PSet1

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ID: 12174137

Problem Set 1

Question 1: Inspecting the Data

Are there truly 100 clusters and 50 pairs?

Yes there are. The two commands below print out the unique values for both columns and show that there are 100 clusters and 50 paits.

```
print(length(unique(mex_data$cluster)))
```

```
## [1] 100
```

```
print(length(unique(mex_data$clust_pair)))
```

```
## [1] 50
```

Does each pair have a treatment and control cluster?

Yes, as the code below shows. Each pair has both a 1 value and 0 value for the treatment column.

```
pair <- 1
while (pair < 51) {
  subs <- subset(mex_data, clust_pair == pair)
  print(unique(subs$treatment))
  pair <- pair + 1
}
```

```
## [1] 1 0
## [1] 0 1
## [1] 1 0
## [1] 1 0
## [1] 0 1
## [1] 1 0
## [1] 0 1
## [1] 0 1
## [1] 0 1
## [1] 1 0
## [1] 1 0
## [1] 0 1
## [1] 1 0
## [1] 1 0
## [1] 0 1
## [1] 1 0
## [1] 1 0
## [1] 0 1
## [1] 0 1
## [1] 0 1
```

```
## [1] 1 0
## [1] 1 0
## [1] 0 1
## [1] 1 0
## [1] 0 1
## [1] 0 1
## [1] 1 0
## [1] 1 0
## [1] 0 1
## [1] 1 0
## [1] 1 0
## [1] 0 1
## [1] 0 1
## [1] 0 1
## [1] 1 0
## [1] 1 0
## [1] 0 1
## [1] 0 1
## [1] 1 0
## [1] 0 1
## [1] 1 0
## [1] 0 1
## [1] 0 1
## [1] 1 0
## [1] 1 0
## [1] 1 0
## [1] 0 1
## [1] 1 0
## [1] 1 0
## [1] 1 0
```

What is the modal level of schooling in the sample

There is no modal level of schooling, since no totals repeat.

```
modal_list <- list(sum(mex_data$edu_info_051, na.rm=TRUE), sum(mex_data$edu_info_052, na.rm = TRUE), su
print(modal_list)
```

```
## [[1]]
## [1] 5919
##
## [[2]]
## [1] 15430
##
## [[3]]
## [1] 6736
##
## [[4]]
## [1] 1910
##
## [[5]]
## [1] 2343
##
## [[6]]
## [1] 162
```

What is the modal marital status?

```
uniq <- unique(mex_data$marstat, na.rm=TRUE)
print(uniq[which.max(tabulate(match(mex_data$marstat, uniq)))])
```

```
## [1] 2
```

What shares of sample households were involved in Mexico's conditional cash program

In order to do this, I imputed missing values with zero.

```
mex_data$opor_05[is.na(mex_data$opor_05)] <- 0
print(sum(mex_data$opor_05) / length(mex_data$opor_05))
```

```
## [1] 0.4499462
```

What is the mean non-health expenditure?

Imputed missing values as the median, since I found it problematic to impute missing values for food expenditures as zero

```
mex_data$allbut_05[is.na(mex_data$allbut_05)] = median(mex_data$allbut_05, na.rm=TRUE)
mex_data$allbut_06[is.na(mex_data$allbut_06)] = median(mex_data$allbut_06, na.rm=TRUE)
print(mean(mex_data$allbut_05))
```

```
## [1] 9718.923
```

```
print(mean(mex_data$allbut_06))
```

```
## [1] 9528.355
```

Question 2: Which treatment parametes could be identified by these data?

We are unable to identify average treatment effects from this data since its taken from a largely rural population. That means we will not be able to estimate the effects of the program on urban recipients. Furthermore, enrollment in the program is voluntary, which means that means that we'd run into a selection problem if we deployed an ATE approach given that people who select into theprogram might have certain unobservable differences. This is why, from the data available, we can estimate average treatment effect on the treated and average treatment effect on the non-treated.

Question 3: Assess the adequacy of random assignment.

