Increase your OUTPUT with PROC MEANS and PROC FREQ

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Abstract
How many people have ‘x and y’? How many people are in category ‘z’? The questions are endless, but the solutions are not! Using an output statement in PROC MEANS or PROC FREQ can easily answer those inquiries.

The purpose of this paper is to utilize the OUTPUT statement in a PROC MEANS or PROC FREQ to get simple statistics for a selected variable or group of variables. The resulting SAS® dataset can be used for future analyses and/or be easily exported to create graphical or tabular displays.

Problem
With large datasets it is often hard to tease out necessary simple statistics that analysts are required to produce on a regular basis. Using PROC MEANS and PROC FREQ can be solutions to frequently asked questions and reporting queries.

The Question
We are asked to find simple statistics on the age distribution of children with allergies, stratified by gender. Let's first take a look at the variables, we can utilize the means and frequency procedures to do the investigating.

PROC MEANS analyzes the dataset according to the variable listed in the VAR statement and is a simple way to see standard statistics of continuous variables. The syntax below requests statistics for child age (ch_age).

```
proc means data =tmp1.tablevars;
var ch_age ;run;
```

<table>
<thead>
<tr>
<th>Analysis Variable : CH_AGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
</tr>
<tr>
<td>----</td>
</tr>
<tr>
<td>1233</td>
</tr>
</tbody>
</table>

Output 1. Proc Means

Output 1 includes the N, Mean, Standard Deviation, Maximum and Minimum of child’s age for the dataset “tablevars”.

PROC FREQ analyzes the dataset according to variables listed in the TABLES statement; this is an efficient way to see a snapshot of categorical variables. The following frequency procedure syntax includes a TABLES statement for two variables, gender and allergic status.

```
proc freq data = tmp1.tablevars;
tables gender allergy; run;
```

<table>
<thead>
<tr>
<th>GENDER</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Frequency</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Male</td>
<td>726</td>
<td>58.88</td>
<td>726</td>
<td>58.88</td>
</tr>
<tr>
<td>2 = Female</td>
<td>507</td>
<td>41.12</td>
<td>1233</td>
<td>100.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ALLERGY</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Frequency</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 = No</td>
<td>423</td>
<td>34.31</td>
<td>423</td>
<td>34.31</td>
</tr>
<tr>
<td>1 = Yes</td>
<td>810</td>
<td>65.69</td>
<td>1233</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Output 2. Proc Freq

Output 2 displays the frequency and percent values, as well as indicating to us that there are 810 children with Allergy = 1 ('Yes'). This is a value we will need to carry along to keep children with allergies in our analyses.

It looks like these variables are practical to work with, let's create an output dataset to answer the final question.
By adding a WHERE statement to PROC MEANS we are able to limit our dataset to only children with allergies. The BY statement allows another column to be added in our analysis dataset so not only are we looking at summary statistics for age, but stratifying those statistics by gender. The output statement sends the created variables into a new SAS dataset named Boss1.

```sas
proc sort data =tmp1.tablevars;
 by gender; run;
proc means data= tmp1.tablevars noprint;
 var ch_age; by gender ;
 where allergy = 1;
 output out = Boss1; run;
```

Output 3. Proc Means dataset “Boss1”

Output 3, PROC MEANS includes a "_STAT_" column, containing standard PROC MEANS statistics. We now can see that the mean age of a male with allergies is 7.5 and the mean age of a female with allergies is 7.6.
The above PROC FREQ syntax requests a table of child age by gender, within the same statement we have included ‘out =’ which will output the requested statistics in to the new dataset Boss2. Again, adding a WHERE statement allows us to only include children with allergies.

```
proc freq data = tmp2.tablevars noprint;
tables ch_age*gender/norow nocol out=Boss2;
where allergy = 1; run;
```

Output 4. Proc Freq dataset “Boss2”
Output 4. PROC FREQ, displays a distribution of the data with summary statistics. It contains the column "percent", which refers to the percentage of each age, stratified by gender that is included in the allergy analysis. This output, although informative, is not optimal for reporting. Displaying the data in a graph will make viewing the dataset BOSS2 much less complicated.

Results

Now that we have created a dataset with summary variables there are several ways to display the dataset BOSS1. Using ODS in combination with a simple PROC PRINT is an expedient way to get the output dataset from a PROC MEANS into a tabular display.

```
ods rtf file = 'tab_disp.rtf';
proc print data = boss1;
where _STAT_ = "MEAN";
run;
```

"Mean Age of Children with Allergies, Stratified by Gender"

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Mean Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>493</td>
<td>7.50507</td>
</tr>
<tr>
<td>Female</td>
<td>317</td>
<td>7.59937</td>
</tr>
</tbody>
</table>

Output 5. Using ODS with proc print

Output 5 is an example of edited ODS output, the table was exported into a word document (tab_disp.rtf). In this format the document can be easily edited and ready for distribution in minutes.
There are also several options to graphically display the data, one way, is to utilize PROC FREQ in combination with ODS to create a frequency dot plot which clearly shows the distribution of age by gender for the allergic children.

```sas
ods rtf file=graph_disp.rtf;
ods graphics on;
proc freq data=boss2 order=freq;
tables gender*ch_age/plots=freqplot
(type=dot scale =percent);
weight count;
run;
ods graphics off;
ods rtf close;
```

Graph 1. Frequency Plot – Distribution of Allergic Children by Gender and Age
Graph 1 indicates by gender, the percent of each age with allergies. Clearly illustrating the highest overall percentage of children with allergies is in the category of eight year old males.

Conclusion

PROC MEANS and PROC FREQ offer an OUTPUT statement which can be utilized to create datasets with simple statistics and produce graphical or tabular displays. Using the OUTPUT statement can be an ally in everyday programming.

CONTACT INFORMATION

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