

SAS[®] GLOBAL FORUM 2018

USERS PROGRAM

Determining differences in health care costs
before and after Alzheimer's diagnosis using
SAS[®] Studio

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#SASGF

Determining Differences in Health Care Costs Before and After Alzheimer's Diagnosis Using SAS® Studio

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Optum

ABSTRACT

Problem: Delayed or missed diagnoses of Alzheimer's might deprive afflicted individuals of treatments, care plans, and services that improve their symptoms, slow disease progression, and help them maintain independence. Cost-based evidence to substantiate the importance of early diagnosis is lacking.

Solution: Use the tools of SAS® Studio to analyze administrative claims data and identify cost trends before and after Alzheimer's diagnoses.

Objective: Demonstrate a method using SAS® Studio for assessing significant differences in fall-related, injury-related, and poisoning-related costs (inpatient, outpatient, ER and office visit costs) before and after Alzheimer's diagnoses, and interpreting those results. Apply SAS® Studio analysis to health care claims data of 9,879 patients diagnosed with Alzheimer's.

Results: Total treatment costs were lower (61 percent for poisoning, 13 percent for falls, 12 percent for injuries) in the first six months after diagnosis compared to the six months before. Inpatient health care costs were comparably lower (60 percent for poisoning, 14 percent for falls, 17 percent for injuries). Outpatient costs were higher related to falls (97 percent) and injuries (134 percent).

The results suggest a trend toward less costly care immediately after an Alzheimer's diagnosis. The research method resulted in tips for future SAS® Studio users, including:

- How to prepare sample datasets for use with SAS® Studio's statistics tasks.
- How to execute summary statistics and paired t-tests and interpret the results.