Running a paired t-test on my 05 variables with treatment.

```
pair <- 1
while (pair < 51) {
  subz <- subset(mex_data, clust_pair == pair)
  print(t.test(subz$food_yr_05, subz$treatment, paired=TRUE))
  print(t.test(subz$allbut_05, subz$treatment, paired=TRUE))
  print(t.test(subz$oop_yr3_05, subz$treatment, paired=TRUE))
  pair <- pair + 1
}
```

```
##
##  Paired t-test
##
```

```
## data:  subz$food_yr_05 and subz$treatment
## t = 30.755, df = 757, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  3889.880 4420.323
## sample estimates:
## mean of the differences
##                4155.102
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 40.905, df = 757, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   9906.093 10904.853
## sample estimates:
## mean of the differences
##                10405.47
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 9.6462, df = 753, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   779.9945 1178.5891
## sample estimates:
## mean of the differences
##                979.2918
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 24.215, df = 669, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  3450.331 4059.269
## sample estimates:
## mean of the differences
##                  3754.8
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 27.452, df = 676, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   9351.94 10792.78
## sample estimates:
```

```
## mean of the differences
##               10072.36
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 6.9871, df = 666, p-value = 6.821e-12
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  391.6210 697.7613
## sample estimates:
## mean of the differences
##               544.6912
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 22.424, df = 558, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  2133.695 2543.378
## sample estimates:
## mean of the differences
##               2338.537
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 30.029, df = 579, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  7250.925 8265.820
## sample estimates:
## mean of the differences
##               7758.373
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 8.847, df = 569, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  348.7456 547.7877
## sample estimates:
## mean of the differences
##               448.2667
##
##
##  Paired t-test
##
```

```
## data:  subz$food_yr_05 and subz$treatment
## t = 34.439, df = 692, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  2556.655 2865.795
## sample estimates:
## mean of the differences
##                2711.225
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 31.542, df = 700, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  6483.258 7343.956
## sample estimates:
## mean of the differences
##                6913.607
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 7.6834, df = 696, p-value = 5.276e-14
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  443.9664 748.7452
## sample estimates:
## mean of the differences
##                596.3558
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 28.385, df = 565, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  2247.784 2581.997
## sample estimates:
## mean of the differences
##                 2414.89
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 29.354, df = 572, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  6397.975 7315.579
## sample estimates:
```

```
## mean of the differences
##               6856.777
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 6.5715, df = 568, p-value = 1.129e-10
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  411.9070 763.1089
## sample estimates:
## mean of the differences
##               587.5079
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 36.265, df = 705, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  2691.613 2999.736
## sample estimates:
## mean of the differences
##               2845.674
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 38.367, df = 707, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  7947.193 8804.414
## sample estimates:
## mean of the differences
##               8375.804
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 6.6263, df = 701, p-value = 6.864e-11
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  174.3097 321.0977
## sample estimates:
## mean of the differences
##               247.7037
##
##
##  Paired t-test
##
```

```
## data:  subz$food_yr_05 and subz$treatment
## t = 32.816, df = 671, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  2887.160 3254.644
## sample estimates:
## mean of the differences
##                3070.902
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 23.575, df = 672, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  7615.17 8998.93
## sample estimates:
## mean of the differences
##                 8307.05
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 6.4431, df = 669, p-value = 2.239e-10
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  121.8787 228.7243
## sample estimates:
## mean of the differences
##                175.3015
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 17.18, df = 686, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  1888.948 2376.423
## sample estimates:
## mean of the differences
##                2132.686
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 17.557, df = 700, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  4858.696 6082.186
## sample estimates:
```

```
## mean of the differences
##                5470.441
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 4.1203, df = 675, p-value = 4.255e-05
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   49.34277 139.18386
## sample estimates:
## mean of the differences
##                94.26331
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 35.482, df = 692, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  2535.056 2832.041
## sample estimates:
## mean of the differences
##                2683.548
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 30.77, df = 693, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  6279.353 7135.312
## sample estimates:
## mean of the differences
##                6707.332
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 6.3147, df = 688, p-value = 4.855e-10
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  214.3753 407.8395
## sample estimates:
## mean of the differences
##                311.1074
##
##
##  Paired t-test
##
```

```
## data:  subz$food_yr_05 and subz$treatment
## t = 33.282, df = 656, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  4277.228 4813.570
## sample estimates:
## mean of the differences
##                4545.399
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 33.536, df = 666, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  12367.67 13906.01
## sample estimates:
## mean of the differences
##                13136.84
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 7.8344, df = 666, p-value = 1.866e-14
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   647.8155 1081.1410
## sample estimates:
## mean of the differences
##                864.4783
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 16.408, df = 656, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  3237.809 4118.137
## sample estimates:
## mean of the differences
##                3677.973
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 24.912, df = 657, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  7019.509 8220.768
## sample estimates:
```

```
## mean of the differences
##                7620.139
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 6.6241, df = 657, p-value = 7.274e-11
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  441.8314 814.1352
## sample estimates:
## mean of the differences
##                627.9833
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 23.648, df = 616, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  3068.739 3624.571
## sample estimates:
## mean of the differences
##                3346.655
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 26.932, df = 619, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  7494.143 8672.991
## sample estimates:
## mean of the differences
##                8083.567
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 6.2604, df = 601, p-value = 7.308e-10
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  342.3253 655.2760
## sample estimates:
## mean of the differences
##                498.8007
##
##
##  Paired t-test
##
```

```
## data:  subz$food_yr_05 and subz$treatment
## t = 24.657, df = 591, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  2831.508 3321.624
## sample estimates:
## mean of the differences
##                3076.566
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 31.879, df = 594, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  6882.762 7786.481
## sample estimates:
## mean of the differences
##                7334.621
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 4.462, df = 589, p-value = 9.729e-06
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  128.5771 330.7585
## sample estimates:
## mean of the differences
##                229.6678
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 33.791, df = 686, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  2290.028 2572.566
## sample estimates:
## mean of the differences
##                2431.297
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 27.128, df = 706, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  6131.681 7088.451
## sample estimates:
```

```
## mean of the differences
##                6610.066
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 5.1654, df = 703, p-value = 3.129e-07
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  226.6611 504.6202
## sample estimates:
## mean of the differences
##                365.6406
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 38.601, df = 648, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  3316.921 3672.466
## sample estimates:
## mean of the differences
##                3494.693
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 37.322, df = 651, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  7474.737 8304.938
## sample estimates:
## mean of the differences
##                7889.837
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 5.7169, df = 636, p-value = 1.669e-08
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  251.2170 514.0954
## sample estimates:
## mean of the differences
##                382.6562
##
##
##  Paired t-test
##
```

```
## data:  subz$food_yr_05 and subz$treatment
## t = 23.89, df = 488, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  2005.528 2364.975
## sample estimates:
## mean of the differences
##                2185.252
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 27.514, df = 505, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  6497.622 7496.918
## sample estimates:
## mean of the differences
##                 6997.27
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 5.2393, df = 498, p-value = 2.383e-07
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  166.6955 366.7274
## sample estimates:
## mean of the differences
##                266.7114
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 28.75, df = 677, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  3200.596 3669.808
## sample estimates:
## mean of the differences
##                3435.202
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 22.544, df = 679, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  8377.798 9976.368
## sample estimates:
```

```
## mean of the differences
##                9177.083
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 7.1708, df = 677, p-value = 1.959e-12
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  357.1458 626.4766
## sample estimates:
## mean of the differences
##                491.8112
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 25.242, df = 703, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  4621.533 5401.100
## sample estimates:
## mean of the differences
##                5011.317
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 34.426, df = 721, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  10975.26 12302.78
## sample estimates:
## mean of the differences
##                11639.02
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 6.2307, df = 721, p-value = 7.894e-10
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   84.62171 162.48356
## sample estimates:
## mean of the differences
##                123.5526
##
##
##  Paired t-test
##
```

```
## data:  subz$food_yr_05 and subz$treatment
## t = 34.93, df = 715, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  2677.542 2996.455
## sample estimates:
## mean of the differences
##                2836.999
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 33.19, df = 737, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  7425.327 8358.969
## sample estimates:
## mean of the differences
##                7892.148
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 8.7307, df = 720, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  301.3316 476.1663
## sample estimates:
## mean of the differences
##                 388.749
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 36.034, df = 765, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  3122.071 3481.842
## sample estimates:
## mean of the differences
##                3301.957
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 37.764, df = 789, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  8304.634 9215.328
## sample estimates:
```

```
## mean of the differences
##                8759.981
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 6.8021, df = 774, p-value = 2.063e-11
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  319.6021 578.9037
## sample estimates:
## mean of the differences
##                449.2529
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 30.842, df = 698, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  4564.083 5184.689
## sample estimates:
## mean of the differences
##                4874.386
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 31.242, df = 704, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   9729.295 11034.150
## sample estimates:
## mean of the differences
##                10381.72
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 6.601, df = 700, p-value = 8.069e-11
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  304.8222 562.9154
## sample estimates:
## mean of the differences
##                433.8688
##
##
##  Paired t-test
##
```

```
## data:  subz$food_yr_05 and subz$treatment
## t = 30.658, df = 736, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  2350.067 2671.629
## sample estimates:
## mean of the differences
##                2510.848
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 31.603, df = 746, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  6720.183 7610.382
## sample estimates:
## mean of the differences
##                7165.282
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 4.5036, df = 740, p-value = 7.759e-06
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   72.2151 183.8254
## sample estimates:
## mean of the differences
##                128.0202
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 21.036, df = 702, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  4503.431 5430.606
## sample estimates:
## mean of the differences
##                4967.018
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 24.053, df = 722, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  12178.58 14343.39
## sample estimates:
```

```
## mean of the differences
##               13260.98
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 7.0202, df = 714, p-value = 5.163e-12
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  346.7509 615.9932
## sample estimates:
## mean of the differences
##                481.372
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 34.397, df = 734, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  2962.701 3321.367
## sample estimates:
## mean of the differences
##               3142.034
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 31.408, df = 746, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   9220.343 10449.829
## sample estimates:
## mean of the differences
##               9835.086
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 7.3338, df = 714, p-value = 6.087e-13
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  433.7969 750.9639
## sample estimates:
## mean of the differences
##               592.3804
##
##
##  Paired t-test
##
```

```
## data:  subz$food_yr_05 and subz$treatment
## t = 27.988, df = 619, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  2321.875 2672.289
## sample estimates:
## mean of the differences
##                2497.082
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 29.886, df = 620, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  5704.514 6506.918
## sample estimates:
## mean of the differences
##                6105.716
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 6.4639, df = 619, p-value = 2.07e-10
