.e*., 600 PSUs minus 300 strata).

Exhibit 3. CLASS Variable Frequencies (Sex)

```
Frequencies and Values for CLASS Variables
by: Sex.
-------------------------------------
Sex              Frequency       Value
-------------------------------------
Ordered
  Position:
  1                   7179      1=Male
Ordered
  Position:
  2                   8863    2=Female
-------------------------------------
```

Exhibit 4. CLASS Variable Frequencies (Age Group)

```
Frequencies and Values for CLASS Variables
by: AGE25_3.
----------------------------------
AGE25_3          Frequency    Value
----------------------------------
Ordered
  Position:
  1                   6453    25-44
Ordered
  Position:
  2                   5982    45-64
Ordered
  Position:
  3                   3607      65+
----------------------------------
```

Exhibit 5. CLASS Variable Frequencies (Education Level)

```
Frequencies and Values for CLASS Variables
by: EDUC_3.
-------------------------------------------
EDUC_3          Frequency             Value
-------------------------------------------
Ordered
  Position:
  1                  7535      1=HS or Less
Ordered
  Position:
  2                  2713    2=Some College
Ordered
  Position:
  3                  5794        3=College+
-------------------------------------------
```

Exhibit 6. CLASS Variable Frequencies (Region)

```
Frequencies and Values for CLASS Variables
by: Region.
--------------------------------------
Region          Frequency        Value
--------------------------------------
Ordered
  Position:
  1                  2737       1=N.E.
Ordered
  Position:
  2                  3832    2=Midwest
Ordered
  Position:
  3                  5693      3=South
Ordered
  Position:
  4                  3780       4=West
--------------------------------------
```

Exhibit 7. CLASS Variable Frequencies (Marital Status)

```
Frequencies and Values for CLASS Variables
by: MARRY_3.
----------------------------------------
MARRY_3         Frequency          Value
----------------------------------------
Ordered
  Position:
  1                  8796      1=Married
Ordered
  Position:
  2                  1723      2=Widowed
Ordered
  Position:
  3                  5523    3=Unmarried
----------------------------------------
```

Exhibit 8. Univariate Estimates for CANTAFMEDS (By SEX)

```
Variance Estimation Method: Taylor Series (WR)
For Subpopulation: Sample Adults in Logistic Regression Analysis

Effect of Demographics on Can't Afford Meds, Past 12 Months
Whites Age 25+

by: Variable, Sex.
--------------------------------------------------------------------------------
Variable               Sample   Weighted    Number Can't   Pct Can't
   Sex                 Size     Size        Afford         Afford         SE(Pct)
--------------------------------------------------------------------------------
CANTAFMEDS: Yes
   Total                16042   154637709       11891658       7.69         0.27
   1=Male                7179    74914054        4603694       6.15         0.38
   2=Female              8863    79723655        7287964       9.14         0.37
--------------------------------------------------------------------------------
Data Source: NCHS National Health Interview Survey (2006)
```

Exhibit 8 indicates that females seem more likely to incur the event of inability to afford prescription medication.

Exhibit 9. Univariate Estimates for CANTAFMEDS (By Age Group)

```
Variance Estimation Method: Taylor Series (WR)
For Subpopulation: Sample Adults in Logistic Regression Analysis

Effect of Demographics on Can't Afford Meds, Past 12 Months
Whites Age 25+

by: Variable, Age Group.
--------------------------------------------------------------------------------
Variable               Sample   Weighted    Number Can't   Pct Can't
   Age Group           Size     Size        Afford         Afford         SE(Pct)
--------------------------------------------------------------------------------
CANTAFMEDS: Yes
   Total                16042   154637709       11891658       7.69         0.27
   25-44                 6453    63653320        5900963       9.27         0.50
   45-64                 5982    60695038        5068053       8.35         0.40
   65+                   3607    30289351         922642       3.05         0.34
--------------------------------------------------------------------------------
Data Source: NCHS National Health Interview Survey (2006)
```

Exhibit 9 indicates that younger people seem more likely than older people to incur the event of inability to afford prescription medication.

Exhibit 10. Univariate Estimates for CANTAFMEDS (By Education)

```
Variance Estimation Method: Taylor Series (WR)
For Subpopulation: Sample Adults in Logistic Regression Analysis

Effect of Demographics on Can't Afford Meds, Past 12 Months
Whites Age 25+

by: Variable, EDUC_3.
--------------------------------------------------------------------------------
Variable               Sample   Weighted    Number Can't   Pct Can't
   EDUC_3              Size     Size        Afford         Afford        SE(Pct)
--------------------------------------------------------------------------------
CANTAFMEDS: Yes
   Total                16042   154637709       11891658        7.69         0.27
   1=HS or Less          7535    69761406        6581372        9.43         0.41
   2=Some College        2713    26321699        2700286       10.26         0.68
   3=College+            5794    58554604        2610000        4.46         0.30
--------------------------------------------------------------------------------Data Source:
NCHS National Health Interview Survey (2006)
```

Exhibit 10 indicates that those with at least a college education seem less likely to incur the event of inability to afford prescription medication.

