**Training Course in MCH Epidemiology**

**Denver May/June 2012, Wednesday 1-3pm**

**Model-Building Exercise**

The next pages display contingency table analyses for factors potentially related to childhood overweight/obesity (85th percentile of the CDC age-for-gender growth charts) among African-American adolescents in the U.S. (age 12-17). We will interactively conduct a logistic regression analysis of data from the 2003 National Survey of Children’s Health.

**Research Question:** What factors are associated with overweight/obesity among African-American Adolescents? (Note: Underweight adolescents have been excluded)

**Instructions:** In groups of 6-7, please take 20 minutes to discuss the results of the contingency table analyses below and choose the variables/terms you would like to see included in initial regression model(s) – up to 3 models. Each group will present their initial models to the full group and the group will vote to decide the best initial model(s). We will carry out subsequent model-building as a group to select a final model. Note: You may suggest handling any of the variables in a different way (re-coding, different level of measurement, composite variables, etc)

**Selected Variable List**

|  |  |  |
| --- | --- | --- |
| **Variable**  | **Description** | **Values** |
| ovwt | Weight status according to CDC age for gender percentiles of BMI (available in NSCH as BMICLASS) | 1= Overweight/Obese0 = Normal Weight (Underweight excluded) |
| povI | Household Income in comparison to the Federal Poverty Level (FPL) | 1=<100% FPL2=100-199% FPL3=200-299% FPL4=300%+ FPL |
| male | Child’s gender | 1=Male0=Female |
| Agecat | Child’s age, categorized | 1=12-140=15-17 |
| Lesscol | Highest level of education for anyone in the child’s household | 1=Less than College0=College or more |
| rural | Geographic area where child lives | 1=Rural0=Urban/Suburban |
| Ins | Insurance status of child | 1=Uninsured2=Medicaid3=Private Insurance |
| nodoctor | Personal doctor or nurse for child | 1=No personal doctor/nurse0=Has personal doctor/nurse |
| noprev12 | Receipt of preventative care for child in last 12 months | 1=No preventative care in last 12 mths0=Had preventative care in last 12 mths |
| sedentry | Hours per day of television watching, video game playing and/or computer use  | 1=>2 hours per day0=<2 hours per day |
| phys04 | Days of vigorous physical activity of 20 minutes or longer | 1=0 days/wk2=1-2 days/wk3=3-4 days/wk4=5 or more days/wk |
| nosports | Participation in sports classe(s) or team(s) by child | 1=No sports participation0=Participates in sports |

**Distribution and Relationship between Select Independent Variables and Overweight/Obesity among African-American Adolescents (age 12-17), 2003 NSCH (n = 3,352)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Independent Variable** | **Distribution in Population (Weighted %)** | **% Overweight/Obese (95% CI)** | **OR (95% CI)** |
| Weight Status |  |  |  |
| Normal Weight | 60.3 | -- | -- |
| Overweight (85-<94th percentiles) | 18.4 | -- | -- |
| Overweight (≥95th percentile) | 21.3 | -- | -- |
| Poverty Level\* |  |  |  |
| <100% FPL | 29.3 | 42.6 (37.1, 48.1) | 1.5 (1.1, 2.0) |
| 100-199 FPL | 30.1 | 40.3 (35.3, 45.4) | 1.4 (1.0, 1.8) |
| 200-299 FPL | 14.9 | 43.9 (37.5, 50.3) | 1.6 (1.1, 2.2) |
| 300%+ FPL | 25.8 | 33.2 (28.9, 37.5) | Ref |
| Gender |  |  |  |
| Male | 48.9 | 39.8 (36.3, 43.4) | 1.0 (0.8, 1.3) |
| Female | 51.1 | 39.5 (35.6, 43.5) | Ref |
| Age (categorized)\* |  |  |  |
| 12-14 | 54.6 | 44.4 (40.7, 48.1) |  1.5 (1.3, 2.0) |
| 15-17 | 45.4 | 34.0 (30.3, 37.8) | Ref |
| Highest level of education in household\* |  |  |  |
| Less than College | 42.9 | 43.7 (39.3, 48.1) | 1.3 (1.1, 1.7) |
| College graduate | 57.1 | 36.6 (33.4, 39.8) | Ref |
| Geographic area of residence |  |  |  |
| Rural | 15.2 | 42.1 (36.8, 47.4) | 1.1 (0.9, 1.4) |
| Urban/Suburban | 84.8 | 39.3 (36.3, 42.2) | Ref |
| Insurance Status |  |  |  |
| Uninsured | 10.4 | 40.4 (30.7, 50.1) | 1.2 (0.8, 1.8) |
| Medicaid | 45.1 | 42.9 (38.5, 47.3) | 1.3 (1.0, 1.6) |
| Privately Insured | 44.6 | 36.9 (33.5, 40.3) | Ref |
| Child has personal doctor or nurse |  |  |  |
| No | 27.5 | 42.0 (36.3, 47.7) | 1.1 (0.9, 1.5) |
| Yes | 72.5 | 38.8 (35.9, 41.8) | Ref |
| Child had preventive care in last 12 mos |  |  |  |
| No | 18.2 | 38.5 (32.3, 44.8) | 0.9 (0.7, 1.3) |
| Yes | 81.8 | 39.9 (36.9, 42.9) | Ref |
| Hrs of TV /Games/ Computer Use per day\* |  |  |  |
| >2 hours/day | 64.3 | 42.2 (38.8, 45.5) | 1.3 (1.1, 1.7) |
| <=2 hours per day | 35.7 | 35.5 (31.2, 39.8) | Ref |
| Days of Vigorous Physical Activity of 20 minutes or longer\* |  |  |  |
| 0 days/wk | 18.4 | 48.0 (41.5, 54.5) | 1.6 (1.2, 2.3) |
| 1-2 days/wk | 13.6 | 41.1 (35.0, 47.2) | 1.2 (0.9, 1.7) |
| 3-4 days/wk | 21.7 | 39.7 (34.5, 45.0) | 1.2 (0.9, 1.6) |
| 5-7 days/wk | 46.3 | 36.0 (31.9, 40.1) | Ref |
| Participation in sports teams/lessons |  |  |  |
| No | 49.0 | 41.9 (37.8, 46.0) | 1.2 (1.0, 1.5) |
| Yes | 51.0 | 37.6 (34.1, 41.0) | Ref |

