

Problem Set 3

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Weather and Witch Killing

Construct a new variable for the total number of murders in a village-year (witch + non-witch murders).

```
killling$total_murders <- killing$witch_murders + killing$oth_murders
```

Create a table of summary statistics for all variables in the dataset, including the mean, standard deviation, minimum, maximum, and number of observations, using stargazer, summary or describe commands in R. Discuss any noteworthy patterns. Pay particular attention to the murder and rainfall variables.

```
summary(killing)
```

##	vid	year	witch_murders	oth_murders
##	Min. : 1.00	Min. :1992	Min. :0.00000	Min. :0.00000
##	1st Qu.:17.00	1st Qu.:1994	1st Qu.:0.00000	1st Qu.:0.00000
##	Median :34.00	Median :1997	Median :0.00000	Median :0.00000
##	Mean :35.03	Mean :1997	Mean :0.09103	Mean :0.09103
##	3rd Qu.:54.00	3rd Qu.:2000	3rd Qu.:0.00000	3rd Qu.:0.00000
##	Max. :71.00	Max. :2002	Max. :3.00000	Max. :5.00000
##	any_rain	any_disease	famine	educat
##	Min. :0.0000	Min. :0.0000	Min. :0.0000	Min. :0.8571
##	1st Qu.:0.0000	1st Qu.:0.0000	1st Qu.:0.0000	1st Qu.:3.5263
##	Median :0.0000	Median :0.0000	Median :0.0000	Median :4.2000
##	Mean :0.1712	Mean :0.1481	Mean :0.1739	Mean :4.0346
##	3rd Qu.:0.0000	3rd Qu.:0.0000	3rd Qu.:0.0000	3rd Qu.:4.6875
##	Max. :1.0000	Max. :1.0000	Max. :1.0000	Max. :6.6667
##	trad_relig	total_murders		
##	Min. :0.0000	Min. :0.0000		
##	1st Qu.:0.5333	1st Qu.:0.0000		
##	Median :0.6500	Median :0.0000		
##	Mean :0.6541	Mean :0.1821		
##	3rd Qu.:0.8000	3rd Qu.:0.0000		
##	Max. :1.0000	Max. :5.0000		

Now consider the effect of extreme weather on murders in the village.

Install “miceadds” and “sandwich”. Using the `lm.cluster` command, regress total murders (in a village in a particular year) on the indicator for whether a drought or flood occurred in that year. Make sure that error terms should be allowed to be correlated (“clustered”) across years for the same village (use `vid`). Simply use `summary` to report the results in this question. [Note: Results estimated by `lm.cluster` could not be exported directly with `stargazer` so we use `summary` for simplicity. In the section we will teach how to export clustered regression results in a neater way.]

```
library(miceadds)
library(sandwich)
```

```
model <- lm.cluster(data = killing, total_murders ~ any_rain, cluster = "vid")
summary(model)
```

```
## R^2= 0.00125
##
##              Estimate Std. Error  t value    Pr(>|t|)
## (Intercept) 0.17377049 0.02208164 7.869457 3.561844e-15
## any_rain     0.04845173 0.04567845 1.060713 2.888203e-01
```

In a second regression, add average years of schooling and proportion of households practicing traditional religions as additional explanatory variables.

```
model <- lm.cluster(data = killing, total_murders ~ any_rain + educat +
                    trad_relig, cluster = "vid")
summary(model)
```

```
## R^2= 0.00738
##
##              Estimate Std. Error  t value    Pr(>|t|)
## (Intercept) 0.327626665 0.14575336 2.247815515 0.02458796
## any_rain     0.0400209562 0.04263900 0.938599790 0.34793626
## educat      -0.0378694872 0.02644472 -1.432024384 0.15213684
## trad_relig   0.0005751421 0.10422490 0.005518279 0.99559707
```

Finally, consider a possible instrumental variables (IV) approach. Economic theory suggests that extreme economic hardship—such as a famine—may be associated with more violence, including murders. Famine may be caused by extreme rainfall (which would be the instrumental variable).