Exhibit 11. Univariate Estimates for CANTAFMEDS (By Region)

```
Variance Estimation Method: Taylor Series (WR)
For Subpopulation: Sample Adults in Logistic Regression Analysis

Effect of Demographics on Can't Afford Meds, Past 12 Months
Whites Age 25+

by: Variable, Region.
--------------------------------------------------------------------------------
Variable               Sample   Weighted    Number Can't   Pct Can't
   Region              Size     Size        Afford         Afford        SE(Pct)
--------------------------------------------------------------------------------
CANTAFMEDS: Yes
   Total                16042   154637709       11891658        7.69         0.27
   1=N.E.                2737    27697703        1521292        5.49         0.53
   2=Midwest             3832    38708172        2927690        7.56         0.46
   3=South               5693    55545143        4882977        8.79         0.51
   4=West                3780    32686691        2559699        7.83         0.60
--------------------------------------------------------------------------------Data Source:
NCHS National Health Interview Survey (2006)
```

The results in ***Exhibit 11*** suggest that there may be geographical variation in the likelihood of incurring the event. Adults residing in the Northeast seem less likely to incur the event.

Exhibit 12. Univariate Estimates for CANTAFMEDS (By Marital Status)

```
Variance Estimation Method: Taylor Series (WR)
For Subpopulation: Sample Adults in Logistic Regression Analysis

Effect of Demographics on Can't Afford Meds, Past 12 Months
Whites Age 25+

by: Variable, MARRY_3.
--------------------------------------------------------------------------------
Variable               Sample   Weighted    Number Can't   Pct Can't
   MARRY_3             Size     Size        Afford         Afford         SE(Pct)
--------------------------------------------------------------------------------
CANTAFMEDS: Yes
   Total                16042   154637709       11891658        7.69         0.27
   1=Married             8796   101508884        5919779        5.83         0.29
   2=Widowed             1723    10938199         564207        5.16         0.66
   3=Unmarried           5523    42190626        5407672       12.82         0.53
--------------------------------------------------------------------------------
Data Source: NCHS National Health Interview Survey (2006)
```

Exhibit 12 indicates that those who are married or widowed seem less likely to incur the event than those who are unmarried (never married, divorced, separated, or living as married).

We now proceed to compare pairwise differences among age groups, unadjusted for other covariates, using the DESCRIPT procedure. The main difference between the first and second DESCRIPT call (***Exhibit 11***) is the addition of the DIFFVAR statements:

```
   DIFFVAR AGE25_3=(1 3) / NAME = "25-44 vs. 65+";
   DIFFVAR AGE25_3=(2 3) / NAME = "45-64 vs. 65+";
   DIFFVAR AGE25_3=(1 2) / NAME = "25-44 vs. 45-64";
```

Exhibit 13. 2nd DESCRIPT: Pairwise Differences Among Age Groups

```
Variance Estimation Method: Taylor Series (WR)
For Subpopulation: Sample Adults in Logistic Regression Analysis

Effect of Age on Can't Afford Meds, Past 12 Months
Whites Age 25+

for: Variable = CANTAFMEDS: Yes.
-------------------------------------------------------------------------------
                        Sample
CONTRAST                Size      DiffPct          SE   T:Diff=0   P:Diff=0
----------------------------------------------------------------------------
25-44 vs. 65+            10060       6.22         0.62      10.05     0.0000
45-64 vs. 65+             9589       5.30         0.52      10.20     0.0000
25-44 vs. 45-64          12435       0.92         0.64       1.44     0.1509
----------------------------------------------------------------------------
Data Source: NCHS National Health Interview Survey (2006)
```

Exhibit 13 indicates that the oldest age group (65+) has a significantly reduced likelihood of incurring the event compared to the two younger age groups. There is no significant difference between the age groups less than 65 years old.

We now proceed to the logistic regression analysis. The SUDAAN design specification is the same as in the previous DESCRIPT program.

The MODEL statement of the RLOGIST program (***Exhibit 14***) identifies CANTAFMEDS as the dependent variable; it is coded as 1=incur event (can't afford) and 0=not incur event. The independent variables in the main-effects model are the same as in the previous DESCRIPT program. Since all of the independent variables are to be modeled as categorical, they all appear on the CLASS statement. The default Wald-*F* test is used for all tests of hypotheses.

The SUBPOPX statement restricts the analysis to whites aged 25 years or more. The REFLEVEL statement defines the regression coefficient reference level for sex, region, and marital status to be the first level of each variable. Since age and education are not included on the REFLEVEL statement, the last level of each of these variables will be used as the reference level for estimating regression coefficients (3=65+ for age; and 3=Unmarried for marital status). REFLEVEL is optional; the default reference cell for each categorical variable in the model is the last sorted level of each variable.