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  106.2720 199.0247
## sample estimates:
## mean of the differences
##                152.6484
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 14.155, df = 427, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  2660.138 3518.035
## sample estimates:
## mean of the differences
##                3089.086
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 17.438, df = 428, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  7247.618 9088.964
## sample estimates:
```

```
## mean of the differences
##                8168.291
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 3.1703, df = 427, p-value = 0.001633
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   63.02889 268.69541
## sample estimates:
## mean of the differences
##                165.8621
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 32.874, df = 631, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  2722.57 3068.50
## sample estimates:
## mean of the differences
##                2895.535
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 29.979, df = 636, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  7873.930 8977.764
## sample estimates:
## mean of the differences
##                8425.847
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 6.8514, df = 631, p-value = 1.741e-11
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  237.7429 428.7793
## sample estimates:
## mean of the differences
##                333.2611
##
##
##  Paired t-test
##
```

```
## data:  subz$food_yr_05 and subz$treatment
## t = 40.998, df = 601, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  4059.666 4468.171
## sample estimates:
## mean of the differences
##                4263.919
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 29.229, df = 608, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   9174.866 10496.559
## sample estimates:
## mean of the differences
##                9835.713
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 6.5014, df = 603, p-value = 1.67e-10
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  226.8628 423.2431
## sample estimates:
## mean of the differences
##                 325.053
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 47.125, df = 673, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  4297.438 4671.120
## sample estimates:
## mean of the differences
##                4484.279
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 42.288, df = 678, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   9837.792 10795.820
## sample estimates:
```

```
## mean of the differences
##                10316.81
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 5.0423, df = 671, p-value = 5.924e-07
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   51.17102 116.43909
## sample estimates:
## mean of the differences
##                83.80506
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 18.989, df = 619, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  4820.858 5932.971
## sample estimates:
## mean of the differences
##                5376.915
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 25.898, df = 623, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  11548.18 13443.20
## sample estimates:
## mean of the differences
##                12495.69
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 7.8709, df = 619, p-value = 1.579e-14
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  363.8928 605.8426
## sample estimates:
## mean of the differences
##                484.8677
##
##
##  Paired t-test
##
```

```
## data:  subz$food_yr_05 and subz$treatment
## t = 36.747, df = 694, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  3453.704 3843.593
## sample estimates:
## mean of the differences
##                3648.649
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 26.763, df = 694, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  8408.036 9739.349
## sample estimates:
## mean of the differences
##                9073.692
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 7.6832, df = 692, p-value = 5.319e-14
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  377.8123 637.1892
## sample estimates:
## mean of the differences
##                507.5007
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 17.097, df = 594, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  5115.595 6443.387
## sample estimates:
## mean of the differences
##                5779.491
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 26.086, df = 600, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  11539.96 13419.07
## sample estimates:
```

```
## mean of the differences
##               12479.51
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 7.0569, df = 593, p-value = 4.771e-12
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  237.4484 420.5819
## sample estimates:
## mean of the differences
##               329.0152
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 28.551, df = 613, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  5271.731 6050.510
## sample estimates:
## mean of the differences
##               5661.121
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 33.181, df = 616, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  12712.94 14312.44
## sample estimates:
## mean of the differences
##               13512.69
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 4.0154, df = 560, p-value = 6.742e-05
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  121.7829 355.0156
## sample estimates:
## mean of the differences
##               238.3993
##
##
##  Paired t-test
##
```

```
## data:  subz$food_yr_05 and subz$treatment
## t = 32.2, df = 543, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  4901.111 5537.930
## sample estimates:
## mean of the differences
##                 5219.52
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 23.416, df = 555, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  12262.21 14507.84
## sample estimates:
## mean of the differences
##                13385.02
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 5.4572, df = 553, p-value = 7.311e-08
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  255.7937 543.4879
## sample estimates:
## mean of the differences
##                399.6408
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 42.905, df = 706, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  4470.134 4898.859
## sample estimates:
## mean of the differences
##                4684.496
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 41.108, df = 706, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   9429.143 10375.005
## sample estimates:
```

```
## mean of the differences
##               9902.074
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 8.7652, df = 701, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  144.5637 228.0203
## sample estimates:
## mean of the differences
##                186.292
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 25.472, df = 681, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  4926.227 5749.107
## sample estimates:
## mean of the differences
##               5337.667
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 31.165, df = 685, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  10919.50 12387.89
## sample estimates:
## mean of the differences
##               11653.69
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 7.2547, df = 680, p-value = 1.1e-12
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  213.5924 372.1110
## sample estimates:
## mean of the differences
##               292.8517
##
##
##  Paired t-test
##
```

```
## data:  subz$food_yr_05 and subz$treatment
## t = 26.201, df = 488, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  4143.917 4815.821
## sample estimates:
## mean of the differences
##                4479.869
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 25.686, df = 491, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  8424.141 9819.661
## sample estimates:
## mean of the differences
##                9121.901
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 5.5225, df = 489, p-value = 5.437e-08
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  187.1121 393.7899
## sample estimates:
## mean of the differences
##                 290.451
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 23.266, df = 648, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  4588.716 5434.702
## sample estimates:
## mean of the differences
##                5011.709
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 33.646, df = 651, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  11053.64 12423.80
## sample estimates:
```

```
## mean of the differences
##                11738.72
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 6.7241, df = 638, p-value = 3.929e-11
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  125.924 229.813
## sample estimates:
## mean of the differences
##                177.8685
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 21.633, df = 446, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  5508.410 6609.277
## sample estimates:
## mean of the differences
##                6058.843
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 21.793, df = 447, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  12151.33 14560.22
## sample estimates:
## mean of the differences
##                13355.77
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 4.6127, df = 442, p-value = 5.213e-06
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  225.1716 559.4965
## sample estimates:
## mean of the differences
##                392.3341
##
##
##  Paired t-test
##
```

```
## data:  subz$food_yr_05 and subz$treatment
## t = 9.7276, df = 629, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  3004.951 4525.062
## sample estimates:
## mean of the differences
##                3765.006
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 19.2, df = 629, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  7394.677 9079.608
## sample estimates:
## mean of the differences
##                8237.142
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 5.7067, df = 622, p-value = 1.783e-08
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  228.9771 469.2476
## sample estimates:
## mean of the differences
##                349.1124
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 17.474, df = 743, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  3035.154 3803.459
## sample estimates:
## mean of the differences
##                3419.306
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 30.464, df = 782, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  7140.428 8124.029
## sample estimates:
```

```
## mean of the differences
##                7632.229
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 6.6892, df = 773, p-value = 4.306e-11
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  233.7871 427.9984
## sample estimates:
## mean of the differences
##                330.8928
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 23.621, df = 626, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  2533.793 2993.297
## sample estimates:
## mean of the differences
##                2763.545
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 32.147, df = 626, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  5567.315 6291.753
## sample estimates:
## mean of the differences
##                5929.534
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 4.9096, df = 624, p-value = 1.167e-06
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  165.3759 385.8657
## sample estimates:
## mean of the differences
##                275.6208
##
##
##  Paired t-test
##
```

```
## data:  subz$food_yr_05 and subz$treatment
## t = 24.626, df = 701, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  1984.307 2328.117
## sample estimates:
## mean of the differences
##                2156.212
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 27.345, df = 765, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  5552.483 6411.353
## sample estimates:
## mean of the differences
##                5981.918
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 5.1814, df = 751, p-value = 2.833e-07
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  26.21413 58.19545
## sample estimates:
## mean of the differences
##                42.20479
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 29.801, df = 348, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  2621.733 2992.238
## sample estimates:
## mean of the differences
##                2806.986
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 24.722, df = 363, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  6294.618 7382.558
## sample estimates:
```

```
## mean of the differences
##                6838.588
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 3.2554, df = 354, p-value = 0.001241
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  128.6047 521.1136
## sample estimates:
## mean of the differences
##                324.8592
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 28.149, df = 518, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  5366.321 6171.559
## sample estimates:
## mean of the differences
##                 5768.94
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 28.766, df = 533, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  11142.93 12776.37
## sample estimates:
## mean of the differences
##                11959.65
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 5.25, df = 527, p-value = 2.209e-07
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  308.2934 676.9566
## sample estimates:
## mean of the differences
##                 492.625
##
##
##  Paired t-test
##
```

```
## data:  subz$food_yr_05 and subz$treatment
## t = 20.334, df = 728, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  5670.239 6882.134
## sample estimates:
## mean of the differences
##                6276.187
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 24.605, df = 739, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  13450.33 15782.73
## sample estimates:
## mean of the differences
##                14616.53
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 8.0479, df = 738, p-value = 3.364e-15
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  445.7014 733.3053
## sample estimates:
## mean of the differences
##                589.5034
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 15.949, df = 741, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  5020.119 6429.439
## sample estimates:
## mean of the differences
##                5724.779
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 26.474, df = 743, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  11690.40 13563.09
## sample estimates:
```

```
## mean of the differences
##                12626.75
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 8.479, df = 736, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  400.9352 642.5356
## sample estimates:
## mean of the differences
##                521.7354
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 40.31, df = 754, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  5012.408 5525.611
## sample estimates:
## mean of the differences
##                5269.009
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 37.892, df = 758, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  14004.47 15534.83
## sample estimates:
## mean of the differences
##                14769.65
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 3.7501, df = 755, p-value = 0.0001903
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##   76.57591 244.82356
## sample estimates:
## mean of the differences
##                160.6997
##
##
##  Paired t-test
##
```

```
## data:  subz$food_yr_05 and subz$treatment
## t = 29.886, df = 459, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  8164.711 9314.023
## sample estimates:
## mean of the differences
##                8739.367
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 20.659, df = 461, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  20230.57 24483.92
## sample estimates:
## mean of the differences
##                22357.25
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 5.0052, df = 460, p-value = 7.962e-07
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  178.5022 409.2765
## sample estimates:
## mean of the differences
##                293.8894
##
##
##  Paired t-test
##
## data:  subz$food_yr_05 and subz$treatment
## t = 36.306, df = 712, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  4751.193 5294.431
## sample estimates:
## mean of the differences
##                5022.812
##
##
##  Paired t-test
##
## data:  subz$allbut_05 and subz$treatment
## t = 41.411, df = 730, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  10744.65 11814.12
## sample estimates:
```

```
## mean of the differences
##                11279.39
##
##
##  Paired t-test
##
## data:  subz$oop_yr3_05 and subz$treatment
## t = 5.1577, df = 720, p-value = 3.235e-07
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  181.3033 404.1586
## sample estimates:
## mean of the differences
##                292.7309
```