Write out the first stage regression, the second stage regression, and the reduced form regression.

```
# First stage regression
any_rain ~ famine

# Second stage regression
total_murders ~ any_rain + educat + trad_relig

# Reduced form regression
total_murders ~ famine + educat + trad_relig
```

The Primary School Deworming Project (PSDP)

Use R to estimate regressions in the format of the following. Simply use summary to report the results in this question. To receive full credits, please highlight the names of dependent variables and estimated coefficients of treatment with red rectangles. You could do this by annotating the pdf document compiled from .rmd or exported from Microsoft Word.

name_dep_var = treatment + name_control_vars, with “weight” as the sampling weight and “psdpsch98” as the cluster ID

```
model <- lm.cluster(data = deworming,
                    formula = as.formula(paste("totyrs enrolled ~ treatment +", controls)),
                    cluster = "psdpsch98",
                    weights = deworming$weight)
summary(model)
```

```
## R^2= 0.29307
##
##              Estimate Std. Error  t value    Pr(>|t|)
```

```
## (Intercept)          9.36193350 0.23062645 40.59349415 0.000000e+00
## treatment            0.29293848 0.14457838  2.02615697 4.274870e-02
## saturation_dm        1.04973111 0.83687238  1.25435029 2.097147e-01
## demeaned_popT_6k     0.11471369 0.04544937  2.52398868 1.160317e-02
## zoneidI2             -0.35050682 0.29689217 -1.18058626 2.377671e-01
## zoneidI3             -0.33705209 0.26835345 -1.25600059 2.091158e-01
## zoneidI4             -0.71992160 0.24136882 -2.98266197 2.857534e-03
## zoneidI5             -0.34618274 0.18964652 -1.82541046 6.793911e-02
## zoneidI6             -0.33159907 0.25912715 -1.27967703 2.006587e-01
## zoneidI7             -0.18222813 0.22504363 -0.80974577 4.180863e-01
## zoneidI8             -0.29463521 0.20355627 -1.44743859 1.477741e-01
## pup_pop              0.05735229 0.31829823  0.18018414 8.570080e-01
## month_interviewI2    -0.05851750 0.20532211 -0.28500338 7.756416e-01
## month_interviewI3    -0.26699350 0.24919370 -1.07142954 2.839763e-01
## month_interviewI4     0.06983719 0.21985684  0.31764847 7.507516e-01
## month_interviewI5     0.06284821 0.18252743  0.34432201 7.306041e-01
## month_interviewI6    -0.52084524 0.21061417 -2.47298284 1.339906e-02
## month_interviewI7    -0.12045817 0.21799893 -0.55256314 5.805626e-01
## month_interviewI8    -0.09906835 0.19625913 -0.50478341 6.137110e-01
## month_interviewI9    -0.55896077 0.19810614 -2.82152174 4.779640e-03
## month_interviewI10   -0.41672577 0.21515277 -1.93688309 5.275964e-02
## month_interviewI11    0.01662161 0.21979527  0.07562316 9.397189e-01
## month_interviewI12    0.20870572 0.21561415  0.96795929 3.330647e-01
## cost_sharing         -0.25515415 0.13983446 -1.82468728 6.804823e-02
## std98_base_I2        -0.83988629 0.13756892 -6.10520385 1.026696e-09
## std98_base_I3        -1.63654576 0.13385499 -12.22625893 2.250676e-34
## std98_base_I4        -2.43389048 0.14885867 -16.35034418 4.325301e-60
## std98_base_I5        -3.53685841 0.14889959 -23.75331158 1.015487e-124
## std98_base_I6        -4.22771777 0.17284421 -24.45970073 3.968030e-132
## female_baseline      -0.84317914 0.10269801 -8.21027752 2.206778e-16
## avgtest96            0.62820130 0.22734032  2.76326386 5.722648e-03
```

```
model <- lm.cluster(data = deworming,
                    formula = as.formula(paste("passed_primary_exam ~ treatment +", controls)),
                    cluster = "psdpsch98",
                    weights = deworming$weight)
summary(model)
```

```
## R^2= 0.07025
##
##              Estimate Std. Error   t value    Pr(>|t|)
## (Intercept)    0.55703765 0.041667729 13.3685628 9.230720e-41
## treatment      0.05059504 0.030832345  1.6409727 1.008031e-01
## saturation_dm   0.21401952 0.161796316  1.3227713 1.859115e-01
## demeaned_popT_6k 0.00648825 0.009623449  0.6742126 5.001762e-01
## zoneidI2       -0.01851791 0.053875838 -0.3437147 7.310609e-01
## zoneidI3       -0.02933843 0.056266748 -0.5214168 6.020765e-01
## zoneidI4       -0.06412930 0.041452900 -1.5470401 1.218536e-01
## zoneidI5       -0.04823160 0.041268200 -1.1687351 2.425104e-01
## zoneidI6       -0.09347771 0.044252900 -2.1123522 3.465626e-02
## zoneidI7       -0.01260101 0.039584380 -0.3183329 7.502325e-01
## zoneidI8       -0.03444625 0.035483581 -0.9707660 3.316648e-01
## pup_pop        -0.04467231 0.057779367 -0.7731534 4.394316e-01
## month_interviewI2 -0.02470522 0.037212977 -0.6638873 5.067624e-01
## month_interviewI3 0.01908657 0.046188352  0.4132333 6.794357e-01
```

```
## month_interviewI4 0.02680356 0.045131554 0.5938984 5.525801e-01
## month_interviewI5 0.07783873 0.034265023 2.2716673 2.310662e-02
## month_interviewI6 -0.03233291 0.035497349 -0.9108542 3.623722e-01
## month_interviewI7 0.05702830 0.035993701 1.5843966 1.131035e-01
## month_interviewI8 0.01787235 0.034023825 0.5252894 5.993820e-01
## month_interviewI9 -0.06583911 0.033295183 -1.9774366 4.799230e-02
## month_interviewI10 -0.01787251 0.037135018 -0.4812845 6.303143e-01
## month_interviewI11 0.03459020 0.037483934 0.9228007 3.561111e-01
## month_interviewI12 0.08543936 0.044767967 1.9084932 5.632750e-02
## cost_sharing -0.03940312 0.026995349 -1.4596263 1.443928e-01
## std98_base_I2 0.04144177 0.030373615 1.3644004 1.724416e-01
## std98_base_I3 0.09995566 0.034478228 2.8990951 3.742413e-03
## std98_base_I4 0.09042610 0.027376615 3.3030418 9.564214e-04
## std98_base_I5 0.09483187 0.031264189 3.0332426 2.419410e-03
## std98_base_I6 0.08928989 0.026568670 3.3607210 7.773930e-04
## female_baseline -0.18346549 0.019210568 -9.5502375 1.293993e-21
## avgtest96 0.13895945 0.039079567 3.5558083 3.768187e-04
```

```
model <- lm.cluster(data = deworming,
                    formula = as.formula(paste("num_meals_yesterday ~ treatment +", controls)),
                    cluster = "psdpsch98",
                    weights = deworming$weight)
summary(model)
```

```
## R^2= 0.03368
```

```
##
```