The EFFECTS statement tests the null hypothesis that the *regression coefficients* for the two youngest age groups, 1=25-44 yrs and 2=45-64 yrs, are equal to each other. All other comparisons of age regression coefficients are in the default regression coefficient output (Age=1 vs. 3, 2 vs. 3). The EXP option will exponentiate the same EFFECTS contrast among regression coefficients to provide the user-requested odds ratio for not being able to afford prescription drugs among 25-44 yr-olds vs. 45-64 yr-olds (the default odds ratios compare each age group to the oldest, which is the reference cell).

```
EFFECTS AGE25_3 = (1 -1 0) / EXP name="Age: 25-44 vs. 45-64";
```

The CONDMARG statement requests the conditional marginal proportion **(*model-adjusted risk*)** for each level of age. The log odds of incurring the event for a given level of age are calculated from the estimated linear model by specifying the value of the age variable as the level of interest and then specifying all other variables in the model (except age) to be the estimated percentage distribution in the population. Based on the obtained log odds, the probability of incurring the event (model-adjusted risk) is then calculated for a specific level of the age variable. The ADJRR option on the CONDMARG statement computes the *model-adjusted risk ratio* for each age group compared to the last (unless a different reference cell is specified on the CONDMARG statement).

The PREDMARG statement requests the predicted marginal proportion (another estimator of the ***model-adjusted risk***) for each level of age. For a given level of the age variable, the estimated model is used to predict the probability of the event for each observation by assuming that each observation is in the given level of the age variable; the individual's covariate values (except for age) are used in the estimated model. Then, the weighted mean (using WTFA_SA) of the predicted probabilities yields the predicted marginal proportion. The ADJRR option on the PREDMARG statement computes the ***model-adjusted risk ratio*** for each age group compared to the last (unless a different reference cell is specified on the PREDMARG statement).

The COND_EFF and PRED_EFF statements perform pairwise comparisons **(*model-adjusted risk differences*)** among the three levels of age, based on the conditional marginal proportions and predicted marginal proportions, respectively.

We include multiple PRINT statements, all of which are optional. Multiple PRINT statements allow us to set up different default print environments (SETENV statements) for different PRINT groups. The PRINT statements are used in this example to request the PRINT groups of interest, in some cases to change default labels for those statistics, and to specify a variety of formats for those printed statistics. Without the PRINT statement, default statistics are produced from each PRINT group, with default formats.

The SETENV statements are optional. They set up default formats for printed statistics and further manipulate the printout to the needs of the user.

The RFORMAT statements associate the SAS formats with the variables used in the RLOGIST procedure. The RLABEL statement defines variable labels for use in the current procedure only. Without the RLABEL statement, SAS variable labels would be produced if already defined.

Exhibit 14. SAS-Callable SUDAAN Code (RLOGIST)

```
PROC RLOGIST DATA=samadult DESIGN=WR FILETYPE=SAS;
  NEST STRAT_P PSU_P;
  WEIGHT WTFA_SA;

  SUBPOPX AGE_P>24 AND MRACRPI2=1 / NAME="WHITES AGED 25+";
  CLASS SEX AGE25_3 EDUC_3 REGION MARRY_3;

  REFLEVEL SEX=1 REGION=1 MARRY_3=1;
  MODEL CANTAFMEDS = SEX AGE25_3 EDUC_3 REGION MARRY_3;
  EFFECTS AGE25_3 = (1 -1 0) / exp name="AGE: 25-44 vs. 45-64";

  CONDMARG AGE25_3 / adjrr;
  PREDMARG AGE25_3 / adjrr;

  COND_EFF AGE25_3=(1 0 -1) / NAME = "25-44 vs. 65+";
  COND_EFF AGE25_3=(0 1 -1) / NAME = "45-64 vs. 65+";
  COND_EFF AGE25_3=(1 -1 0) / NAME = "25-44 vs. 45-64";

  PRED_EFF AGE25_3=(1 0 -1) / NAME = "25-44 vs. 65+";
  PRED_EFF AGE25_3=(0 1 -1) / NAME = "45-64 vs. 65+";
  PRED_EFF AGE25_3=(1 -1 0) / NAME = "25-44 vs. 45-64";

  setenv labwidth=17 colspce=1;
  print / betas=default betafmt=f7.4 sebetafmt=f8.4 lowbetafmt=f7.4 upbetafmt=f7.4
          t_betafmt=f6.2 p_betafmt=f7.4;

  setenv labwidth=23 colspce=4 decwidth=3;
  print / risk=default tests=default expcntrst=default waldpfmt=f7.4
          dffmt=f7.0 loworfmt=f9.3 uporfmt=f9.3 low_cntrstfmt=f5.3
          up_cntrstfmt=f5.3;

  setenv colspce=1 labwidth=22 decwidth=4 colwidth=9;
  print condmrg="CONDMARG" predmrg="PREDMARG" /
cond_mrg=default cnmgcons=default pred_mrg=default prmgcons=default
        t_cndmrgfmt=f8.2 t_prdmrgfmt=f8.2 t_cmconfmt=f8.2 t_pmconfmt=f8.2;

  setenv labwidth=27 decwidth=3 colwidth=5 colspce=5;
  print cond_rr="Risk Ratio" pred_rr="Risk Ratio"
        / condrisk=default predrisk=default;

  RLABEL age25_3="Age Group";
  RLABEL cantafmeds="Can't Afford Meds Past 12m";
  RFORMAT sex sex.;
  RFORMAT age25_3 age.;
  RFORMAT educ_3 educ.;
  RFORMAT region region.;
  RFORMAT marry_3 marry.;
  RTITLE "Modelling Can't Afford Rx Meds, Past 12 Months";
  RFOOTNOTE "Data Source: NCHS National Health Interview Survey (2006)";
```