How important is it to account for dependence within cluster?

It's critically important to account for dependence within cluster, since not doing so would introduce multicolllinearity into the ultimate analysis.

What is the bottom line?

There is no real discernible difference between difference of means in the control group vs treatment group

Was random assignment properly executed?

In this case, random assignment was properly executed. All of the means of differences between the 05 variables for every cluster were within the 95% confidence interval.

Question 4: Construct two variables relating health spending to total income

First step is filling in missing variables

```r
mex_data$food_yr_05[is.na(mex_data$food_yr_05)] = median(mex_data$food_yr_05, na.rm=TRUE)
mex_data$food_yr_06[is.na(mex_data$food_yr_06)] = median(mex_data$food_yr_06, na.rm=TRUE)
mex_data$oop_yr3_05[is.na(mex_data$oop_yr3_05)] <- 0
mex_data$oop_yr3_06[is.na(mex_data$oop_yr3_06)] <- 0
```

Next step calculates the health budget share and appends to end of dataframe

```r
mex_data$hbs_05 <- mex_data$oop_yr3_05 / (mex_data$food_yr_05 + mex_data$allbut_05 + mex_data$oop_yr3_0
mex_data$hbs_06 <- mex_data$oop_yr3_06 / (mex_data$food_yr_06 + mex_data$allbut_06 + mex_data$oop_yr3_0
```

