Chapter 8 PRODUCING FREQUENCY TABLES

* The **PROC FREQ** may be used to create a **one-way frequency table** that reports the number (frequency) of observations for each value of a **categorical** variable. That is, the one-way frequency table contains the **frequency distribution**. By default, the PROC FREQ reports **frequency count**, **percentage**, **cumulative frequency**, and **cumulative percentage** for each value of a variable.

Example. Ten people were treated for glaucoma. Their gender, race, and response to the treatment (yes or no) were recorded. The following code produces a one-way frequency table for the three categorical variables in the data set.

data glaucoma;

input gender $ race $ response $ @@;

cards;

female white yes male white yes male black no male hispanic no

female hispanic yes male white yes male black yes male white no

female black yes female white no

;

proc freq;

run;

The output is

The FREQ Procedure

Cumulative Cumulative

gender Frequency Percent Frequency Percent

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female 4 40.00 4 40.00

male 6 60.00 10 100.00

Cumulative Cumulative

race Frequency Percent Frequency Percent

ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ

black 3 30.00 3 30.00

hispanic 2 20.00 5 50.00

white 5 50.00 10 100.00

Cumulative Cumulative

response Frequency Percent Frequency Percent

ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ

no 4 40.00 4 40.00

yes 6 60.00 10 100.00

* To specify the variables to be processed by the FREQ procedure, use the **TABLES statement.** The syntax is

proc freq;

tables *variable1* *variable2* … ;

run;

Example. In the glaucoma example, to compute the frequency distribution for gender and Response only, use the following code

proc freq;

tables gender response;

run;

The output is

The FREQ Procedure

Cumulative Cumulative

gender Frequency Percent Frequency Percent

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female 4 40.00 4 40.00

male 6 60.00 10 100.00

Cumulative Cumulative

Response Frequency Percent Frequency Percent

ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ

no 4 40.00 4 40.00

yes 6 60.00 10 100.00

* To suppress the **percentage** and **cumulative percentage**, use the option **NOPERCENT**. To suppress the **cumulative frequency** and **cumulative percentage**, use the option **NOCUM**. The syntax is

proc freq;

tables *variable1* *variable2* … / <nopercent> < nocum>;

run;

Example. In the glaucoma example, to create a frequency table for Response that

contains only frequency count and percentage, type

proc freq;

tables response /nocum ;

run;

The output is

The FREQ Procedure

response Frequency Percent

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no 4 40.00

yes 6 60.00

* The **PROC FREQ** may be used to create **cross-tabulation tables** (**crosstabs**, for short) that summarize data for two or more categorical variables by showing the frequency and percentage of observations for each combination of variable values. By default, the FREQ procedure computes **frequency count**, **overall percentage**, **row percentage**, and **column percentage** for each cell in the table. The syntax for creating a two-way crosstab is

proc freq;

tables *variable1*\**variable2*;

run;

Example. In the glaucoma example, to compute the two-way tables for gender by race, and for gender by response, use the program below

proc freq;

table gender\*race gender\*response;

run;

The output is

The FREQ Procedure

Table of gender by race

gender race

Frequency‚

Percent ‚

Row Pct ‚

Col Pct ‚black ‚hispanic‚white ‚ Total

ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ

female ‚ 1 ‚ 1 ‚ 2 ‚ 4

‚ 10.00 ‚ 10.00 ‚ 20.00 ‚ 40.00

‚ 25.00 ‚ 25.00 ‚ 50.00 ‚

‚ 33.33 ‚ 50.00 ‚ 40.00 ‚

ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ

male ‚ 2 ‚ 1 ‚ 3 ‚ 6

‚ 20.00 ‚ 10.00 ‚ 30.00 ‚ 60.00

‚ 33.33 ‚ 16.67 ‚ 50.00 ‚

‚ 66.67 ‚ 50.00 ‚ 60.00 ‚

ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ

Total 3 2 5 10

30.00 20.00 50.00 100.00

Table of gender by response

gender response

Frequency‚

Percent ‚

Row Pct ‚

Col Pct ‚no ‚yes ‚ Total

ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ

female ‚ 1 ‚ 3 ‚ 4

‚ 10.00 ‚ 30.00 ‚ 40.00

‚ 25.00 ‚ 75.00 ‚

‚ 25.00 ‚ 50.00 ‚

ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ

male ‚ 3 ‚ 3 ‚ 6

‚ 30.00 ‚ 30.00 ‚ 60.00

‚ 50.00 ‚ 50.00 ‚

‚ 75.00 ‚ 50.00 ‚

ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ

Total 4 6 10

40.00 60.00 100.00

* The **NOFREQ** option suppresses the **frequency count** for each cell, the **NOPERCENT** option suppresses the **percentage** for each cell, the **NOROW** option suppresses the **row percentage** for each cell, and the **NOCOL** option suppresses the **column percentage** for each cell.