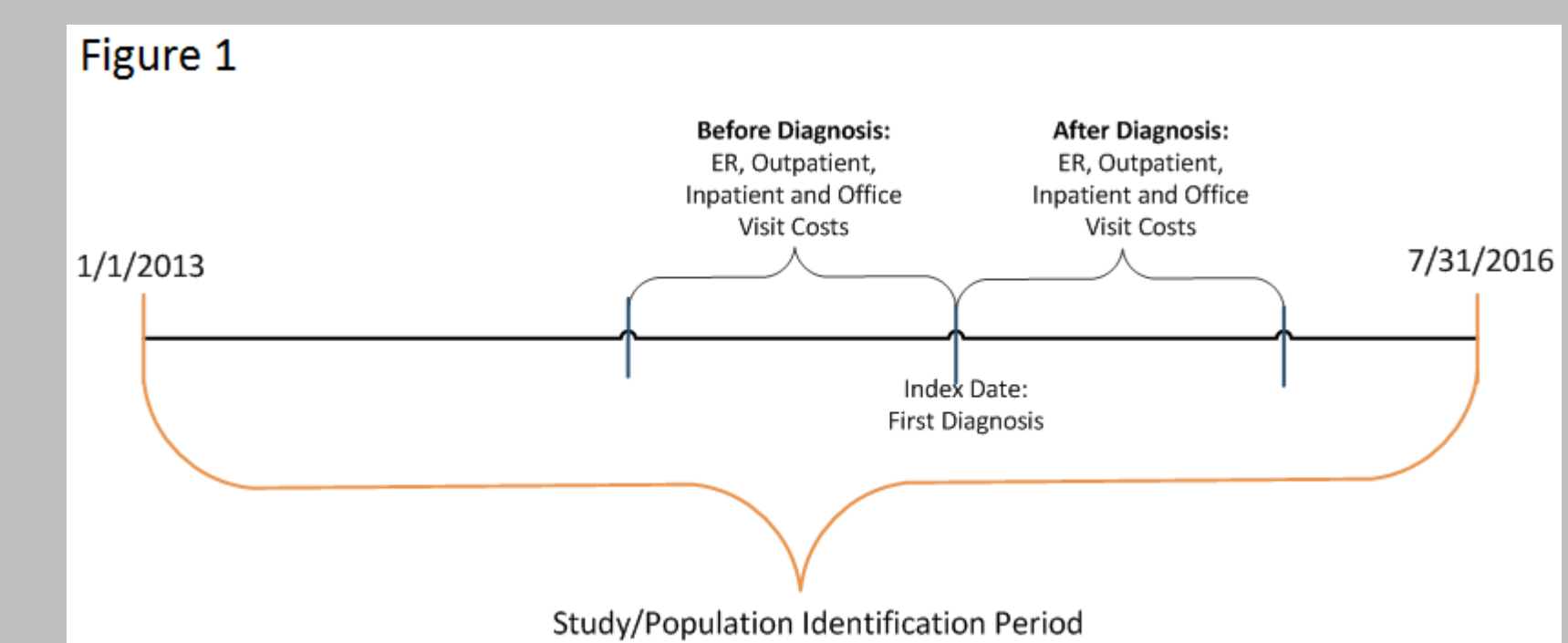
DATA

For this study, 9,879 Alzheimer's members were selected from a company research database that includes de-identified administrative claims data. These members must have had at least two Alzheimer's diagnoses in the same 12 month period from 1/1/2013-7/31/2016.

Members' health care costs were calculated 6 months before and after their first Alzheimer's diagnosis (Figure 1). A member level analytic dataset was then created for each of these variables:

- Fall-related inpatient, outpatient, ER, office visit and total costs (before and after diagnosis).
- Injury-related inpatient, outpatient, ER, office visit and total costs (before and after diagnosis).
- Poisoning-related inpatient, outpatient, ER, office visit and total costs (before and after diagnosis).
- Overall inpatient, outpatient, ER, office visit and total costs (before and after diagnosis).

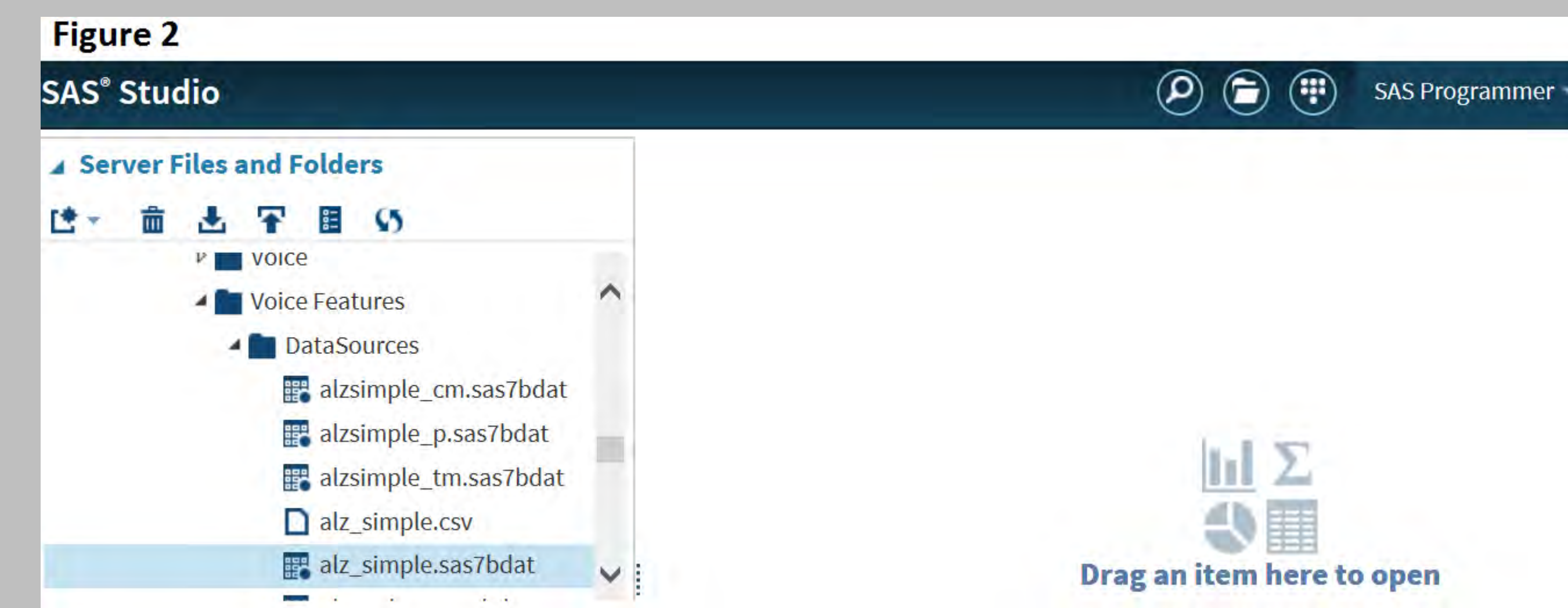
DATA (CONTINUED)



METHODS

Load Member Analytic File to SAS® Studio

The member's analytic file (alz_simple.sas7bdat) was loaded into SAS® Studio by dragging and dropping from the file location on the left to the "Drag item here to open" on the right (Figure 2).