Next step calculates the adjusted health spending and appends to end of dataframe

```r
mex_data$adj_hbs_05 <- mex_data$oop_yr3_05 / (mex_data$allbut_05 + mex_data$oop_yr3_05)
mex_data$adj_hbs_06 <- mex_data$oop_yr3_06 / (mex_data$allbut_06 + mex_data$oop_yr3_06)
```

```r
head(mex_data, n=10)
```

```
## # A tibble: 10 x 36
##    id_h~   sex   age mars~ hhsi~ food~ allb~ oop_~ food~ allb~ oop_~ trea~
##    <chr> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
##  1 GROO~  1.00  22.0 2      4.00  6300  8340     0  6720 10825     0  0
##  2 GROO~  1.00  56.0 3      1.00  5580  9342   150  3600  7810     0  1.00
```

```
##   3 GROO~   2.00   52.0 1       3.00   1500   4450      0   1800   4041      0   1.00
##   4 GROO~   1.00   21.0 1       6.00   4500  10000      0   6000  11288      0   1.00
##   5 GROO~   1.00   33.0 6       3.00   3600   7225      0   4800   7842      0   1.00
##   6 GROO~   2.00   32.0 2       5.00   6300  13700      0   3600   7810      0   1.00
##   7 GROO~   1.00   34.0 2       5.00   3600   8929      0   6600  11958      0   1.00
##   8 GROO~   1.00   29.0 3       3.00   2700   5628      0   6000   9140      0   0
##   9 GROO~   2.00   20.0 1       9.00   5400   7650    900   5400  13235      0   1.00
##  10 GROO~   2.00   30.0 2       3.00   4500   7802      0   4800   8390    120   1.00
## # ... with 24 more variables: clust_pair <dbl>, nkid_05 <dbl>, nadult_05
## #   <dbl>, headwomen_05 <dbl>, edu_info_051 <dbl>, edu_info_052 <dbl>,
## #   edu_info_053 <dbl>, edu_info_054 <dbl>, edu_info_055 <dbl>,
## #   edu_info_056 <dbl>, insp2005 <dbl>, insp2006 <dbl>, opor_05 <dbl>,
## #   cluster <dbl>, marstat1 <dbl>, marstat2 <dbl>, marstat3 <dbl>,
## #   marstat4 <dbl>, marstat5 <dbl>, marstat6 <dbl>, hbs_05 <dbl>, hbs_06
## #   <dbl>, adj_hbs_05 <dbl>, adj_hbs_06 <dbl>
```

Question 5: On average, what share of total expenditures does health spending account for?

```r
mex_data$hbs_05[is.na(mex_data$hbs_05)] <- 0
mex_data$hbs_06[is.na(mex_data$hbs_06)] <- 0

print('share for 05:')
```

```
## [1] "share for 05:"
```

```r
print(mean(mex_data$hbs_05))
```

```
## [1] 0.02199777
```

```r
print('share for 06:')
```

```
## [1] "share for 06:"
```

```r
print(mean(mex_data$hbs_06))
```

```
## [1] 0.02308555
```

What are the 75 and 90 percentile of the budget share distribution

```r
print('percentiles 05:')
```

```
## [1] "percentiles 05:"
```

```r
print(quantile(mex_data$hbs_05, c(.75, 0.9)))
```

```
##        75%        90%
## 0.00000000 0.06749156
```

```r
print('percentiles 06:')
```

```
## [1] "percentiles 06:"
```

```r
print(quantile(mex_data$hbs_06, c(.75, .90)))
```

```
##       75%       90%
## 0.0000000 0.0706304
```

What share of disposable income does health spending account for

```
mex_data$adj_hbs_05[is.na(mex_data$adj_hbs_05)] <- 0
mex_data$adj_hbs_06[is.na(mex_data$adj_hbs_06)] <- 0

print('adjustable share for 05:')
```

```
## [1] "adjustable share for 05:"
```

```
print(mean(mex_data$adj_hbs_05))
```

```
## [1] 0.02825808
```

```
print('adjustable share for 06:')
```

```
## [1] "adjustable share for 06:"
```

```
print(mean(mex_data$adj_hbs_06))
```

```
## [1] 0.02978188
```

What are the 75 and 90 percentile of adjusted budget distribution?

```
print('adjustable percentiles 05:')
```

```
## [1] "adjustable percentiles 05:"
```

```
print(quantile(mex_data$adj_hbs_05, c(.75, .9)))
```

```
##        75%        90%
## 0.00000000 0.09170026
```

```
print('adjustable percentiles 06:')
```

```
## [1] "adjustable percentiles 06:"
```

```
print(quantile(mex_data$adj_hbs_06, c(.75, .9)))
```

```
##        75%        90%
## 0.00000000 0.09773515
```

Question 6: Construct two measures of extreme health spending

A dummy equal to one if household budget exceeds 0.2

```
mex_data$ext_hbs_05[mex_data$hbs_05 >= 0.2] <- 1
```

```
## Warning: Unknown or uninitialised column: 'ext_hbs_05'.
```

```
mex_data$ext_hbs_05[mex_data$hbs_05 < 0.2] <- 0

mex_data$ext_hbs_06[mex_data$hbs_06 >= 0.2] <- 1
```

```
## Warning: Unknown or uninitialised column: 'ext_hbs_06'.
```

```
mex_data$ext_hbs_06[mex_data$hbs_06 < 0.2] <- 0
```

A dummy equal to one if household health budget exceeds 0.3 as percent of disposable

```r
mex_data$ext_ahbs_05[mex_data$adj_hbs_05 >= 0.3] <- 1
```

```
## Warning: Unknown or uninitialised column: 'ext_ahbs_05'.
```

```r
mex_data$ext_ahbs_05[mex_data$adj_hbs_05 < 0.3] <- 0

mex_data$ext_ahbs_06[mex_data$adj_hbs_06 >= 0.3] <- 1
```

```
## Warning: Unknown or uninitialised column: 'ext_ahbs_06'.
```

```r
mex_data$ext_ahbs_06[mex_data$adj_hbs_06 < 0.3] <- 0
```

```r
head(mex_data, n=10)
```

```
## # A tibble: 10 x 40
##    id_h~   sex   age mars~ hhsi~ food~ allb~ oop_~ food~ allb~ oop_~ trea~
##    <chr> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
##  1 GROO~  1.00  22.0 2      4.00  6300  8340     0  6720 10825     0  0
##  2 GROO~  1.00  56.0 3      1.00  5580  9342   150  3600  7810     0  1.00
##  3 GROO~  2.00  52.0 1      3.00  1500  4450     0  1800  4041     0  1.00
##  4 GROO~  1.00  21.0 1      6.00  4500 10000     0  6000 11288     0  1.00
##  5 GROO~  1.00  33.0 6      3.00  3600  7225     0  4800  7842     0  1.00
##  6 GROO~  2.00  32.0 2      5.00  6300 13700     0  3600  7810     0  1.00
##  7 GROO~  1.00  34.0 2      5.00  3600  8929     0  6600 11958     0  1.00
##  8 GROO~  1.00  29.0 3      3.00  2700  5628     0  6000  9140     0  0
##  9 GROO~  2.00  20.0 1      9.00  5400  7650   900  5400 13235     0  1.00
## 10 GROO~  2.00  30.0 2      3.00  4500  7802     0  4800  8390   120  1.00
## # ... with 28 more variables: clust_pair <dbl>, nkid_05 <dbl>, nadult_05
## #   <dbl>, headwomen_05 <dbl>, edu_info_051 <dbl>, edu_info_052 <dbl>,
## #   edu_info_053 <dbl>, edu_info_054 <dbl>, edu_info_055 <dbl>,
## #   edu_info_056 <dbl>, insp2005 <dbl>, insp2006 <dbl>, opor_05 <dbl>,
## #   cluster <dbl>, marstat1 <dbl>, marstat2 <dbl>, marstat3 <dbl>,
## #   marstat4 <dbl>, marstat5 <dbl>, marstat6 <dbl>, hbs_05 <dbl>, hbs_06
## #   <dbl>, adj_hbs_05 <dbl>, adj_hbs_06 <dbl>, ext_hbs_05 <dbl>,
## #   ext_hbs_06 <dbl>, ext_ahbs_05 <dbl>, ext_ahbs_06 <dbl>
```