Example. In the glaucoma example, to display a crosstab of gender by response that contains only frequency counts, type

proc freq;

tables gender\*response /nopercent norow nocol;

run;

The output is

The FREQ Procedure

Table of gender by response

gender response

Frequency‚no ‚yes ‚ Total

ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ

female ‚ 1 ‚ 3 ‚ 4

ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ

male ‚ 3 ‚ 3 ‚ 6

ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ

Total 4 6 10

CREATING N-WAY TABLES

The PROC FREQ creates n-way crosstabs as a series of two-way tables, one for each level of the other variables. The order of the variables specified in the TABLES statement is important. For example, the code

proc freq;

tables *variable1*\**variable2*\**variable3*;

run;

instructs SAS to create a two-way table of *variable2* by *variable3* for each level of *variable1*.

Example. . In the glaucoma example, to create crosstabs of gender by response for different levels of race, type

proc freq;

tables race\*gender\*response;

run;

The output is

The FREQ Procedure

Table 1 of gender by response

Controlling for race=black

gender response

Frequency‚

Percent ‚

Row Pct ‚

Col Pct ‚no ‚yes ‚ Total

ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ

female ‚ 0 ‚ 1 ‚ 1

‚ 0.00 ‚ 33.33 ‚ 33.33

‚ 0.00 ‚ 100.00 ‚

‚ 0.00 ‚ 50.00 ‚

ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ

male ‚ 1 ‚ 1 ‚ 2

‚ 33.33 ‚ 33.33 ‚ 66.67

‚ 50.00 ‚ 50.00 ‚

‚ 100.00 ‚ 50.00 ‚

ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ

Total 1 2 3

33.33 66.67 100.00

Table 2 of gender by response

Controlling for race=hispanic

gender response

Frequency‚

Percent ‚

Row Pct ‚

Col Pct ‚no ‚yes ‚ Total

ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ

female ‚ 0 ‚ 1 ‚ 1

‚ 0.00 ‚ 50.00 ‚ 50.00

‚ 0.00 ‚ 100.00 ‚

‚ 0.00 ‚ 100.00 ‚

ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ

male ‚ 1 ‚ 0 ‚ 1

‚ 50.00 ‚ 0.00 ‚ 50.00

‚ 100.00 ‚ 0.00 ‚

‚ 100.00 ‚ 0.00 ‚

ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ

Total 1 1 2

50.00 50.00 100.00

Table 3 of gender by response

Controlling for race=white

gender response

Frequency‚

Percent ‚

Row Pct ‚

Col Pct ‚no ‚yes ‚ Total

ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ

female ‚ 1 ‚ 1 ‚ 2

‚ 20.00 ‚ 20.00 ‚ 40.00

‚ 50.00 ‚ 50.00 ‚

‚ 50.00 ‚ 33.33 ‚

ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ

male ‚ 1 ‚ 2 ‚ 3

‚ 20.00 ‚ 40.00 ‚ 60.00

‚ 33.33 ‚ 66.67 ‚

‚ 50.00 ‚ 66.67 ‚

ƒƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆƒƒƒƒƒƒƒƒˆ

Total 2 3 5

40.00 60.00 100.00

THE LIST AND CROSSLIST OPTIONS

Crosstabs may be displayed in a column format by using the **LIST** or **CROSSLIST** options in the TABLES statement.

Example. Using the LIST option in the glaucoma example

proc freq;

tables gender\*response/list;

run;

obtain the table

The FREQ Procedure

Cumulative Cumulative

gender response Frequency Percent Frequency Percent

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female no 1 10.00 1 10.00

female yes 3 30.00 4 40.00

male no 3 30.00 7 70.00

male yes 3 30.00 10 100.00

Using the CROSSLIST option

proc freq;

tables gender\*response/crosslist;

run;

obtain the table

The FREQ Procedure

Table of gender by response

Row Column

gender response Frequency Percent Percent Percent

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female no 1 10.00 25.00 25.00

yes 3 30.00 75.00 50.00

Total 4 40.00 100.00

-----------------------------------------------------------------

male no 3 30.00 50.00 75.00

yes 3 30.00 50.00 50.00

Total 6 60.00 100.00

-----------------------------------------------------------------

Total no 4 40.00 100.00

yes 6 60.00 100.00

Total 10 100.00

ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