Education Research Statistics Descriptive and Comparative

Assignment #4

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Assignment #4

Sample

The original sample of 17,486 mental health treatment facilities included a variety of facility types. Data was trimmed to include only facilities in Texas which narrowed the sample size to 382 facilities. The sampled facilities included both public and private mental health treatment facilities. The treatment facilities included psychiatric hospitals which included non-federal general hospitals with separate psychiatric units and VA hospitals. Treatment facilities also included facilities with out-patient, day treatment, or partial hospitalization programs. Residential treatment facilities for adults and children were also part of the survey sample. Multi-setting, including non-hospital centers, were also included in the sample (SAMHSA et al., 2016).

Variables

For the most part, data was reported in a binary format with facilities either having the service or not. To provide a more continuous variable, variables were grouped by similar type of service until three variable categories were developed: mental health services, other services, and treatment modality. These new variables met the criteria for normality using a histogram as a visual test of normalcy. Data was subsetted into facilities with a sliding fee scale and facilities without sliding fee scale.

Some variables were excluded from the data analysis because they were irrelevant to economics and mental health related services provided. These variables included languages, age groups, and location. Institution licensing and accreditation were also excluded in the data analysis.

Data Analysis

RStudio software was used to analyze the data. Because data was sorted into two groups for comparison, data analysis involved a Welch two sample t-test. Independent variables included: mental health services, other related services, and treatment modality. The dependent variable was fee scale.

Central tendencies for the three variables for the data set Texas can be found in Table 1. The average number of mental health services available at facilities in Texas was 10.58. The average number of other related services available at facilities in Texas was 5.3. The average number of treatment modalities provided at Texas facilities was 5.3. Variance indicated a high level of variation in the number of mental health services and other related services provided at all Texas mental health treatment facilities.

Central tendencies for facilities with a sliding fee scale can be found in Table 2. The means for all variables were slightly higher than for Texas overall and variance was comparable. Central tendencies for facilities with no sliding fee scale can be found in Table 3. For facilities with no sliding fee scale, the average number of services for all three variables was lower. As seen in Table 4, the Welch two sample t-test proved statistical significance for all three variables.

Data was also analyzed using an ANOVA test. Table 5 shows p values that demonstrate statistical significance between mental health services, other related services, and treatment modality in facilities with a sliding fee scale. Statistical significance was also demonstrated for all three variables for facilities with no sliding fee scale (See Table 5). TukeyHSD is a post-hoc test designed to determine the significant differences between group means in after conducting an ANOVA. Statistical significance between some variables was demonstrated using TukeyHSD analysis for both subsets of data (See Tables 7-10).

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| Table 1 All Texas Facilities Surveyed | | | | | | |  | | |  | | |  | | |
|  | Mean | | | Median | | | Range | | | sd | | | var | | |
| Mental Health Services | 10.58 | | | 10.00 | | | 18.00 | | | 3.56 | | | 12.66 | | |
| Other Related Services | 5.30 | | | 5.00 | | | 12.00 | | | 3.18 | | | 10.09 | | |
| TX Modality | 3.94 | | | 4.00 | | | 8.00 | | | 1.44 | | | 2.09 | | |
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| Table 2 Facilities with Sliding Fee Scale | | | | | |  | | |  | | |  | | |
|  | Mean | | Median | | | Range | | | sd | | | var | | |
| Mental Health Services | 11.35 | | 11.00 | | | 18.00 | | | 3.50 | | | 12.24 | | |
| Other Related Services | 6.05 | | 6.00 | | | 12.00 | | | 2.94 | | | 8.60 | | |
| TX Modality | 3.75 | | 4.00 | | | 6.00 | | | 1.45 | | | 2.10 | | |
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| Table 3 Facilities with No Sliding Fee Scale | | | | |  | | |  | | |  | | |
|  | Mean | Median | | | Range | | | sd | | | var | | |
| Mental Health Services | 9.4 | 9.00 | | | 15.00 | | | 3.25 | | | 10.58 | | |
| Other Related Services | 4.16 | 4.00 | | | 11.00 | | | 3.08 | | | 9.49 | | |
| TX Modality | 4.07 | 4.00 | | | 7.00 | | | 1.40 | | | 1.95 | | |
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| Table 4 Welch Two Sample T-test Results | | |  |  |
|  | t | df | p | significance |
| Mental Health Services | 5.50 | 356.14 | 7.38e-08 | \*\*\* |
| Other Related Services | 5.20 | 345.29 | 6.67e-09 | \*\*\* |
| TX Modality | -2.09 | 353.87 | .03711 | \* |
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| note: for p values \*\*\* 0.001 \*\*0.01 \*0.05 | | | | |