Question 7: Estimate the ITT effects of the intervention on extreme health spending

Regress the extreme health spending on the treatment and calculate standard errors that account for dependence among households within clusters

```r
regr05 <- lm(ext_hbs_05 ~ treatment, data = mex_data)
regr05adj <- lm(ext_ahbs_05 ~ treatment, data = mex_data)

regr06 <- lm(ext_hbs_06 ~ treatment, data = mex_data)
regr06adj <- lm(ext_ahbs_06 ~ treatment, data = mex_data)

stargazer(regr05, regr05adj, regr06, regr06adj, type="text", title = "Extreme Health on Treatment")
```

```
##
## Extreme Health on Treatment
## ============================================================================
##                                               Dependent variable:
##                                   ------------------------------------------
##                                   ext_hbs_05 ext_ahbs_05 ext_hbs_06 ext_ahbs_06
```

```
##                                      (1)          (2)          (3)          (4)
## ------------------------------------------------------------------------------
## treatment                            -0.001       -0.001      -0.008***    -0.006***
##                                      (0.002)      (0.002)     (0.002)      (0.002)
##
## Constant                             0.029***     0.022***    0.035***     0.026***
##                                      (0.001)      (0.001)     (0.001)      (0.001)
##
## ------------------------------------------------------------------------------
## Observations                         32,515       32,515      32,515       32,515
## R2                                   0.00000      0.00001     0.0005       0.0004
## Adjusted R2                          -0.00003     -0.00002    0.0004       0.0003
## Residual Std. Error (df = 32513)     0.167        0.147       0.173        0.152
## F Statistic (df = 1; 32513)          0.091        0.208       15.268***    11.835***
## ==============================================================================
## Note:                                              *p<0.1; **p<0.05; ***p<0.01
```

Add cluster-pair dummies, calculate standard errors that account for dependence among households within clusters

```
mex_data_dummies <- cbind(mex_data, fastDummies::dummy_cols(mex_data$clust_pair))

regr051 <- lm(ext_hbs_05 ~ treatment + .data_1 + .data_2 + .data_3 + .data_4 + .data_5 + .data_6 + .data
regr051adj <- lm(ext_ahbs_05 ~ treatment + .data_1 + .data_2 + .data_3 + .data_4 + .data_5 + .data_6 +

regr061 <- lm(ext_hbs_06 ~ treatment + .data_1 + .data_2 + .data_3 + .data_4 + .data_5 + .data_6 + .data
regr061adj <- lm(ext_ahbs_06 ~ treatment + .data_1 + .data_2 + .data_3 + .data_4 + .data_5 + .data_6 +

stargazer(regr051, regr051adj, regr061, regr061adj, type="text", title="Extremem Health on Treatment and
```

```
##
## Extremem Health on Treatment and Dummies
## ==============================================================================
##                                                  Dependent variable:
##                                     ------------------------------------------
##                                     ext_hbs_05 ext_ahbs_05 ext_hbs_06 ext_ahbs_06
##                                        (1)         (2)         (3)         (4)
## ------------------------------------------------------------------------------
## treatment                            -0.001      -0.001     -0.008***   -0.006***
##                                      (0.002)     (0.002)    (0.002)     (0.002)
##
## .data_1                              0.060***    0.043***   0.059***    0.041***
##                                      (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_2                              0.029***    0.024***   0.038***    0.031***
##                                      (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_3                              0.030***    0.018**    0.077***    0.055***
##                                      (0.009)     (0.008)    (0.010)     (0.008)
##
## .data_4                              0.066***    0.050***   0.060***    0.049***
##                                      (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_5                              0.060***    0.048***   0.086***    0.065***
```

```
##                                  (0.009)     (0.008)    (0.010)     (0.008)
##
## .data_6                          0.017**      0.009     0.029***   0.021***
##                                  (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_7                           0.013       0.007     0.030***    0.017**
##                                  (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_8                           0.002      -0.001     0.052***   0.038***
##                                  (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_9                          0.021**     0.015*     0.047***   0.034***
##                                  (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_10                         0.047***   0.028***    0.036***   0.023***
##                                  (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_11                         0.050***   0.038***    0.042***   0.029***
##                                  (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_12                         0.037***   0.026***    0.043***   0.030***
##                                  (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_13                          0.017*      0.009     0.027***    0.019**
##                                  (0.009)     (0.008)    (0.010)     (0.008)
##
## .data_14                         0.031***    0.016**     0.018*      0.013*
##                                  (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_15                         0.021**     0.015*     0.035***   0.021***
##                                  (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_16                         0.019**     0.015*      0.018*      0.011
##                                  (0.010)     (0.008)    (0.010)     (0.009)
##
## .data_17                         0.037***   0.033***    0.067***   0.043***
##                                  (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_18                         -0.007      -0.007     0.033***   0.021***
##                                  (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_19                         0.034***   0.022***    0.036***   0.029***
##                                  (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_20                         0.027***     0.012     0.026***    0.013*
##                                  (0.009)     (0.007)    (0.009)     (0.008)
##
## .data_21                         0.023***    0.015*     0.019**     0.015*
##                                  (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_22                          0.007     -0.0001     0.019**      0.013
##                                  (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_23                         0.018**     0.017**    0.038***   0.025***
```

```
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_24                           0.039***   0.028***    0.037***   0.025***
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_25                            0.014       0.008     0.031***   0.028***
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_26                            0.004      -0.001     0.058***   0.047***
##                                    (0.010)     (0.009)    (0.010)     (0.009)
##
## .data_27                            0.017*      0.012     0.021**     0.015*
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_28                            0.017*      0.012     0.054***   0.036***
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_29                            -0.007     -0.005      0.011       0.007
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_30                           0.024***    0.016**     0.016*      0.012
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_31                           0.031***   0.024***    0.033***   0.022***
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_32                            0.009       0.009     0.020**     0.015*
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_33                           -0.0001     -0.002      0.007       0.002
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_34                           0.019**      0.012      0.013       0.008
##                                    (0.009)     (0.008)    (0.010)     (0.009)
##
## .data_35                            -0.002     -0.005     0.031***    0.021**
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_36                            0.008       0.002     0.018**      0.011
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_37                            0.008       0.006      0.011       0.006
##                                    (0.010)     (0.009)    (0.010)     (0.009)
##
## .data_38                            -0.005     -0.005      0.010       0.007
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_39                            0.008       0.003     0.022**     0.018**
##                                    (0.010)     (0.009)    (0.010)     (0.009)
##
## .data_40                           0.024***    0.017**    0.045***   0.034***
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_41                           0.034***   0.020***    0.025***    0.018**
```

```
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_42                           0.021**     0.017**     0.013       0.013
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_43                            0.001      -0.006      0.005       0.002
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_44                           0.022**      0.008      0.016       0.009
##                                    (0.011)     (0.009)    (0.011)     (0.010)
##
## .data_45                           0.020**     0.014*      0.018*     0.015*
##                                    (0.009)     (0.008)    (0.010)     (0.009)
##
## .data_46                           0.030***   0.024***   0.026***    0.017**
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_47                           0.021**     0.016**     0.010       0.009
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_48                           -0.0002     -0.002     0.022**     0.014*
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_49                            0.007       0.007      0.010       0.006
##                                    (0.010)     (0.009)    (0.010)     (0.009)
##
## .data_50
##
##
## Constant                            0.008       0.009      0.004       0.005
##                                    (0.006)     (0.005)    (0.006)     (0.006)
##
## -----------------------------------------------------------------------------
## Observations                        32,515     32,515      32,515     32,515
## R2                                  0.011       0.009      0.012       0.009
## Adjusted R2                         0.009       0.007      0.010       0.007
## Residual Std. Error (df = 32464)    0.167       0.146      0.172       0.151
## F Statistic (df = 50; 32464)       7.141***   5.721***    7.683***   5.675***
## =============================================================================
## Note:                                             *p<0.1; **p<0.05; ***p<0.01
```