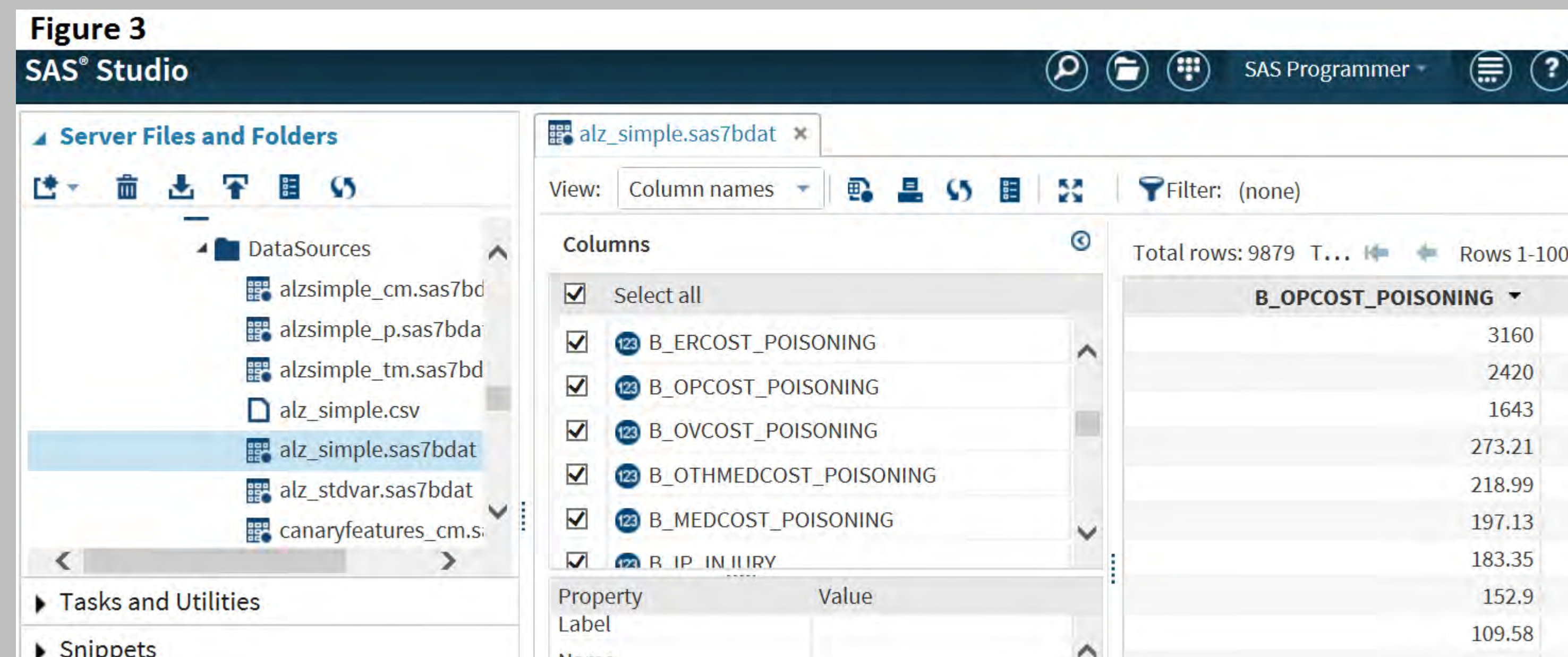


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METHODS (CONTINUED)