	Estimate	Std. Error	t value	Pr(> t)
## (Intercept)	2.137800535	0.054071596	39.5364793	0.000000e+00
## treatment	0.095214738	0.028534499	3.3368288	8.474014e-04
## saturation_dm	0.404266462	0.125253242	3.2275928	1.248365e-03
## demeaned_popT_6k	-0.014600039	0.009440756	-1.5464905	1.219862e-01
## zoneidI2	-0.206007638	0.041904835	-4.9160828	8.829306e-07
## zoneidI3	-0.105488852	0.048372829	-2.1807460	2.920221e-02
## zoneidI4	-0.182413806	0.049443528	-3.6893363	2.248398e-04
## zoneidI5	-0.040890385	0.035695649	-1.1455286	2.519903e-01
## zoneidI6	-0.160519728	0.054835676	-2.9272864	3.419339e-03
## zoneidI7	-0.155582782	0.054927217	-2.8325262	4.618178e-03
## zoneidI8	-0.117487515	0.057083089	-2.0581843	3.957245e-02
## pup_pop	-0.129344800	0.056389843	-2.2937606	2.180425e-02
## month_interviewI2	-0.005970265	0.058303488	-0.1023998	9.184393e-01
## month_interviewI3	-0.070618194	0.045376447	-1.5562742	1.196429e-01
## month_interviewI4	-0.019954171	0.054799429	-0.3641310	7.157602e-01
## month_interviewI5	0.084093784	0.057604882	1.4598378	1.443347e-01
## month_interviewI6	0.108489699	0.053660956	2.0217623	4.320091e-02
## month_interviewI7	0.109581708	0.061996822	1.7675375	7.713825e-02
## month_interviewI8	0.080570005	0.046600183	1.7289633	8.381567e-02
## month_interviewI9	0.068880307	0.068668539	1.0030839	3.158204e-01
## month_interviewI10	0.068954527	0.053630068	1.2857438	1.985325e-01
## month_interviewI11	0.093683454	0.052829555	1.7733152	7.617649e-02
## month_interviewI12	0.094273287	0.056944788	1.6555209	9.781888e-02
## cost_sharing	-0.072602514	0.031463293	-2.3075307	2.102525e-02
## std98_base_I2	0.095995229	0.036459465	2.6329303	8.465172e-03
## std98_base_I3	0.099110690	0.025664884	3.8617237	1.125899e-04
## std98_base_I4	0.115604211	0.041040041	2.8168639	4.849506e-03
## std98_base_I5	0.094638757	0.037128737	2.5489355	1.080523e-02

```
## std98_base_I6      0.077599439 0.034085379 2.2766195 2.280896e-02
## female_baseline    0.078479802 0.025786968 3.0433900 2.339289e-03
## avgtest96          0.047527477 0.030363191 1.5652991 1.175128e-01
```