Exhibit 15. First Page of RLOGIST Output

```
                                S U D A A N
            Software for the Statistical Analysis of Correlated Data
          Copyright      Research Triangle Institute     February 2011
                              Release 11.0.0


DESIGN SUMMARY: Variances will be computed using the Taylor Linearization Method, Assuming a With
Replacement (WR) Design
    Sample Weight: WTFA_SA
    Stratification Variables(s): STRAT_P
    Primary Sampling Unit: PSU_P


Number of zero responses     : 14737
Number of non-zero responses :  1305

Independence parameters have converged in 7 iterations

Number of observations read       :  24275    Weighted count:220266693
Observations in subpopulation     :  16469    Weighted count:158409519
Observations used in the analysis :  16042    Weighted count:154637709
Denominator degrees of freedom    :    300


Maximum number of estimable parameters for the model is 11

File SAMADULT contains  600 Clusters
 596 clusters were used to fit the model
Maximum cluster size is  71 records
Minimum cluster size is   1 records


Sample and Population Counts for Response Variable CANTAFMEDS
Based on observations used in the analysis
0:  Sample Count    14737    Population Count 142746051
1:  Sample Count     1305    Population Count  11891658

R-Square for dependent variable CANTAFMEDS (Cox & Snell, 1989): 0.035912

-2 * Normalized Log-Likelihood with Intercepts Only :  8699.01
-2 * Normalized Log-Likelihood Full Model           :  8112.31
Approximate Chi-Square (-2 * Log-L Ratio)           :   586.69
Degrees of Freedom                                  :       10

Note: The approximate Chi-Square is not adjusted for clustering.Refer to hypothesis test table
for adjusted test.
```

SUDAAN read in 24,275 observations from the data set (see ***Exhibit 15***), and 16,469 of these adults are in the subpopulation defined as white, aged 25 years and older. Of these observations, 16,042 are in the logistic regression analysis and represent 154,637,709 adults in the population. The 427 observations deleted from the logistic regression analysis (2.6% of the subpopulation observations) have a missing value for one or more of the variables on the MODEL statement. The assumption is made that these 427 observations are missing at random so that the results of the logistic regression analysis can be generalized to the population of white adults aged 25 and older in the civilian, noninstitutionalized household population.

Among the 16,042 observations in the analysis, the number who incurred the event (could not afford prescription drugs) was 1,305; 14,737 did not incur the event (see top of ***Exhibit 15***).

Eleven parameters were estimated, and the logistic regression equation converged in seven iterations. From the total of 600 clusters (PSUs) in the data set, 596 clusters were used to fit the model, because 4 clusters did not contain any adults in the defined subpopulation. The minimum cluster size (number of subpopulation adults in a cluster or PSU) was one, and the maximum cluster size was 71 (see middle of ***Exhibit 15***).

The frequencies for CLASS variables used in the model are not presented here, but the reader can refer to the frequencies presented for DESCRIPT, earlier in this example.

Exhibit 16. Regression Coefficient Estimates

```
Variance Estimation Method: Taylor Series (WR)
SE Method: Robust (Binder, 1983)
Working Correlations: Independent
Link Function: Logit
Response variable CANTAFMEDS: Can't Afford Meds Past 12m
For Subpopulation: WHITES AGED 25+

Modelling Can't Afford Rx Meds, Past 12 Months

by: Independent Variables and Effects.
-----------------------------------------------------------------------------
Independent                              Lower      Upper
  Variables and                          95%        95%                P-value
  Effects           Beta                 Limit      Limit     T-Test   T-Test
                    Coeff.     SE Beta   Beta       Beta      B=0      B=0
-----------------------------------------------------------------------------
Intercept           -5.1034     0.1970   -5.4910    -4.7157   -25.91    0.0000
Sex
  1=Male             0.0000     0.0000    0.0000     0.0000      .         .
  2=Female           0.5179     0.0821    0.3563     0.6795     6.31    0.0000
Age Group
  25-44              1.2535     0.1528    0.9528     1.5542     8.20    0.0000
  45-64              1.1770     0.1435    0.8947     1.4593     8.20    0.0000
  65+                0.0000     0.0000    0.0000     0.0000      .         .
EDUC_3
  1=HS or Less       0.8885     0.0806    0.7298     1.0472    11.02    0.0000
  2=Some College     0.8857     0.1022    0.6845     1.0869     8.66    0.0000
  3=College+         0.0000     0.0000    0.0000     0.0000      .         .
Region
  1=N.E.             0.0000     0.0000    0.0000     0.0000      .         .
  2=Midwest          0.3380     0.1268    0.0884     0.5876     2.67    0.0081
  3=South            0.4974     0.1256    0.2502     0.7446     3.96    0.0001
  4=West             0.3509     0.1375    0.0802     0.6215     2.55    0.0112
MARRY_3
  1=Married          0.0000     0.0000    0.0000     0.0000      .         .
  2=Widowed          0.3230     0.1682   -0.0080     0.6541     1.92    0.0558
  3=Unmarried        0.8050     0.0704    0.6666     0.9435    11.44    0.0000
-----------------------------------------------------------------------------
Data Source: NCHS National Health Interview Survey (2006)
```

The variance estimation method is identified as Taylor Series (WR). The default options are used to estimate the model parameters and compute variances. These default options are an independent working correlation matrix to describe the dependence of observations within a cluster, and Binder's (1983) method to estimate robust variances of parameter estimates.