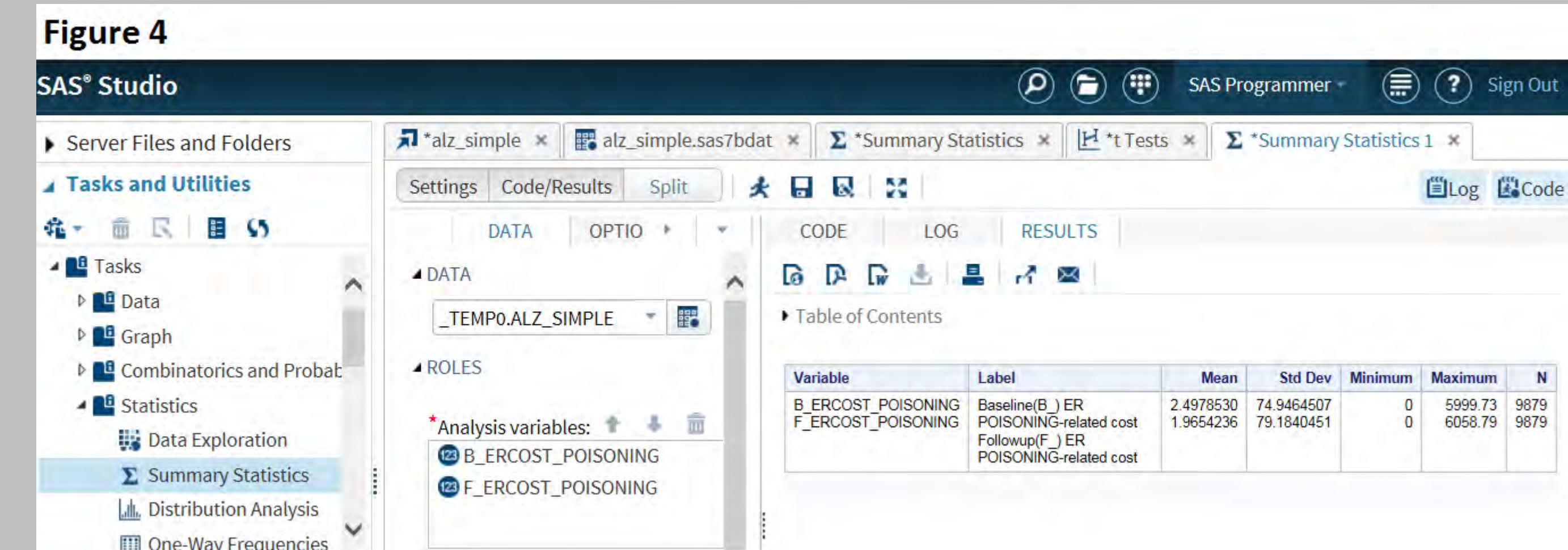
After the file was loaded, all variables were viewable under the “Columns” heading (Figure 3). For example, Figure 3 shows the poisoning-related ER, outpatient and office visit costs before a member's Alzheimer's diagnosis (B_ERCOST_POISONING, B_OPCOST_POISONING, B_OVCOSTPOISONING - respectively). Figure 3 also shows each member’s poisoning-related outpatient costs under the corresponding variable name “B_OPCOST_POISONING” (\$3,160, \$2,420, etc)