\*p<0.05 for chi-square test

**Select Stratified Analyses** ORs (95% CIs) for relationship between each independent variable and overweight/obesity in each stratum of potential effect modifier, among Adolescent African-Americans

**Stratified By Gender:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Independent Variable** | **Female****(n = 1,642)** | **Male****(n = 1,710)** | **p-value for Interaction\*** |
| Highest Level of Education in Household: Less than College vs College Graduate | 1.8 (1.3, 2.5) | 1.0 (0.7, 1.4) | 0.01 |
| >2 hours TV/games/computer vs Less | 1.5 (1.0, 2.1) | 1.2 (0.9, 1.6) | 0.42 |
| Days/wk of Vigorous Activity for 20 min01-23-45-7 | 2.0 (1.3, 3.1)1.3 (0.8, 2.1)1.2 (0.8, 1.9)Ref | 1.3 (0.8, 2.1)1.2 (0.8, 1.8)1.1 (0.8, 1.6)Ref | 0.62 (Type III) |
| Not on a sports team vs on a team | 1.5 (1.1, 2.1) | 0.9 (0.7, 1.3) | 0.03 |

\*Note: significance of interaction was determined from unadjusted logistic regression models including the independent variable, stratification factor and the multiplicative term for both; Breslow-Day tests from contingency tables are not available in software for complex survey procedures.

**Stratified By Age:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Independent Variable** | **12-14****(n = 1,729)** | **15-17****(n = 1,623)** | **p-value for Interaction** |
| Highest Level of Education in Household: Less than College vs College Graduate | 1.6 (1.1, 2.1) | 1.1 (0.8, 1.5) | 0.11 |
| >2 hours TV/games/computer vs Less | 1.5 (1.1, 2.0) | 1.2 (0.8, 1.7) | 0.41 |
| Days/wk of Vigorous Activity for 20 min01-23-45-7 | 1.8 (1.2, 2.9)1.4 (0.9, 2.1)1.4 (0.9, 2.0)Ref | 1.5 (1.0, 2.4)1.0 (0.6, 1.6)1.0 (0.7 (1.6)Ref | 0.69 (Type III) |
| Not on a sports team vs on a team | 1.3 (0.9, 1.8) | 1.1 (0.8, 1.5) | 0.46 |

**Stratified Analysis (Continued)**

**Stratified by Poverty Level (3 categories):**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Independent Variable** | **<200%****(n = 1,681)** | **200-299%****(n = 568)** | **≥300%****(n = 1,103)** | **p-value for Interaction\*** |
| Highest Level of Education in Household: Less than College vs  | 1.1 (0.8, 1.6) | 1.4 (0.8, 2.5) | 1.7 (1.0, 3.0) | 0.44 |
| >2 hours TV/games/computer vs Less | 1.2 (0.9, 1.6) | 0.9 (0.5, 1.6) | 2.1 (1.4, 3.2) | 0.02 |
| Days/wk of Vigorous Activity for 20 min01-23-45-7 | 1.3 (0.9, 2.0)1.0 (0.6, 1.5)0.9 (0.6, 1.4)Ref | 1.9 (0.9, 4.2)3.0 (1.4, 6.2)1.7 (0.9, 3.2)Ref | 2.6 (1.4, 4.9)1.4 (0.9, 2.4)1.6 (1.0, 2.5)Ref | 0.10 |
| Not on a sports team vs on a team | 0.9 (0.7, 1.3) | 2.0 (1.2, 3.4) | 1.4 (1.0, 2.1) | 0.02 |