Regression 4: Total hours worked

```
model <- lm.cluster(data = deworming,
                    formula = as.formula(paste("total_hours ~ treatment +", controls)),
                    cluster = "psdpsch98",
                    weights = deworming$weight)
summary(model)
```

```
## R^2= 0.05921
```

```
##
```

	Estimate	Std. Error	t value	Pr(> t)
## (Intercept)	13.08876272	2.3381078	5.59801508	2.168199e-08
## treatment	1.59859758	1.0363162	1.54257702	1.229334e-01
## saturation_dm	9.67442053	7.8239659	1.23651109	2.162686e-01
## demeaned_popT_6k	0.17674733	0.3611574	0.48939143	6.245646e-01
## zoneidI2	1.17502130	2.3036805	0.51006261	6.100076e-01
## zoneidI3	0.54679120	2.3153729	0.23615687	8.133109e-01
## zoneidI4	2.80939706	2.2247462	1.26279441	2.066631e-01
## zoneidI5	1.47963117	1.9343260	0.76493371	4.443110e-01
## zoneidI6	3.19678682	1.8918127	1.68980087	9.106606e-02
## zoneidI7	-0.47977600	2.0075523	-0.23898555	8.111168e-01
## zoneidI8	1.15439311	1.9203894	0.60112450	5.477571e-01
## pup_pop	-2.15632733	2.8595008	-0.75409224	4.507938e-01
## month_interviewI2	0.59573594	2.3590944	0.25252739	8.006334e-01
## month_interviewI3	-0.06585665	1.6962492	-0.03882487	9.690300e-01
## month_interviewI4	2.41820950	2.1724916	1.11310420	2.656637e-01
## month_interviewI5	0.46863387	1.8747642	0.24996950	8.026109e-01
## month_interviewI6	-0.14118560	1.7967851	-0.07857679	9.373693e-01
## month_interviewI7	0.26229886	1.8579415	0.14117714	8.877300e-01
## month_interviewI8	2.70864575	1.6499411	1.64166212	1.006600e-01
## month_interviewI9	3.39383629	1.7666636	1.92104270	5.472632e-02
## month_interviewI10	4.38247383	1.9968526	2.19469068	2.818579e-02
## month_interviewI11	2.29345736	1.6612186	1.38058732	1.674059e-01
## month_interviewI12	2.61232134	2.3204101	1.12580155	2.602495e-01
## cost_sharing	-1.58852908	0.8426322	-1.88519863	5.940303e-02
## std98_base_I2	2.87021252	1.1831510	2.42590540	1.527025e-02
## std98_base_I3	5.25419541	1.4098919	3.72666536	1.940298e-04
## std98_base_I4	9.11589669	1.6967973	5.37241346	7.768972e-08
## std98_base_I5	11.75981169	1.3679153	8.59688610	8.190821e-18
## std98_base_I6	10.43739045	1.4692341	7.10396673	1.212261e-12
## female_baseline	-6.63145907	0.9455658	-7.01321801	2.328981e-12
## avgtest96	-0.44322869	1.5109010	-0.29335389	7.692517e-01

```
model <- lm.cluster(data = deworming,
                    formula = as.formula(paste("ln_emp_salary_total ~ treatment +", controls)),
                    cluster = "psdpsch98",
                    weights = deworming$weight)
summary(model)
```

```
## R^2= 0.18863
```

```
##
```