Summary Statistics

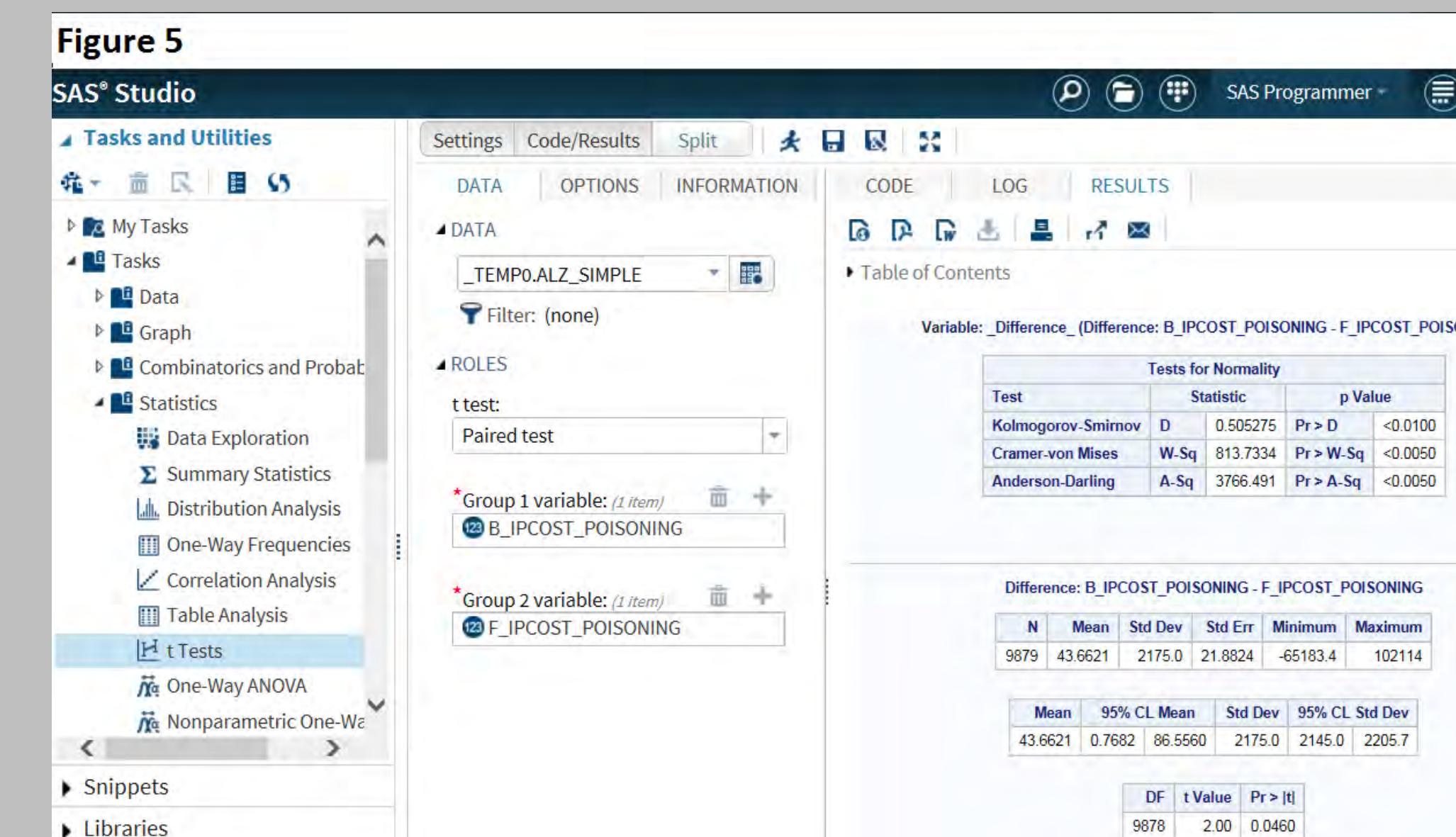
Summary statistics were run on each of the health care cost variables by selecting “Task and Utilities” -> “Tasks” -> “Statistics” -> “Summary Statistics”, and choosing the “Analysis variables” and then selecting the run icon. Figure 4 demonstrates the summary statistics for poisoning-related ER Costs before and after diagnosis. The mean poisoning-related ER costs before diagnosis were \$2.50 per member and \$1.97 per member.

METHODS (CONTINUED)



Paired t Tests

Paired t Tests were run on each pair of health care cost variables before and after diagnosis by selecting “Task and Utilities” -> “Tasks” -> “Statistics” -> “t Tests”, and then selecting “Paired test” under “t Test”. For the “Group 1 variable”, the cost variable before diagnosis (ex. B_IPCOST_POISONING) was selected. For the “Group 2 variable”, the cost variable after diagnosis (ex. F_IPCOST_POISONING) was selected. Figure 4 demonstrates the t Test for inpatient-related costs before and after diagnosis. The mean difference after diagnosis is \$43.66 which is a significant decrease of 61.46% in poisoning-related inpatient costs after diagnosis ($p < .005$).



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RESULTS

Poisoning-Related Costs: Before and After Diagnosis

| Poisoning Related Costs | Mean \$ per Member Before Dx | Mean \$ per Member After Dx | Difference | %Increase/Decrease |
|-------------------------|------------------------------|-----------------------------|------------|--------------------|
| ER | 2.50 | 1.97 | -0.53 | -21.32% |
| Office Visit | 0.17 | 0.17 | 0.00 | 0.63% |
| Inpatient | 71.04 | 27.38 | -43.66 | -61.46%* |
| Outpatient | 0.89 | 0.06 | -0.83 | -93.62%* |
| Other | 0.18 | 0.08 | -0.10 | -56.77% |
| Total | 74.78 | 29.66 | -45.12 | -60.34%* |

*Statistically Significant (p<.05)

There were statistically significant decreases of 61% in poisoning-related inpatient costs and 60% in poisoning-related total costs after members were diagnosed with Alzheimer's. Poisoning-related ER, outpatient and other costs also show % decreases, although statistical significance was not proven.