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| Table 5 ANOVA results sliding scale fee | | | | |
|  | df | p | significance |  |
| MHS/ORS | 1.00 | 2e-16 | \*\*\* |  |
| MHS/TXMOD | 6.00 | 1.15e-10 | \*\*\* |  |
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| note: for p values \*\*\* 0.001 \*\*0.01 \*0.05 | | | | |

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| Table 6 ANOVA results no sliding scale fee | | | | |
|  | df | p | significance |  |
| MHS/ORS | 11.00 | 3.18e-09 | \*\*\* |  |
| MHS/TXMOD | 7.00 | 3.85e-05 | \*\*\* |  |
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| note: for p values \*\*\* 0.001 \*\*0.01 \*0.05 | | | | |

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| Table 7 TukeyHSD sliding fee scale MHS/ORS | | | | |  |
| Diff lwr upr p adj |  |  |  |  |  |
| 1-0 1.62500000 -8.1768002 11.426800 0.9996030 | | | | | |
| 2-0 2.33333333 -7.2109637 11.877630 0.9951908 | | | | | |
| 3-0 4.60000000 -4.8242382 14.024238 0.8068344 | | | | | |
| 4-0 4.10000000 -5.2331806 13.433181 0.8782087 | | | | | |
| 5-0 4.68888889 -4.6544531 14.032231 0.7836885 | | | | | |
| 6-0 6.25000000 -3.2194386 15.719439 0.4669024 | | | | | |
| 7-0 10.00000000 -0.6708485 20.670848 0.0839259 | | | | | |
| 2-1 0.70833333 -3.3374524 4.754119 0.9994313 | | | | | |
| 3-1 2.97500000 -0.7788037 6.728804 0.2322421 | | | | | |
| 4-1 2.47500000 -1.0439540 5.993954 0.3814328 | | | | | |
| 5-1 3.06388889 -0.4819277 6.609705 0.1448387 | | | | | |
| 6-1 4.62500000 0.7591179 8.490882 0.0076587 | | | | | |
| 7-1 8.37500000 2.1186605 14.631339 0.0015853 | | | | | |
| 3-2 2.26666667 -0.7515051 5.284838 0.2964501 | | | | | |
| 4-2 1.76666667 -0.9538766 4.487210 0.4887286 | | | | | |
| 5-2 2.35555556 -0.3996457 5.110757 0.1543828 | | | | | |
| 6-2 3.91666667 0.7601871 7.073146 0.0047664 | | | | | |
| 7-2 7.66666667 1.8220022 13.511331 0.0021625 | | | | | |
| 4-3 -0.50000000 -2.7636288 1.763629 0.9974503 | | | | | |
| 5-3 0.08888889 -2.2162778 2.394056 1.0000000 | | | | | |
| 6-3 1.65000000 -1.1223678 4.422368 0.6019526 | | | | | |
| 7-3 5.40000000 -0.2464823 11.046482 0.0719690 | | | | | |
| 5-4 0.58888889 -1.3100025 2.487780 0.9801379 | | | | | |
| 6-4 2.15000000 -0.2949985 4.594999 0.1299039 | | | | | |
| 7-4 5.90000000 0.4068445 11.393155 0.0257478 | | | | | |
| 6-5 1.56111111 -0.9223937 4.044616 0.5319456 | | | | | |
| 7-5 5.31111111 -0.1992913 10.821514 0.0677110 | | | | | |
| 7-6 3.75000000 -1.9716051 9.471605 0.4763255 |  |  |  |  |  |
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| Table 8 TukeyHSD sliding fee scale MHS/TXMOD | | | | |  |
| Diff lwr upr p adj |  |  |  |  |  |
| 2-1 -0.20779221 -3.4391054 3.023521 0.9999957 | | | | | |
| 3-1 2.84090909 -0.2202139 5.902032 0.0881965 | | | | | |
| 4-1 3.16363636 0.1643606 6.162912 0.0313361 | | | | | |
| 5-1 2.93939394 -0.2221203 6.100908 0.0870879 | | | | | |
| 6-1 5.07792208 1.4191803 8.736664 0.0010311 | | | | | |