	Estimate	Std. Error	t value	Pr(> t)
--	----------	------------	---------	----------

```
## (Intercept)      7.639928289 0.19773326 38.63754808 0.000000e+00
## treatment      0.264505216 0.08519794  3.10459639 1.905388e-03
## saturation_dm   0.946135127 0.86137458  1.09840149 2.720292e-01
## demeaned_popT_6k 0.032530501 0.02671009  1.21791074 2.232579e-01
## zoneidI2       -0.182680139 0.14830549 -1.23178272 2.180303e-01
## zoneidI3       -0.167813300 0.15061279 -1.11420348 2.651919e-01
## zoneidI4       -0.142579282 0.14632985 -0.97436906 3.298733e-01
## zoneidI5       -0.111112127 0.18852035 -0.58939062 5.555993e-01
## zoneidI6        0.129125628 0.13982088  0.92350747 3.557428e-01
## zoneidI7       -0.119284338 0.14656991 -0.81383918 4.157371e-01
## zoneidI8       -0.070609931 0.18902352 -0.37355104 7.087384e-01
## pup_pop        -0.004367281 0.25788153 -0.01693522 9.864883e-01
## month_interviewI2 -0.424540364 0.20029479 -2.11957764 3.404168e-02
## month_interviewI3 -0.248233855 0.19172212 -1.29475857 1.954035e-01
## month_interviewI4 -0.340358635 0.25542149 -1.33253721 1.826837e-01
## month_interviewI5 -0.146851797 0.16768340 -0.87576823 3.811560e-01
## month_interviewI6 -0.115661602 0.15892609 -0.72776975 4.667545e-01
## month_interviewI7  0.137806747 0.14837657  0.92876355 3.530116e-01
## month_interviewI8 -0.009137235 0.14447234 -0.06324557 9.495710e-01
## month_interviewI9 -0.063554020 0.13255454 -0.47945561 6.316145e-01
## month_interviewI10 -0.080449366 0.12892352 -0.62400843 5.326220e-01
## month_interviewI11 -0.218388053 0.15388675 -1.41914782 1.558559e-01
## month_interviewI12 0.145665489 0.18990377  0.76704895 4.430524e-01
## cost_sharing    -0.148538108 0.08788652 -1.69011257 9.100642e-02
## std98_base_I2   0.042169073 0.15448271  0.27296952 7.848766e-01
## std98_base_I3   0.327266912 0.15126070  2.16359517 3.049543e-02
## std98_base_I4   0.549476543 0.17078767  3.21730799 1.293996e-03
## std98_base_I5   0.576142925 0.14800390  3.89275491 9.911227e-05
## std98_base_I6   0.706708226 0.17421753  4.05647025 4.981990e-05
## female_baseline -0.436652085 0.08992569 -4.85569896 1.199628e-06
## avgtest96       0.032740253 0.12304016  0.26609404 7.901668e-01
```

Deworming benefits might be stronger for certain groups — for instance, girls (perhaps because they were more likely to be infected) or children with lower BMI at baseline (because they were less healthy initially).