Fall-Related Costs: Before and After Diagnosis

| Fall Related Costs | Mean \$ per Member Before Dx | Mean \$ per Member After Dx | Difference | %Increase/Decrease |
|--------------------|------------------------------|-----------------------------|------------|--------------------|
| ER | 18.86 | 21.84 | 2.98 | 15.78% |
| Office Visit | 1.36 | 1.88 | 0.51 | 37.75% |
| Inpatient | 851.41 | 727.49 | -123.92 | -14.55%* |
| Outpatient | 4.35 | 8.57 | 4.22 | 97.05%* |
| Other | 3.01 | 4.56 | 1.55 | 51.39% |
| Total | 879.00 | 764.34 | -114.66 | -13.04%* |

*Statistically Significant (p<.05)

There were decreases of 14% in fall-related inpatient costs and 13% in fall-related total costs after members were diagnosed with Alzheimer's (statistical significance not proven). A statistically significant increase of 97% in outpatient costs, along with decreases in inpatient and total costs, suggests a trend toward less invasive and less costly care after a member is diagnosed.

RESULTS (CONTINUED)

Injury-Related Costs: Before and After Diagnosis

| Injury Related Costs | Mean \$ per Member Before Dx | Mean \$ per Member After Dx | Difference | %Increase/Decrease |
|----------------------|------------------------------|-----------------------------|------------|--------------------|
| ER | 96.84 | 125.85 | 29.01 | 29.96%* |
| Office Visit | 13.72 | 17.46 | 3.74 | 27.29% |
| Inpatient | 1925.85 | 1603.61 | -322.24 | -16.73%* |
| Outpatient | 27.86 | 65.28 | 37.42 | 134.32%* |
| Other | 13.34 | 20.17 | 6.83 | 51.22% |
| Total | 2077.61 | 1832.38 | -245.23 | -11.80%* |

*Statistically Significant (p<.05)

There was a statistically significant decrease of 17% in injury-related inpatient costs and 134% increase in injury-related outpatient costs after members were diagnosed with Alzheimer's. Along with the decrease in overall total costs, these trends suggest movement toward outpatient services and less invasive care after a member is diagnosed.

Overall Costs: Before and After Diagnosis

| Overall Costs | Mean \$ per Member Before Dx | Mean \$ per Member After Dx | Difference | %Increase/Decrease |
|---------------|------------------------------|-----------------------------|------------|--------------------|
| ER | 613.81 | 745.49 | 131.67 | 21.45%* |
| Office Visit | 678.42 | 827.14 | 148.72 | 21.92%* |
| Outpatient | 966.85 | 1446.29 | 479.44 | 49.59%* |
| Inpatient | 5233.29 | 5101.14 | -132.15 | -2.53% |
| Other | 431.64 | 693.62 | 261.98 | 60.69%* |
| Total | 7924.01 | 8813.67 | 889.66 | 11.23%* |

*Statistically Significant (p<.05)

Significant increases in overall healthcare costs, except for inpatient. Over time, a decrease in the most expensive form of care per member (inpatient) may be beneficial.

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CONCLUSIONS

- Falls, injuries and poisoning-related costs decreased after members were diagnosed with Alzheimer's.
- Increases in falls and injury-related outpatient costs, along with decreases in inpatient and total costs, suggest a trend toward less costly and invasive care after a member is diagnosed.
 - With fall and injury prevention measures in place, there may be a shift from more severe to less severe injuries resulting in less costly care.
 - In addition, there may be a paradigm shift after a member is diagnosed resulting in focused treatment of Alzheimer's that prevents the need for unnecessary invasive tests or procedures.
- Higher pre-diagnosis falls and poisoning costs could suggest that these accidents led to Alzheimer's being detected. An early detection system may be beneficial if it identifies diseases before costly accidents occur.
- Overall costs increased after members were diagnosed, however, the utilization of less costly services after diagnosis may lead to decreases in overall spend longer term. This may justify screening measures for early diagnosis.



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