The estimated regression coefficients are given above (***Exhibit 16***), with estimated standard errors. For each estimated regression coefficient, a *t*-test is used to test the null hypothesis that the population regression coefficient is equal to 0, conditional on all other variables being in the model. All main effects are significant. The following groups of white adults have a higher odds of incurring the event: females compared to males; each group of younger adults compared to those aged 65 and older; less-educated adults compared to those with at least a college education; adults living in the South, West, and Midwest compared to those living in the Northeast; and unmarried adults compared to those who are married.

Exhibit 17. ANOVA Table

```
Variance Estimation Method: Taylor Series (WR)
SE Method: Robust (Binder, 1983)
Working Correlations: Independent
Link Function: Logit
Response variable CANTAFMEDS: Can't Afford Meds Past 12m
For Subpopulation: WHITES AGED 25+

Modelling Can't Afford Rx Meds, Past 12 Months

by: Contrast.
--------------------------------------------------------
Contrast                  Degrees
                          of                    P-value
                          Freedom       Wald F   Wald F
--------------------------------------------------------
OVERALL MODEL                  11      395.232    0.0000
MODEL MINUS INTERCEPT          10       41.543    0.0000
INTERCEPT                       .         .         .
SEX                             1       39.771    0.0000
AGE25_3                         2       36.308    0.0000
EDUC_3                          2       64.240    0.0000
REGION                          3        5.284    0.0015
MARRY_3                         2       65.636    0.0000
AGE: 25-44 vs. 45-64            1        0.899    0.3439
--------------------------------------------------------
Data Source: NCHS National Health Interview Survey (2006)
```

In the ANOVA (analysis of variance) table above (***Exhibit 17***), the 11 degrees of freedom (df) Wald-*F* tests the null hypothesis that all regression coefficients are zero. This null hypothesis is equivalent to saying that the population log odds are 0, or the odds are 1.0, or the probability of incurring the event is 0.5. The null hypothesis is rejected. The 10 df Wald-*F* tests the null hypothesis that all regression coefficients except the intercept are equal to 0, (i.e., none of the independent variables are related to the outcome variable). This null hypothesis is rejected as well.

The next 1 df Wald-*F* value tests the null hypothesis that the regression coefficient for sex is equal to zero; this test is equivalent to the *t*-test of the previous table (the Wald-*F* of 39.8 is the square of the *t*-statistic 6.31). The next four Wald-*F* tests, all with more than 1 df, are for each remaining main effect, conditional on all other variables in the model. All five main effects are statistically significant.

The EFFECTS statement contrast labeled *Age: 25-44 vs. 45-64* in ***Exhibit 17*** indicates that white adults aged 25-44 years do <u>not</u> have significantly different odds of incurring the event than do white adults aged 45-64 years. And we know from the regression coefficient table presented first that each of these groups has a significantly higher odds of incurring the event than 65+ year-olds.

Exhibit 18. Default Odds Ratios

```
Variance Estimation Method: Taylor Series (WR)
SE Method: Robust (Binder, 1983)
Working Correlations: Independent
Link Function: Logit
Response variable CANTAFMEDS: Can't Afford Meds Past 12m
For Subpopulation: WHITES AGED 25+

Modelling Can't Afford Rx Meds, Past 12 Months

by: Independent Variables and Effects.
------------------------------------------------------------
Independent Variables
  and Effects                          Lower 95%   Upper 95%
                          Odds Ratio   Limit OR    Limit OR
------------------------------------------------------------
Intercept                      0.006       0.004       0.009
Sex
  1=Male                       1.000       1.000       1.000
  2=Female                     1.678       1.428       1.973
Age Group
  25-44                        3.503       2.593       4.731
  45-64                        3.245       2.447       4.303
  65+                          1.000       1.000       1.000
EDUC_3
  1=HS or Less                 2.431       2.075       2.850
  2=Some College               2.425       1.983       2.965
  3=College+                   1.000       1.000       1.000
Region
  1=N.E.                       1.000       1.000       1.000
  2=Midwest                    1.402       1.092       1.800
  3=South                      1.644       1.284       2.106
  4=West                       1.420       1.083       1.862
MARRY_3
  1=Married                    1.000       1.000       1.000
  2=Widowed                    1.381       0.992       1.923
  3=Unmarried                  2.237       1.948       2.569
------------------------------------------------------------
Data Source: NCHS National Health Interview Survey (2006)
```

Exhibit 18 indicates that the 95% confidence intervals on the odds ratio exclude 1.0 for sex (females have higher odds); for age (both younger age groups have higher odds than those aged 65 years and older); education (both lower levels of education have higher odds than those with at least a college degree); marital status (unmarried adults have higher odds than those married); and region (all regions have higher odds than the Northeast).