Please estimate whether the deworming treatment had a differential impact on `totyrs_enrolled`, `passed_primary_exam`, and `total_hours` by gender (`female_baseline`) and then by BMI (BMI). To receive full credits, please highlight the names of dependent variables and estimated coefficients of interactive terms with red rectangles.

```
model <- lm.cluster(data = deworming,
                    formula = as.formula(paste("totyrs_enrolled ~ treatment * female_baseline +", contr
                    cluster = "psdpsch98",
                    weights = deworming$weight)
summary(model)
```

```
## R^2= 0.29309
##
##              Estimate Std. Error    t value    Pr(>|t|)
## (Intercept)   9.34001706 0.24721368  37.78115022 2.317739e-312
## treatment     0.32385023 0.18053697   1.79381668 7.284243e-02
## female_baseline -0.79960859 0.17844147 -4.48106943 7.426994e-06
## saturation_dm  1.05224345 0.83649024   1.25792675 2.084182e-01
## demeaned_popT_6k 0.11466494 0.04546365   2.52212371 1.166487e-02
## zoneidI2     -0.34974800 0.29800975 -1.17361260 2.405502e-01
## zoneidI3     -0.33726921 0.26900407 -1.25376990 2.099257e-01
```



```
## zoneidI4 -0.72133229 0.24104169 -2.99256231 2.766462e-03
## zoneidI5 -0.34623462 0.18997892 -1.82248965 6.838072e-02
## zoneidI6 -0.33210664 0.25915253 -1.28151032 2.000145e-01
## zoneidI7 -0.18283586 0.22464763 -0.81387840 4.157146e-01
## zoneidI8 -0.29404148 0.20403279 -1.44114815 1.495428e-01
## pup_pop 0.05876268 0.31944114 0.18395463 8.540490e-01
## month_interviewI2 -0.05861037 0.20542269 -0.28531598 7.754021e-01
## month_interviewI3 -0.26636026 0.24879319 -1.07060911 2.843452e-01
## month_interviewI4 0.06941129 0.22006370 0.31541454 7.524469e-01
## month_interviewI5 0.06263877 0.18278430 0.34269226 7.318300e-01
## month_interviewI6 -0.52011182 0.21024141 -2.47387905 1.336549e-02
## month_interviewI7 -0.12064488 0.21824338 -0.55279972 5.804006e-01
## month_interviewI8 -0.09862315 0.19608533 -0.50296036 6.149921e-01
## month_interviewI9 -0.55875945 0.19805360 -2.82125365 4.783636e-03
## month_interviewI10 -0.41503373 0.21531819 -1.92753684 5.391276e-02
## month_interviewI11 0.01586017 0.21953159 0.07224552 9.424065e-01
## month_interviewI12 0.20674065 0.21657115 0.95460845 3.397757e-01
## cost_sharing -0.25594858 0.13972764 -1.83176779 6.698602e-02
## std98_base_I2 -0.83902395 0.13697869 -6.12521504 9.056121e-10
## std98_base_I3 -1.63610041 0.13445383 -12.16849222 4.574545e-34
## std98_base_I4 -2.43318459 0.14785632 -16.45641291 7.544072e-61
## std98_base_I5 -3.53668628 0.14865619 -23.79104696 4.134304e-125
## std98_base_I6 -4.22676043 0.17291273 -24.44447293 5.761752e-132
## avgtest96 0.62918271 0.22797704 2.75985119 5.782770e-03
## treatment:female_baseline -0.06432997 0.21798401 -0.29511328 7.679073e-01
```

```
model <- lm.cluster(data = deworming,
  formula = as.formula(paste("passed_primary_exam ~ treatment * female_baseline +",
  cluster = "psdpsch98",
  weights = deworming$weight)
summary(model)
```

```
