**EPID 5314 - Homework 9**

1. The rate ratio for the effect of treatment on the number of colorectal polyps was reported as 0.45. The 95% confidence interval for this estimate was reported as 0.39 to 0.52, which suggests that this rate ratio is statistically significant since the null value (1.00) is not contained within the reported confidence interval. This estimate suggests that the incidence of colorectal polyps among those who received treatment was lesser than the incidence of colorectal polyps among those who did not receive treatment.

A picture containing graphical user interface

Description automatically generated

If we want to test for multiplicative interaction between gender and treatment, it is often useful to first determine if the exposure (treatment) estimate varies across strata of the effect modifier (gender).

**Sex = 0**

Table

Description automatically generated

**Sex = 1**

Table

Description automatically generated

From this output, it is evident that some form of interaction may be present since the exposure estimate does in fact vary across the different levels of the effect modifier.

1. From the output below, it is evident that interaction between gender and treatment is not statistically significant on a multiplicative scale at the 95% level of confidence (p = 0.9141 > 0.05). Though multiplicative interaction is not present, we must still test for additive interaction based on the output from the stratified analysis (which suggests that some sort of interaction is present).

Table

Description automatically generated

1. According to the output below, the interaction between gender and treatment is not significant on an additive scale at the 95% level of confidence either (p = 0.6988 > 0.05). However, we did find that biological interaction between these two variables was probable based on our results from the stratified analysis. As such, we will still report the risk difference under the assumption that the detected biological interaction is significant to impact the number of colorectal polyps.

Table

Description automatically generated

Graphical user interface, application

Description automatically generated

According to the output above, the risk differences and 95% confidence intervals are as follows:

|  |  |  |
| --- | --- | --- |
| **Strata** | **Gender-specific estimates** | **95% Confidence Interval** |
| Treatment = 1 vs. treatment = 0 for females (gender = 0) | -0.9337 | [-3.10, 1.23] |
| Treatment = 1 vs. treatment = 0 for males (gender = 1) | -0.9611 | [-3.07,1.14] |

**SAS Code**

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

\* Course: Data Analysis - EPID 5314 \*

\* Assignment: Homework 9 \*

\* Due Date: 11/3/2021 \*

\* Programmer(s): Jessie Ausman \*

\* Program Name: HW9 \*

\* Save Program/Log/Output: C:\Users\jessa\Desktop\EPID 5314\Homework9 \*

\* Save Data Files: C:\Users\jessa\Desktop\EPID 5314\Homework9\Data \*

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/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* PART 0 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

\*read in data;

libname bios "C:\Users\jessa\Desktop\EPID 5314\Homework9\Data";

\*create temporary dataset;

**data** HW9;

set bios.hw9;

**run**;

\*check for missing values;

**proc** **freq** data=hw9;

tables trt npolyps;

**run**;

/\*no missing values --> no need for weighting\*/

\*do however need to use offset to calculate rate ratio --> need to create logtime var;

**data** HW9\_1;

set HW9;

logtime = log(time);

**run**;

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* PART 1 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

\*Calculate rate ratio and 95% CI for effect of trt on npolyps;

**proc** **genmod** data=HW9\_1;

model npolyps = trt / link=log dist=p offset=logtime;

estimate "RR" trt **1**/exp;

**run**;

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* PART 2 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

\*test for multiplicative interaction between gender and treatment;

\*first need to create time variables to test for interaction without using the offset statement;

**data** HW9\_2;

set HW9\_1;

gender\_t = sex\*time;

trt\_t = trt\*time;

**run**;

\*test interaction across strata;

**proc** **sort** data=HW9\_2;

by sex;

**run**;

**proc** **genmod** data=HW9\_2;

by sex;

model npolyps = time trt\_t/ link=log dist=p;

**run**;

\*then fit multiplicative interaction model and use estimate statements to determine if interaction exists;

**proc** **genmod** data=HW9\_2;

title "multiplicative interaction";

model npolyps = time gender\_t trt\_t trt\_t\*gender\_t/link=log dist=p type3 noint lrci dscale;

estimate "RR, trt=1 vs. trt=0 for gender=0" trt\_t **1**/exp;

estimate "RR, trt=1 vs. trt=0 for gender=1" trt\_t **1** trt\_t\*gender\_t **1**/exp;

**run**;

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* PART 3 \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

\*then fit additive interaction model and use estimate statements to determine if interaction exists;

**proc** **genmod** data=HW9\_2;

title "additive interaction";

model npolyps = time gender\_t trt\_t trt\_t\*gender\_t/link=identity dist=p type3 noint lrci dscale;

estimate "RD, trt=1 vs. trt=0 for gender=0" trt\_t **1**;

estimate "RD, trt=1 vs. trt=0 for gender=1" trt\_t **1** trt\_t\*gender\_t **1**;

**run**;