What happens to coefficients and standard errors when adding dummies and why?

There is actually no discernible in the direction or magnitude of the coefficients or standard errors when you move the cluster pair column into 50 separate dummies (as is the definition of creating dummy variables, unless it's been oddly defined in this homework). This is likely because the cluster pairs have been effectively built to be independent of each other.

Question 8: Now adjust for baseline characteristics

Without dummies

```
regr_base05 <- lm(ext_hbs_05 ~ treatment + sex + age + marstat + hhsize, data = mex_data_dummies)
regr_base05adj <- lm(ext_ahbs_05 ~ treatment + sex + age + marstat + hhsize, data = mex_data_dummies)

regr_base06 <- lm(ext_hbs_06 ~ treatment + sex + age + marstat + hhsize, data = mex_data_dummies)
regr_base06adj <- lm(ext_ahbs_06 ~ treatment + sex + age + marstat + hhsize, data = mex_data_dummies)

stargazer(regr_base05, regr_base05adj, regr_base06, regr_base06adj, type='text', title='Extreme Health o
```

```
##
## Extreme Health on Treatment with Baseline
## ============================================================================
##                                               Dependent variable:
##                                  -------------------------------------------
##                                  ext_hbs_05 ext_ahbs_05 ext_hbs_06 ext_ahbs_06
##                                     (1)         (2)        (3)         (4)
## ----------------------------------------------------------------------------
## treatment                          -0.001     -0.001    -0.007***   -0.006***
##                                    (0.002)    (0.002)    (0.002)     (0.002)
##
## sex                                 0.003      0.002     0.005**     0.006***
##                                    (0.002)    (0.002)    (0.002)     (0.002)
##
## age                              0.0004***   0.0003***  0.001***    0.001***
##                                   (0.0001)   (0.0001)   (0.0001)    (0.0001)
##
## marstat                           -0.002**   -0.001**   -0.001**     -0.001
##                                    (0.001)    (0.001)    (0.001)     (0.001)
##
## hhsize                           -0.001***  -0.001***  -0.002***   -0.001***
##                                   (0.0005)   (0.0004)   (0.0005)    (0.0004)
##
## Constant                          0.020***   0.014***    0.013**      0.004
##                                    (0.005)    (0.005)    (0.005)     (0.005)
##
## ----------------------------------------------------------------------------
## Observations                       31,726     31,726     31,726      31,726
## R2                                  0.002      0.002      0.005       0.005
## Adjusted R2                         0.002      0.002      0.005       0.005
## Residual Std. Error (df = 31720)    0.168      0.147      0.173       0.152
## F Statistic (df = 5; 31720)      12.037***  12.760***  29.998***   29.826***
## ============================================================================
## Note:                                            *p<0.1; **p<0.05; ***p<0.01
```

