Chapter 18 – Comparisons of Proportions or Odds

Case 18.1.1. Obesity and Heart Disease – An Observational Study. R&S p.550.

Step 1: Input the data directly into a worksheet. Input the data into columns directly. Name Column 1 as CVD_Yes and name Column 2 as CVD_No. Under Column 1, input the values 16 and 7 in column 1 from *R&S Display 18.1*. Under Column 2, input the values 2045 and 1044 in column 2 from *R&S Display 18.1*.

Data Display

```
Row CVD_Yes CVD_No
1 16 2045
2 7 1044
```

Step 2: Construct a z- C.I. interval for the true proportion of CVD deaths in the population of obese Samoan women. Go to Stat \rightarrow Basic Statistics \rightarrow 1-Proportion; click on Summarized Data; for results, see *R&S Display 18.4*.

One-Sample Proportion			×				
	Summarized data		-				
	Number of events:	16	One-Sample Proportio	n: Options		2	×
	N <u>u</u> mber of trials:	2061	<u>C</u> onfidence level:	95.0			
			Alternative hypothesis:	Proportion ≠	hypothesized	proportion 💌	-
	Perform hypothes	is test	Method:	Normal appro	ximation	-	-
	Hypothesized prop	portion:	Help		<u>о</u> к	Cancel	
Select		Op	tio <u>n</u> s				
Help		<u>o</u> k c	ancel				

Test and CI for One Proportion

 Sample
 X
 N
 Sample p
 95% CI

 1
 16
 2061
 0.007763
 (0.003974, 0.011552)

Using the normal approximation.

Next, construct a z- C.I. interval for the true proportion of CVD deaths in the population of non-obese Samoan women. Go to Stat \rightarrow Basic Statistics \rightarrow 1-Proportion; click on Summarized Data; for results,

Test and CI for One Proportion

Sample X N Sample p 95% CI 1 7 1051 0.006660 (0.001743, 0.011578) Using the normal approximation.

Step 3: Test for equality of two true population proportions, viz., the proportion of CVD deaths in the population of obese Samoan women and the proportion of CVD deaths in the population of non-obese Samoan women. Go to Stat \rightarrow Basic Statistics \rightarrow 2-Proportion2; click on Summarized Data, input data for obese women into First and data for non-obese women into Second; click on options, select Alternative "greater than" and click on Use pooled estimate of p for test. For formula details, see *R&S p*. *555 - 557*. For results, see *R&S Display 18.5*.

Two-Sample Proportion			×	Two-Sample Proportion		×
	Summarized data	Sample 1	Sample 2 2061	<u>C</u> onfidence level: <u>Hypothesized difference</u> :	roportion) - (sample 2 proportion)	
	Number of trials:	7	1051	<u>A</u> lternative hypothesis: <u>T</u> est method:	Difference > hypothesized difference Use the pooled estimate of the proportion	•
Select			Optio <u>n</u> s	Help	<u>O</u> K Cancel	
Help		<u>0</u> K	Cancel			

Test and CI for Two Proportions

Case 18.1.2. Vitamin C and the Common Cold –A Randomized Experiment. *R&S p.551-552*.

Data Display

Row Cold No_Cold 1 335 76 2 302 105

	C Samples in columns:
	Summarized data Number of events: 302 Number of trials: 407 Perform hypothesis test Hypothesized proportion:
Select Help	Options OK Cancel

Test and CI for One Proportion

SampleXNSample p95% CI13024070.742015(0.699508, 0.784521)

Using the normal approximation.

	C Samples in columns:
	Summarized data Number of events: 335 Number of trials: 411
	Perform hypothesis test Hypothesized proportion:
Select	Options
Help	OK Cancel

Test and CI for One Proportion

SampleXNSample95% CI13354110.815085(0.777552, 0.852618)

Using the normal approximation.

	C Samples in Samples:	one column	
	Subscripts:		
	C Samples in	different column:	s
	First:		
	Second:		
	Summarized		
	First:	Events: 335	Trials: 411
J	Second:	302	407
Select			Options
Help		OK	Cancel

	C Samples in one column Samples:
	2 Proportions - Options
	Confidence level: 1550 Test difference: 0.0 Alternative: greater than v If Use pooled estimate of p for test Help OK
-	Lep OK Cancel

Test and CI for Two Proportions

Discussion of Odds and Ratio of Odds

Enter data into Minitab as follows:

Treatmen	t Cold	Count
С	Yes	302
С	No	105
Placebo	Yes	335
Placebo	No	76

ŧ	C1-T	C2-T	C3	C4	C5	C6	C7	C8	C9	C10
	Treatment	Cold	Count							
1	Placebo	Yes	335	*						
2	Placebo	No	76							
3	VitC	Yes	302							
4	VitC	No	105							
5										
6										
7										
8										
9										

Go to Stat \rightarrow Regression \rightarrow Binary Logistic Regression. In Response window, enter C2 and in Frequency window, enter C3. In Categorical Predictor window, center C1. Click OK.

	 Response in response/frequency for 	rmat	
	Response: C2		
	Frequency (optional): C3		
	C Response in event/trial format		
	Number of events:		
	Number of trials:		
	Model:		
	C1		
	Factors (optional):		
	C1		*
Select	J		Ŧ
	(Options	Prediction
	Graphs F	Results	Storage
Help		ок	Cancel

Binary Logistic Regression: Cold versus Treatment

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Link Function: Logit

Response Information

Variable Value Count

Cold Yes 637 (Event)

No 181

Total 818

Frequency: Count

Logistic Regression Table

Odds 95% CI

Predictor Coef SE Coef Z P Ratio Lower Upper

Constant 1.48340 0.127052 11.68 0.000

Treatment

VitC -0.426931 0.170227 -2.51 0.012 0.65 0.47 0.91

Log-Likelihood = -429.145

Test that all slopes are zero: G = 6.357, DF = 1, P-Value = 0.012

* NOTE * No goodness of fit test performed.

* NOTE * The model uses all degrees of freedom.
```

Measures of Association: (Between the Response Variable and Predicted Probabilities) Pairs Number Percent Summary Measures Concordant 35175 30.5 Somers' D 0.11 Discordant 22952 19.9 Goodman-Kruskal Gamma 0.21 Ties 57170 49.6 Kendall's Tau-a 0.04 Total 115297 100.0