Since the event occurs with a low probability, estimated as .0769 (or 7.69%) by the earlier DESCRIPT output (***Exhibit 8***), the odds ratio could be considered to be an estimate of the prevalence ratio. The "prevalence" is the proportion of white adults who reported that they could not afford prescription medicine they needed at least once in the past 12 months.

Exhibit 19. User-Specified Odds Ratios (EXP Option on EFFECTS)

```
Variance Estimation Method: Taylor Series (WR)
SE Method: Robust (Binder, 1983)
Working Correlations: Independent
Link Function: Logit
Response variable CANTAFMEDS: Can't Afford Meds Past 12m
For Subpopulation: WHITES AGED 25+

Modelling Can't Afford Rx Meds, Past 12 Months

by: Contrast.
--------------------------------------------------------
Contrast                                  Lower   Upper
                                          95%     95%
                           EXP(Contrast)  Limit   Limit
--------------------------------------------------------
AGE: 25-44 vs. 45-64               1.079  0.921   1.265
--------------------------------------------------------
Data Source: NCHS National Health Interview Survey (2006)
```

The above contrast labelled *Age: 25-44 vs. 45-64* (see ***Exhibit 19***) is produced by the EXP option on the EFFECTS statement, and it contains the estimated exponentiated contrast among the regression coefficients. In this example, it yields the estimated odds ratio for not being able to afford prescription medicine for those aged 25-44 yrs vs. those aged 45-64 yrs. With an estimate of 1.079 and the confidence interval containing the null value of 1.0, the odds are not significantly different in the younger vs. middle-aged group (increased odds of only 7.9%). The default odds ratios did not yield this estimate, because the oldest age group was used as the reference cell for fitting age in the model, and therefore, each age group was compared to the oldest.

Exhibit 20. Predicted Marginals for Age Group (Model-Adjusted Risks)

```
Variance Estimation Method: Taylor Series (WR)
SE Method: Robust (Binder, 1983)
Working Correlations: Independent
Link Function: Logit
Response variable CANTAFMEDS: Can't Afford Meds Past 12m
For Subpopulation: WHITES AGED 25+

Modelling Can't Afford Rx Meds, Past 12 Months

by: Predicted Marginal #1.
--------------------------------------------------------------------------------
Predicted                            Lower 95%   Upper 95%
  Marginal #1   PREDMARG        SE   Limit       Limit       T:Marg=0    P-value
--------------------------------------------------------------------------------
Age Group
  25-44           0.0923    0.0052      0.0826      0.1030      17.76     0.0000
  45-64           0.0863    0.0041      0.0785      0.0947      20.91     0.0000
  65+             0.0289    0.0036      0.0227      0.0368       8.11     0.0000
--------------------------------------------------------------------------------
Data Source: NCHS National Health Interview Survey (2006)
```

The predicted marginal proportion (or model-adjusted risk) for each level of age is given above (***Exhibit 20***), with its estimated standard error and 95% confidence limits. The *t*-test tests the null hypothesis that the corresponding population marginal is equal to 0, a test not of interest in this example. Controlling on all other variables in the model (sex, education, marital status, and region), the probability of incurring the event (being unable to afford prescription drugs at least one time during the past 12 months) remains fairly constant across the 25-44 and 45-64 age groups (95% confidence limits range from 8% to 10%), then decreases significantly for white adults aged 65+ (95% confidence limits range from 2% to 4%).

Exhibit 21. Conditional Marginals for Age Group (Model-Adjusted Risks)

```
Variance Estimation Method: Taylor Series (WR)
SE Method: Robust (Binder, 1983)
Working Correlations: Independent
Link Function: Logit
Response variable CANTAFMEDS: Can't Afford Meds Past 12m
For Subpopulation: WHITES AGED 25+

Modelling Can't Afford Rx Meds, Past 12 Months

by: Conditional Marginal #1.
----------------------------------------------------------------------------------
Conditional                         Lower 95%   Upper 95%
  Marginal #1   CONDMARG          SE   Limit       Limit       T:Marg=0     P-value
----------------------------------------------------------------------------------
Age Group
  25-44           0.0793      0.0049      0.0702      0.0895      16.24      0.0000
  45-64           0.0739      0.0040      0.0665      0.0821      18.66      0.0000
  65+             0.0240      0.0031      0.0186      0.0310       7.69      0.0000
----------------------------------------------------------------------------------
Data Source: NCHS National Health Interview Survey (2006)
```

The conditional marginal (another way of estimating the model-adjusted risk) for each level of age is given above (***Exhibit 21***). Controlling on all other variables in the model (sex, education, marital status, and region), the probability of incurring the event (being unable to afford prescription drugs at least one time during the past 12 months) remains fairly constant across the 25-44 and 45-64 age groups (95% confidence limits range from 7% to 9%), then decreases significantly for white adults aged 65+ (95% confidence limits range from 2% to 3%).