## R^2= 0.07025
##
## Estimate Std. Error t value Pr(>|t|)
## (Intercept) 0.557441964 0.043731353 12.74696345 3.241263e-37
## treatment 0.050026456 0.033311587 1.50177346 1.331556e-01
## female_baseline -0.184271956 0.031250938 -5.89652569 3.712350e-09
## saturation_dm 0.213988044 0.161758584 1.32288524 1.858735e-01
## demeaned_popT_6k 0.006490048 0.009610316 0.67532101 4.994718e-01
## zoneidI2 -0.018527494 0.053867896 -0.34394316 7.308890e-01
## zoneidI3 -0.029327980 0.056217244 -0.52169011 6.018861e-01
## zoneidI4 -0.064099432 0.041399314 -1.54832113 1.215450e-01
## zoneidI5 -0.048223975 0.041252990 -1.16898134 2.424112e-01
## zoneidI6 -0.093467000 0.044194572 -2.11489770 3.443867e-02
## zoneidI7 -0.012589094 0.039497033 -0.31873518 7.499273e-01
## zoneidI8 -0.034456278 0.035536450 -0.96960381 3.322440e-01
## pup_pop -0.044706478 0.057794243 -0.77354553 4.391996e-01
## month_interviewI2 -0.024703224 0.037210926 -0.66387016 5.067734e-01
## month_interviewI3 0.019074646 0.046241015 0.41250492 6.799694e-01
## month_interviewI4 0.026810191 0.045158556 0.59369018 5.527194e-01
## month_interviewI5 0.077843332 0.034248830 2.27287567 2.303367e-02
## month_interviewI6 -0.032345065 0.035473801 -0.91180148 3.618732e-01
## month_interviewI7 0.057033818 0.036001736 1.58419631 1.131491e-01
## month_interviewI8 0.017865714 0.034033036 0.52495212 5.996165e-01
```

```
## month_interviewI9      -0.065845139 0.033276147 -1.97874889 4.784429e-02
## month_interviewI10     -0.017905661 0.037223800 -0.48102721 6.304972e-01
## month_interviewI11      0.034604214 0.037522358  0.92222919 3.564090e-01
## month_interviewI12      0.085470424 0.044839977  1.90612103 5.663450e-02
## cost_sharing            -0.039386937 0.026927025 -1.46272889 1.435416e-01
## std98_base_I2           0.041424883 0.030331197  1.36575167 1.720169e-01
## std98_base_I3           0.099946134 0.034529616  2.89450464 3.797573e-03
## std98_base_I4           0.090411934 0.027279029  3.31433838 9.186027e-04
## std98_base_I5           0.094828133 0.031262793  3.03325855 2.419282e-03
## std98_base_I6           0.089267187 0.026633066  3.35174279 8.030459e-04
## avgtest96               0.138941993 0.039026271  3.56021700 3.705485e-04
## treatment:female_baseline 0.001190195 0.039931916  0.02980561 9.762221e-01
```

```
model <- lm.cluster(data = deworming,
                    formula = as.formula(paste("total_hours ~ treatment * female_baseline +", controls)),
                    cluster = "psdpsch98",
                    weights = deworming$weight)
summary(model)
```

```
## R^2= 0.06075
```

```
##
##              Estimate Std. Error    t value    Pr(>|t|)
## (Intercept)    11.73503812  2.3874425  4.91531764 8.863863e-07
## treatment        3.50617266  1.4796274  2.36963222 1.780579e-02
## female_baseline -3.93672015  1.7186783 -2.29055086 2.198940e-02
## saturation_dm    9.80617283  7.7735236  1.26148365 2.071346e-01
## demeaned_popT_6k  0.17268152  0.3560491  0.48499349 6.276810e-01
## zoneidI2         1.22186463  2.2477500  0.54359454 5.867205e-01
## zoneidI3         0.53660107  2.2824402  0.23509973 8.141313e-01
## zoneidI4         2.72192965  2.2250853  1.22329226 2.212193e-01
## zoneidI5         1.47190779  1.9176250  0.76756809 4.427438e-01
## zoneidI6         3.16812913  1.8665723  1.69729784 8.964037e-02
## zoneidI7        -0.51508605  1.9869419 -0.25923559 7.954535e-01
## zoneidI8         1.19552270  1.8866102  0.63368825 5.262843e-01
## pup_pop         -2.07066353  2.8274408 -0.73234549 4.639577e-01
## month_interviewI2  0.59056737  2.3502315  0.25128051 8.015972e-01
## month_interviewI3 -0.02577300  1.6830379 -0.01531338 9.877822e-01
## month_interviewI4  2.39506422  2.1786507  1.09933371 2.716225e-01
## month_interviewI5  0.45658028  1.8761288  0.24336297 8.077242e-01
## month_interviewI6 -0.09547212  1.7888885 -0.05336952 9.574375e-01
## month_interviewI7  0.25580693  1.8506416  0.13822608 8.900617e-01
## month_interviewI8  2.73216078  1.6349465  1.67110102 9.470173e-02
## month_interviewI9  3.41292449  