| 7-1 7.86363636 3.6441695 12.083103 0.0000020 | | | | | |
| 3-2 3.04870130 0.8534562 5.243946 0.0010205 | | | | | |
| 4-2 3.37142857 1.2632820 5.479575 0.0000762 | | | | | |
| 5-2 3.14718615 0.8139911 5.480381 0.0016112 | | | | | |
| 6-2 5.28571429 2.3133384 8.258090 0.0000067 | | | | | |
| 7-2 8.07142857 4.4310265 11.711831 0.0000000 | | | | | |
| 4-3 0.32272727 -1.5139465 2.159401 0.9984807 | | | | | |
| 5-3 0.09848485 -1.9926602 2.189630 0.9999993 | | | | | |
| 6-3 2.23701299 -0.5494017 5.023428 0.2073528 | | | | | |
| 7-3 5.02272727 1.5325101 8.512944 0.0005643 | | | | | |
| 5-4 -0.22424242 -2.2237596 1.775275 0.9998858 | | | | | |
| 6-4 1.91428571 -0.8040388 4.632610 0.3574950 | | | | | |
| 7-4 4.70000000 1.2638980 8.136102 0.0012989 | | | | | |
| 6-5 2.13852814 -0.7578153 5.034872 0.3000425 | | | | | |
| 7-5 4.92424242 1.3456513 8.502834 0.0011823 | | | | | |
| 7-6 2.78571429 -1.2389016 6.810330 0.3789825 |  |  |  |  |  |
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| Table 9 TukeyHSD no sliding fee scale MHS/ORS | | | | | | | | | | |  | | | |
| Diff lwr upr |  |  | | | |  | | |  | | | | p adj | | |
| 1-0 1.12962963 -1.766821132 4.026080 | | | | | | | | | | | 0.9787565 | | | |
| 2-0 1.91666667 -1.046377869 4.879711 | | | | | | | | | | | 0.5903449 | | | |
| 3-0 2.57142857 -0.788348128 5.931205 | | | | | | | | | | | 0.3236476 | | | |
| 4-0 3.00000000 -0.245852662 6.245853 | | | | | | | | | | | 0.0998766 | | | |
| 5-0 4.16666667 0.660745092 7.672588 | | | | | | | | | | | 0.006563 | | | |
| 6-0 2.85714286 -0.502633842 6.216920 | | | | | | | | | | | 0.1812239 | | | |
| 7-0 4.10000000 0.399158561 7.800841 | | | | | | | | | | | 0.0164425 | | | |
| 8-0 4.75000000 1.504147338 7.995853 | | | | | | | | | | | 0.0001789 | | | |
| 9-0 6.11538462 2.687382138 9.543387 | | | | | | | | | | | 0.0000013 | | | |
| 10-0 9.50000000 0.036794634 18.963205 | | | | | | | | | | | 0.0481554 | | | |
| 11-0 6.75000000 1.617856319 11.882144 | | | | | | | | | | | 0.001355 | | | |
| 2-1 0.78703704 -1.788521238 3.362595 | | | | | | | | | | | 0.9971834 | | | |
| 3-1 1.44179894 -1.581769642 4.465368 | | | | | | | | | | | 0.912892 | | | |
| 4-1 1.87037037 -1.026080391 4.766821 | | | | | | | | | | | 0.5929779 | | | |
| 5-1 3.03703704 -0.148140132 6.222214 | | | | | | | | | | | 0.0771826 | | | |
| 6-1 1.72751323 -1.296055356 4.751082 | | | | | | | | | | | 0.7598433 | | | |
| 7-1 2.97037037 -0.428172680 6.368913 | | | | | | | | | | | 0.1511321 | | | |
| 8-1 3.62037037 0.723919609 6.516821 | | | | | | | | | | | 0.0031136 | | | |
| 9-1 4.98575499 1.886550492 8.084959 | | | | | | | | | | | 0.0000208 | | | |
| 10-1 8.37037037 -0.978753830 17.719495 | | | | | | | | | | | 0.1273733 | | | |
| 11-1 5.62037037 0.701756107 10.538985 | | | | | | | | | | | 0.0111541 | | | |
| 3-2 0.65476190 -2.432659817 3.742184 | | | | | | | | | | | 0.9999101 | | | |