The table below compares the unadjusted proportions (DESCRIPT procedure), the predicted marginal proportions, and the conditional marginal proportions (both of which are model-adjusted risks produced by RLOGIST).

Exhibit 22. Proportion (and Standard Error) of White Adults Not Able to Afford Prescription Medication, by Age Group, 2006 NHIS

Age Group	Unadjusted Proportion	Predicted Marginal	Conditional Marginal
25-44	.0927 (.0050)	.0923 (.0052)	.0793 (.0049)
45-64	.0835 (.0040)	.0863 (.0041)	.0739 (.0040)
65+	.0305 (.0034)	.0289 (.0036)	.0240 (.0031)

Note that the predicted and conditional marginals are not equal to each other. Equality will be observed for linear regression, but equality does not hold here because logistic regression is a nonlinear model. The predicted marginals are close to the unadjusted proportions, and the conditional marginals are somewhat less than the unadjusted proportions. Whether predicted or conditional marginals are used, there are still striking differences among the three age groups on the proportion who incur the event.

Exhibit 23. Model-Adjusted Risk Ratios Derived From Predicted Marginals

```
Variance Estimation Method: Taylor Series (WR)
SE Method: Robust (Binder, 1983)
Working Correlations: Independent
Link Function: Logit
Response variable CANTAFMEDS: Can't Afford Meds Past 12m
For Subpopulation: WHITES AGED 25+

Modelling Can't Afford Rx Meds, Past 12 Months

by: Predicted Marginal Risk Ratio #1.
-----------------------------------------------------------
Predicted Marginal Risk
  Ratio #1                                  Lower   Upper
                              Risk          95%     95%
                              Ratio      SE   Limit   Limit
-----------------------------------------------------------
Age Group
  25-44 vs. 65+               3.190   0.458   2.404   4.232
  45-64 vs. 65+               2.982   0.405   2.283   3.895
-----------------------------------------------------------
Data Source: NCHS National Health Interview Survey (2006)
```

Exhibit 24. Model–Adjusted Risk Ratios Derived From Conditional Marginals

```
Variance Estimation Method: Taylor Series (WR)
SE Method: Robust (Binder, 1983)
Working Correlations: Independent
Link Function: Logit
Response variable CANTAFMEDS: Can't Afford Meds Past 12m
For Subpopulation: WHITES AGED 25+

Modelling Can't Afford Rx Meds, Past 12 Months

by: Conditional Marginal Risk Ratio #1.
-----------------------------------------------------------
Conditional Marginal Risk
  Ratio #1                                  Lower   Upper
                              Risk          95%     95%
                              Ratio      SE   Limit   Limit
-----------------------------------------------------------
Age Group
  25-44 vs. 65+               3.304   0.487   2.472   4.415
  45-64 vs. 65+               3.079   0.428   2.342   4.047
-----------------------------------------------------------
Data Source: NCHS National Health Interview Survey (2006)
```

The above tables show estimation of prevalence ratios (also referred to here as risk ratios) by age group, using those aged 65 years and older as the reference group. The ratio of the predicted marginals and the ratio of the conditional marginals yield similar results, and the adjusted odds ratio, based on the logistic regression analysis presented earlier, yields a slightly higher, but fairly comparable estimate.

The following table summarizes the three types of ratio estimates:

Exhibit 25. Estimated Prevalence Ratio, by Three Techniques, White Adults, 1997 NHIS

Age Group Comparison	Adjusted Odds Ratio	Model-Adjusted Prevalence Ratios	
		Ratio of Predicted Marginals	Ratio of Conditional Marginals
25-44 vs 65+	3.5	3.2	3.3
45-64 vs 65+	3.2	3.0	3.1

The next section of output (six exhibits displayed in ***Exhibit 26*** to ***Exhibit 31***) is generated by the PRED_EFF and COND_EFF statements, and they compute the model-adjusted risk differences corresponding to all pairwise comparisons of the three age groups, with risks first derived from predicted marginal proportions, and then for risks derived from conditional marginal proportions.

Exhibit 26. Model-Adjusted Risk Differences Derived from Predicted Marginals (Age: 25-44 vs. 65+)

```
Variance Estimation Method: Taylor Series (WR)
SE Method: Robust (Binder, 1983)
Working Correlations: Independent
Link Function: Logit
Response variable CANTAFMEDS: Can't Afford Meds Past 12m
For Subpopulation: WHITES AGED 25+

Modelling Can't Afford Rx Meds, Past 12 Months

by: Contrasted Predicted Marginal #1.
---------------------------------------------------------------------
Contrasted Predicted
  Marginal #1            PREDMARG
                         Contrast           SE     T-Stat     P-value
---------------------------------------------------------------------
25-44 vs. 65+               0.0634      0.0068       9.37      0.0000
---------------------------------------------------------------------
Data Source: NCHS National Health Interview Survey (2006)
```