\*Type III test

**Appendix: Code Samples for Analysis of Complex Survey Data in SAS, SUDAAN, STATA**

**SAS**

proc surveyfreq data=analysis;

strata state;

cluster idnumr;

weight nschwt;

tables adolblack\*povi\*ovwt/chisq row col cl;

run;

(Note: Domain statement not available in surveyfreq, so variable represented restricted population must be included in tables statement)

proc surveylogistic data=analysis;

strata state;

cluster idnumr;

domain adolblack;

weight nschwt;

tables povi\*ovwt/chisq;

run;

**SAS-Callable SUDAAN**

proc sort data=analysis;

 by state idnumr;

run;

proc crosstab data = analysis filetype=sas design=wr nose notot;

nest state idnumr;

weight nschwt;

subpopn adolblack=1;

class povi phys04 nosports male ovwt;

tables povI \*ovwt;

test chisq;

risk or;

title 'Bivariate Statistics - Obesity Among African-American Adolescents';

run;

proc rlogist design=wr;

nest state idnumr ;

weight nschwt;

class povi phys04 nosports male ovwt;

model ovwt = povi phys04 nosports male;

reflevel povi=4;
run;

**STATA**

svyset idnumr [pweight=nschwt], strata(state)

svy, subpop(adolblack): tabulate povi ovwt, ci pearson row

xi:svy,subpop(adolblack): logit ovwt i.povi phys04 nosports male, or

**Selected Output from SUDAAN: Poverty Level \* Overweight/Obese**

| **ChiSq** | **P-value ChiSq** | **Deg-rees of Fre-edom Chi-Sq** |   | Page: 1 |
| --- | --- | --- | --- | --- |
| 3.62 | 0.0126 | 3 |   | Table: 1 |

Variance Estimation Method: Taylor Series (WR)
For Subpopulation: ADOLBLACK = 1
by: POVI, OVWT.

| **POVI** | **OVWT** | **Sample Size** | **Weighted Size** | **Row Percent** | **Lower 95% Limit ROWPER** | **Upper 95% Limit ROWPER** | **Col Percent** | **Lower 95% Limit COLPER** | **Upper 95% Limit COLPER** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Total | Total | 3352 | 3457554.30 | 100.00 | . | . | 100.00 | . | . |
| Normal Weight | 1964 | 2085471.85 | 60.32 | 57.63 | 62.94 | 100.00 | . | . |
| Overweight or Obese | 1388 | 1372082.46 | 39.68 | 37.06 | 42.37 | 100.00 | . | . |
| 1 | Total | 787 | 1011631.62 | 100.00 | . | . | 29.26 | 26.67 | 31.99 |
| Normal Weight | 435 | 580888.89 | 57.42 | 51.87 | 62.79 | 27.85 | 24.48 | 31.50 |
| Overweight or Obese | 352 | 430742.73 | 42.58 | 37.21 | 48.13 | 31.39 | 27.47 | 35.60 |
| 2 | Total | 894 | 1039014.33 | 100.00 | . | . | 30.05 | 27.52 | 32.71 |
| Normal Weight | 511 | 619889.69 | 59.66 | 54.51 | 64.61 | 29.72 | 26.38 | 33.30 |
| Overweight or Obese | 383 | 419124.64 | 40.34 | 35.39 | 45.49 | 30.55 | 26.78 | 34.59 |
| 3 | Total | 568 | 515181.22 | 100.00 | . | . | 14.90 | 13.17 | 16.82 |
| Normal Weight | 313 | 288913.90 | 56.08 | 49.60 | 62.36 | 13.85 | 11.67 | 16.37 |
| Overweight or Obese | 255 | 226267.32 | 43.92 | 37.64 | 50.40 | 16.49 | 13.79 | 19.60 |
| 4 | Total | 1103 | 891727.12 | 100.00 | . | . | 25.79 | 23.62 | 28.09 |
| Normal Weight | 705 | 595779.37 | 66.81 | 62.40 | 70.95 | 28.57 | 25.56 | 31.78 |
| Overweight or Obese | 398 | 295947.76 | 33.19 | 29.05 | 37.60 | 21.57 | 18.71 | 24.73 |