| 4-2 1.08333333 -1.879711203 4.046378 | | | | | | | | | | | 0.9871931 | | | |
| 5-2 2.25000000 -0.995852662 5.495853 | | | | | | | | | | | 0.4807898 | | | |
| 6-2 0.94047619 -2.146945531 4.027898 | | | | | | | | | | | 0.997261 | | | |
| 7-2 2.18333333 -1.272140697 5.638807 | | | | | | | | | | | 0.625733 | | | |
| 8-2 2.83333333 -0.129711203 5.796378 | | | | | | | | | | | 0.0752992 | | | |
| 9-2 4.19871795 1.037187559 7.360248 | | | | | | | | | | | 0.0011456 | | | |
| 10-2 7.58333333 -1.786636209 16.953303 | | | | | | | | | | | 0.2433798 | | | |
| 11-2 4.83333333 -0.124788507 9.791455 | | | | | | | | | | | 0.0634693 | | | |
| 4-3 0.42857143 -2.931205271 3.788348 | | | | | | | | | | | 0.9999995 | | | |
| 5-3 1.59523810 -2.016413335 5.206890 | | | | | | | | | | | 0.9474689 | | | |
| 6-3 0.28571429 -3.184248169 3.755677 | | | | | | | | | | | 1 | | | |
| 7-3 1.52857143 -2.272581991 5.329725 | | | | | | | | | | | 0.9732174 | | | |
| 8-3 2.17857143 -1.181205271 5.538348 | | | | | | | | | | | 0.5866231 | | | |
| 9-3 3.54395604 0.007893127 7.080019 | | | | | | | | | | | 0.0489337 | | | |
| 10-3 6.92857143 -2.574312121 16.431455 | | | | | | | | | | | 0.3993819 | | | |
| 11-3 4.17857143 -1.026372253 9.383515 | | | | | | | | | | | 0.2543958 | | | |
| 5-4 1.16666667 -2.339254908 4.672588 | | | | | | | | | | | 0.9941079 | | | |
| 6-4 -0.14285714 -3.502633842 3.216920 | | | | | | | | | | | 1 | | | |
| 7-4 1.10000000 -2.600841439 4.800841 | | | | | | | | | | | 0.9977982 | | | |
| 8-4 1.75000000 -1.495852662 4.995853 | | | | | | | | | | | 0.8213963 | | | |
| 9-4 3.11538462 -0.312617862 6.543387 | | | | | | | | | | | 0.1138942 | | | |
| 10-4 6.50000000 -2.963205366 15.963205 | | | | | | | | | | | 0.49557 | | | |
| 11-4 3.75000000 -1.382143681 8.882144 | | | | | | | | | | | 0.3959129 | | | |
| 6-5 -1.30952381 -4.921175240 2.302128 | | | | | | | | | | | 0.9880218 | | | |
| 7-5 -0.06666667 -3.997589452 3.864256 | | | | | | | | | | | 1 | | | |
| 8-5 0.58333333 -2.922588242 4.089255 | | | | | | | | | | | 0.9999923 | | | |
| 9-5 1.94871795 -1.726486477 5.623922 | | | | | | | | | | | 0.8368327 | | | |
| 10-5 5.33333333 -4.222198174 14.888865 | | | | | | | | | | | 0.7861311 | | | |
| 11-5 2.58333333 -2.717121869 7.883789 | | | | | | | | | | | 0.9001704 | | | |
| 7-6 1.24285714 -2.558296277 5.044011 | | | | | | | | | | | 0.9949272 | | | |
| 8-6 1.89285714 -1.466919557 5.252634 | | | | | | | | | | | 0.7758516 | | | |
| 9-6 3.25824176 -0.277821159 6.794305 | | | | | | | | | | | 0.1023295 | | | |
| 10-6 6.64285714 -2.860026407 16.145741 | | | | | | | | | | | 0.4672218 | | | |
| 11-6 3.89285714 -1.312086539 9.097801 | | | | | | | | | | | 0.359119 | | | |
| 8-7 0.65000000 -3.050841439 4.350841 | | | | | | | | | | | 0.9999866 | | | |
| 9-7 2.01538462 -1.846204285 5.876974 | | | | | | | | | | | 0.8505702 | | | |
| 10-7 5.40000000 -4.228755042 15.028755 | | | | | | | | | | | 0.7809096 | | | |
| 11-7 2.65000000 -2.781350349 8.081350 | | | | | | | | | | | 0.8995019 | | | |