With dummies

```
regr05basedums <- lm(ext_hbs_05 ~ treatment + sex + age + marstat + hhsize + .data_1 + .data_2 + .data_3
regr05baseadjdums <- lm(ext_ahbs_05 ~ treatment + sex + age + marstat + hhsize + .data_1 + .data_2 + .da

regr06basedums <- lm(ext_hbs_06 ~ treatment + sex + age + marstat + hhsize+ .data_1 + .data_2 + .data_3
regr06baseadjdums <- lm(ext_ahbs_06 ~ treatment + sex + age + marstat + hhsize + .data_1 + .data_2 + .da

stargazer(regr05basedums, regr05baseadjdums, regr06basedums, regr06baseadjdums, type='text', title='Ext
```

```
##
```

```
## Extreme Health on Treatment with Dummies and Baseline
## ==============================================================================
##                                            Dependent variable:
##                                   --------------------------------------------
##                                   ext_hbs_05 ext_ahbs_05 ext_hbs_06 ext_ahbs_06
##                                      (1)         (2)        (3)         (4)
## ------------------------------------------------------------------------------
## treatment                          -0.001      -0.001    -0.007***   -0.006***
##                                    (0.002)     (0.002)    (0.002)     (0.002)
##
## sex                                 0.002       0.001     0.004**     0.005***
##                                    (0.002)     (0.002)    (0.002)     (0.002)
##
## age                               0.0003***   0.0003***  0.0005***   0.0004***
##                                   (0.0001)    (0.0001)   (0.0001)    (0.0001)
##
## marstat                            -0.001*     -0.001     -0.001      -0.0005
##                                    (0.001)     (0.001)    (0.001)     (0.001)
##
## hhsize                            -0.002***   -0.002***  -0.002***   -0.002***
##                                   (0.0005)    (0.0004)    (0.001)    (0.0004)
##
## .data_1                            0.060***   0.043***    0.056***    0.039***
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_2                            0.031***   0.026***    0.043***    0.035***
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_3                            0.032***    0.019**    0.075***    0.056***
##                                    (0.009)     (0.008)    (0.010)     (0.009)
##
## .data_4                            0.066***   0.050***    0.055***    0.045***
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_5                            0.061***   0.048***    0.085***    0.065***
##                                    (0.009)     (0.008)    (0.010)     (0.009)
##
## .data_6                            0.019**     0.010      0.028***    0.019**
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_7                             0.014       0.008     0.029***    0.018**
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_8                             0.004       0.001     0.051***    0.038***
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_9                            0.023**     0.017**    0.049***    0.035***
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_10                           0.049***   0.029***    0.038***    0.026***
##                                    (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_11                           0.052***   0.039***    0.043***    0.029***
##                                    (0.009)     (0.008)    (0.009)     (0.008)
```

```
##
## .data_12                              0.037***   0.026***    0.040***   0.027***
##                                       (0.009)     (0.008)    (0.010)     (0.008)
##
## .data_13                               0.015       0.010     0.028***    0.020**
##                                       (0.009)     (0.008)    (0.010)     (0.009)
##
## .data_14                              0.033***    0.017**     0.016*      0.011
##                                       (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_15                              0.022**     0.017**    0.036***    0.021**
##                                       (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_16                              0.022**     0.018**     0.019*      0.011
##                                       (0.010)     (0.009)    (0.010)     (0.009)
##
## .data_17                              0.038***   0.034***    0.065***   0.041***
##                                       (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_18                               -0.006     -0.006     0.032***    0.020**
##                                       (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_19                              0.036***   0.023***    0.037***   0.030***
##                                       (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_20                              0.029***    0.013*     0.026***    0.013*
##                                       (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_21                              0.025***    0.016**    0.020**     0.016**
##                                       (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_22                               0.006     -0.0002      0.017*      0.011
##                                       (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_23                              0.019**     0.018**    0.040***   0.027***
##                                       (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_24                              0.042***   0.031***    0.039***   0.026***
##                                       (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_25                               0.016*      0.009     0.031***   0.028***
##                                       (0.009)     (0.008)    (0.010)     (0.008)
##
## .data_26                               0.004      -0.001     0.056***   0.045***
##                                       (0.010)     (0.009)    (0.011)     (0.009)
##
## .data_27                              0.019**     0.014*     0.024**     0.017**
##                                       (0.009)     (0.008)    (0.010)     (0.008)
##
## .data_28                               0.017*      0.012     0.054***   0.035***
##                                       (0.009)     (0.008)    (0.010)     (0.008)
##
## .data_29                               -0.007     -0.005      0.009       0.005
##                                       (0.009)     (0.008)    (0.009)     (0.008)
```

```
##
## .data_30                              0.025***    0.017**     0.014       0.011
##                                       (0.009)     (0.008)    (0.010)     (0.008)
##
## .data_31                              0.031***   0.024***    0.031***   0.021***
##                                       (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_32                               0.011       0.011      0.018*      0.015*
##                                       (0.010)     (0.008)    (0.010)     (0.009)
##
## .data_33                               0.002      0.0005      0.009       0.004
##                                       (0.009)     (0.008)    (0.010)     (0.008)
##
## .data_34                              0.020**      0.012      0.011       0.006
##                                       (0.010)     (0.008)    (0.010)     (0.009)
##
## .data_35                               -0.002     -0.004     0.031***    0.021**
##                                       (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_36                               0.009       0.003     0.019**      0.011
##                                       (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_37                               0.009       0.007      0.010       0.005
##                                       (0.010)     (0.009)    (0.010)     (0.009)
##
## .data_38                               -0.004     -0.004      0.011       0.007
##                                       (0.009)     (0.008)    (0.010)     (0.008)
##
## .data_39                               0.009       0.005     0.023**     0.019**
##                                       (0.010)     (0.009)    (0.011)     (0.009)
##
## .data_40                              0.023**     0.017**    0.041***   0.030***
##                                       (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_41                              0.035***   0.021***    0.024***    0.017**
##                                       (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_42                              0.021**     0.018**     0.012       0.012
##                                       (0.009)     (0.008)    (0.010)     (0.008)
##
## .data_43                               0.003      -0.004      0.006       0.003
##                                       (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_44                              0.022**      0.011      0.018       0.010
##                                       (0.011)     (0.010)    (0.011)     (0.010)
##
## .data_45                              0.020**     0.014*      0.016       0.013
##                                       (0.010)     (0.008)    (0.010)     (0.009)
##
## .data_46                              0.029***   0.024***    0.025***    0.016**
##                                       (0.009)     (0.008)    (0.009)     (0.008)
##
## .data_47                              0.023***    0.018**     0.011       0.009
##                                       (0.009)     (0.008)    (0.009)     (0.008)
```

```
##
## .data_48                           -0.001     -0.002    0.019**     0.012
##                                    (0.009)    (0.008)   (0.009)    (0.008)
##
## .data_49                            0.009      0.009     0.011      0.007
##                                    (0.010)    (0.009)   (0.010)    (0.009)
##
## .data_50
##
##
## Constant                            0.004      0.003     -0.010    -0.011
##                                    (0.008)    (0.007)   (0.008)    (0.007)
##
## ------------------------------------------------------------------------------
## Observations                        31,726    31,726     31,726    31,726
## R2                                  0.013      0.011     0.015      0.013
## Adjusted R2                         0.011      0.009     0.014      0.011
## Residual Std. Error (df = 31671)    0.167      0.147     0.173      0.151
## F Statistic (df = 54; 31671)       7.557***   6.280***   9.183***  7.496***
## ==============================================================================
## Note:                                              *p<0.1; **p<0.05; ***p<0.01
```

What happens to the coefficients when you add cluster-pair dummies? What about the standard error?

As in question 8, there is not much change directionally or in magnitude of coefficient or standard error change once your control for the baseline measures of sex, age, hhsize, and marstat. This is again likely due independence within the clusters.

Question 9: Are any of your conclusions sensitive to the way that you measure extreme health expenditures?

None of my conclusions are sensitive to the way that I measure extreme health expenditures since they all return the same coefficients and standard errors for treatment when accounting for different health expenditure variables, turning cluster pairs into dummies, or adding baselines such as sex, age, hhsize, and marstat.

Question 10: Wald estimator and interpretation

If I could estimate it, you'd see that my interpretation of it would be incredible. But this is one of those chicken and the egg deals: I haven't been able to figure out how to compute it in R, therefore I can't interpret it. . . or is it the other way around?? :D

#NAME: MARIO MORENO