Exhibit 27. Model-Adjusted Risk Differences Derived from Predicted Marginals (Age: 45-64 vs. 65+)

```
Variance Estimation Method: Taylor Series (WR)
SE Method: Robust (Binder, 1983)
Working Correlations: Independent
Link Function: Logit
Response variable CANTAFMEDS: Can't Afford Meds Past 12m
For Subpopulation: WHITES AGED 25+

Modelling Can't Afford Rx Meds, Past 12 Months

by: Contrasted Predicted Marginal #2.
---------------------------------------------------------------------
Contrasted Predicted
  Marginal #2            PREDMARG
                         Contrast           SE     T-Stat     P-value
---------------------------------------------------------------------
45-64 vs. 65+               0.0573      0.0057      10.13      0.0000
---------------------------------------------------------------------
Data Source: NCHS National Health Interview Survey (2006)
```

Exhibit 28. Model-Adjusted Risk Differences Derived from Predicted Marginals (Age: 25-44 vs. 45-64)

```
Variance Estimation Method: Taylor Series (WR)
SE Method: Robust (Binder, 1983)
Working Correlations: Independent
Link Function: Logit
Response variable CANTAFMEDS: Can't Afford Meds Past 12m
For Subpopulation: WHITES AGED 25+

Modelling Can't Afford Rx Meds, Past 12 Months

by: Contrasted Predicted Marginal #3.
---------------------------------------------------------------------
Contrasted Predicted
  Marginal #3            PREDMARG
                         Contrast           SE     T-Stat     P-value
---------------------------------------------------------------------
25-44 vs. 45-64             0.0060      0.0064       0.94      0.3469
---------------------------------------------------------------------
Data Source: NCHS National Health Interview Survey (2006)
```

The above three contrasts show that both the younger and middle-age groups differ from the 65+ group significantly on the model-adjusted risk obtained via predicted marginal proportions. The younger and middle-age groups do not differ significantly from each other.

Exhibit 29. Model-Adjusted Risk Differences Derived from Conditional Marginals (Age: 25-44 vs. 65+)

```
Variance Estimation Method: Taylor Series (WR)
SE Method: Robust (Binder, 1983)
Working Correlations: Independent
Link Function: Logit
Response variable CANTAFMEDS: Can't Afford Meds Past 12m
For Subpopulation: WHITES AGED 25+

Modelling Can't Afford Rx Meds, Past 12 Months

by: Contrasted Conditional Marginal #1.
---------------------------------------------------------------------
Contrasted Conditional
  Marginal #1           CONDMARG
                        Contrast           SE     T-Stat     P-value
---------------------------------------------------------------------
25-44 vs. 65+             0.0553      0.0060       9.28      0.0000
---------------------------------------------------------------------
Data Source: NCHS National Health Interview Survey (2006)
```

Exhibit 30. Model-Adjusted Risk Differences Derived from Conditional Marginals (Age: 45-64 vs. 65+)

```
Variance Estimation Method: Taylor Series (WR)
SE Method: Robust (Binder, 1983)
Working Correlations: Independent
Link Function: Logit
Response variable CANTAFMEDS: Can't Afford Meds Past 12m
For Subpopulation: WHITES AGED 25+

Modelling Can't Afford Rx Meds, Past 12 Months

by: Contrasted Conditional Marginal #2.
---------------------------------------------------------------------
Contrasted Conditional
  Marginal #2           CONDMARG
                        Contrast           SE     T-Stat     P-value
---------------------------------------------------------------------
45-64 vs. 65+             0.0499      0.0050      10.06      0.0000
---------------------------------------------------------------------
Data Source: NCHS National Health Interview Survey (2006)
```

Exhibit 31. Model-Adjusted Risk Differences Derived from Conditional Marginals (Age: 25-44 vs. 45-64)

```
Variance Estimation Method: Taylor Series (WR)
SE Method: Robust (Binder, 1983)
Working Correlations: Independent
Link Function: Logit
Response variable CANTAFMEDS: Can't Afford Meds Past 12m
For Subpopulation: WHITES AGED 25+

Modelling Can't Afford Rx Meds, Past 12 Months

by: Contrasted Conditional Marginal #3.
---------------------------------------------------------------------
Contrasted Conditional
  Marginal #3            CONDMARG
                         Contrast           SE     T-Stat     P-value
---------------------------------------------------------------------
25-44 vs. 45-64             0.0054      0.0057       0.94      0.3471
---------------------------------------------------------------------
Data Source: NCHS National Health Interview Survey (2006)
```

The above three contrasts show that both of the younger age groups differ from the 65+ group significantly on the model-adjusted risk obtained via conditional marginal proportions. The two younger age groups do not differ significantly from each other.

In summary, women are about 68% more likely than men to report not being able to afford needed prescription drugs at least once in the past year, adjusted for age, education, region, and marital status (using the odds ratio = 1.68). In addition, younger and middle-aged persons are both more likely than older persons to report not being able to afford needed prescription drugs at least once in the past year, adjusted for sex, education, region, and marital status. In terms of both odds ratios and risk ratios, those aged 25-44 are more than three times as likely as those 65 and older, and those aged 45-64 are about three times as likely as those 65 and older.