| 9-8 1.36538462 -2.062617862 4.793387 | | | | | | | | | | | 0.9750733 | | | |
| 10-8 4.75000000 -4.713205366 14.213205 | | | | | | | | | | | 0.8807138 | | | |
| 11-8 2.00000000 -3.132143681 7.132144 | | | | | | | | | | | 0.9788831 | | | |
| 10-9 3.38461538 -6.142603374 12.911834 | | | | | | | | | | | 0.9898487 | | | |
| 11-9 0.63461538 -4.614626489 5.883857 | | | | | | | | | | | 0.9999997 | | | |
| 11-10 -2.75000000 -13.014287363 7.514287 |  |  | |  | | | |  | | | 0.9991465 | | | |
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|  |  |  | |  | | | |  | | |  | | | |
| Table 10 TukeyHSD no sliding fee scale MHS/TXMOD | | | | | | | | | | | | | |
| Diff lwr upr p adj | | |  | |  | |  | | |  | |  | |
| 1-0 1.62500000 -8.1768002 11.426800 0.9996030 | | | | | | | | | | | | | |
| 2-0 2.33333333 -7.2109637 11.877630 0.9951908 | | | | | | | | | | | | | |
| 3-0 4.60000000 -4.8242382 14.024238 0.8068344 | | | | | | | | | | | | | |
| 4-0 4.10000000 -5.2331806 13.433181 0.8782087 | | | | | | | | | | | | | |
| 5-0 4.68888889 -4.6544531 14.032231 0.7836885 | | | | | | | | | | | | | |
| 6-0 6.25000000 -3.2194386 15.719439 0.4669024 | | | | | | | | | | | | | |
| 7-0 10.00000000 -0.6708485 20.670848 0.0839259 | | | | | | | | | | | | | |
| 2-1 0.70833333 -3.3374524 4.754119 0.9994313 | | | | | | | | | | | | | |
| 3-1 2.97500000 -0.7788037 6.728804 0.2322421 | | | | | | | | | | | | | |
| 4-1 2.47500000 -1.0439540 5.993954 0.3814328 | | | | | | | | | | | | | |
| 5-1 3.06388889 -0.4819277 6.609705 0.1448387 | | | | | | | | | | | | | |
| 6-1 4.62500000 0.7591179 8.490882 0.0076587 | | | | | | | | | | | | | |
| 7-1 8.37500000 2.1186605 14.631339 0.0015853 | | | | | | | | | | | | | |
| 3-2 2.26666667 -0.7515051 5.284838 0.2964501 | | | | | | | | | | | | | |
| 4-2 1.76666667 -0.9538766 4.487210 0.4887286 | | | | | | | | | | | | | |
| 5-2 2.35555556 -0.3996457 5.110757 0.1543828 | | | | | | | | | | | | | |
| 6-2 3.91666667 0.7601871 7.073146 0.0047664 | | | | | | | | | | | | | |
| 7-2 7.66666667 1.8220022 13.511331 0.0021625 | | | | | | | | | | | | | |
| 4-3 -0.50000000 -2.7636288 1.763629 0.9974503 | | | | | | | | | | | | | |
| 5-3 0.08888889 -2.2162778 2.394056 1.0000000 | | | | | | | | | | | | | |
| 6-3 1.65000000 -1.1223678 4.422368 0.6019526 | | | | | | | | | | | | | |
| 7-3 5.40000000 -0.2464823 11.046482 0.0719690 | | | | | | | | | | | | | |
| 5-4 0.58888889 -1.3100025 2.487780 0.9801379 | | | | | | | | | | | | | |
| 6-4 2.15000000 -0.2949985 4.594999 0.1299039 | | | | | | | | | | | | | |
| 7-4 5.90000000 0.4068445 11.393155 0.0257478 | | | | | | | | | | | | | |
| 6-5 1.56111111 -0.9223937 4.044616 0.5319456 | | | | | | | | | | | | | |
| 7-5 5.31111111 -0.1992913 10.821514 0.0677110 | | | | | | | | | | | | | |
| 7-6 3.75000000 -1.9716051 9.471605 0.4763255 | | |  | |  | |  | | |  | |  | |
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