1.7546443  1.94508058 5.176528e-02
## month_interviewI10 4.48770917  2.0103318  2.23232269 2.559364e-02
## month_interviewI11 2.24371616  1.6676717  1.34541836 1.784902e-01
## month_interviewI12 2.49346436  2.3349363  1.06789395 2.855684e-01
## cost_sharing     -1.63622563  0.8293350 -1.97293681 4.850276e-02
## std98_base_I2     2.92273160  1.1932968  2.44929147 1.431376e-02
## std98_base_I3     5.28265334  1.4283013  3.69855677 2.168289e-04
## std98_base_I4     9.15768482  1.6902812  5.41784680 6.032107e-08
## std98_base_I5    11.77177934  1.3712231  8.58487505 9.093521e-18
## std98_base_I6    10.49573115  1.4770295  7.10597259 1.194781e-12
## avgtest96        -0.37657463  1.4765968 -0.25502874 7.987009e-01
## treatment:female_baseline -3.98006181 2.0074746 -1.98262127 4.740975e-02
```



```
model <- lm.cluster(data = deworming,
  formula = as.formula(paste("totyrs_enrolled ~ treatment * BMI +", controls)),
  cluster = "psdpsch98",
  weights = deworming$weight)

summary(model)
```

```
## R^2= 0.29369
##
##               Estimate Std. Error   t value    Pr(>|t|)
## (Intercept)    9.3646592209 0.234111260  40.0008920 0.000000e+00
## treatment      0.4438721085 0.174112229   2.5493448 1.079255e-02
## BMI            -0.0007735977 0.002551523  -0.3031906 7.617446e-01
## saturation_dm   1.1453317833 0.836062926   1.3699110 1.707147e-01
## demeaned_popT_6k 0.1144899233 0.045023839   2.5428734 1.099450e-02
## zoneidI2       -0.3635414387 0.295246590  -1.2313146 2.182052e-01
## zoneidI3       -0.3458168260 0.267003321  -1.2951780 1.952588e-01
## zoneidI4       -0.7307262629 0.240030062  -3.0443114 2.332136e-03
## zoneidI5       -0.3450610336 0.189399671  -1.8218671 6.847515e-02
## zoneidI6       -0.3375734980 0.252079959  -1.3391525 1.805210e-01
## zoneidI7       -0.2061321001 0.223732079  -0.9213346 3.568758e-01
## zoneidI8       -0.3090969983 0.203399064  -1.5196579 1.285970e-01
## pup_pop        0.0557231043 0.314723774   0.1770540 8.594660e-01
## month_interviewI2 -0.0523600501 0.206251381  -0.2538652 7.995997e-01
## month_interviewI3 -0.2621192547 0.248998591  -1.0526937 2.924814e-01
## month_interviewI4  0.0757273398 0.221913901   0.3412465 7.329180e-01
## month_interviewI5  0.0927886462 0.180002940   0.5154841 6.062148e-01
## month_interviewI6 -0.5180237170 0.210853129  -2.4567988 1.401812e-02
## month_interviewI7 -0.1132420960 0.218377555  -0.5185611 6.040669e-01
## month_interviewI8 -0.1064480454 0.195107800  -0.5455858 5.853507e-01
## month_interviewI9 -0.5581716691 0.198566523  -2.8110059 4.938688e-03
## month_interviewI10 -0.4078057205 0.214195121  -1.9038983 5.692343e-02
## month_interviewI11  0.0255509230 0.218319882   0.1170343 9.068328e-01
## month_interviewI12  0.2198688323 0.216728291   1.0144907 3.103487e-01
## cost_sharing    -0.2574411821 0.138012149  -1.8653516 6.213214e-02
## std98_base_I2   -0.8292292832 0.136242165  -6.0864365 1.154514e-09
## std98_base_I3   -1.6326722055 0.133233180 -12.2542463 1.594247e-34
## std98_base_I4   -2.4163845702 0.149874990 -16.1226671 1.768108e-58
## std98_base_I5   -3.5296716325 0.149498761 -23.6100394 3.039633e-123
## std98_base_I6   -4.2121406691 0.171727176 -24.5280961 7.409797e-133
## female_baseline -0.8336787999 0.102419222  -8.1398665 3.957138e-16
## avgtest96       0.6321743633 0.226136671   2.7955411 5.181291e-03
## treatment:BMI   -0.0063678821 0.004933846  -1.2906528 1.968241e-01
```

```
model <- lm.cluster(data = deworming,
  formula = as.formula(paste("passed_primary_exam ~ treatment * BMI +", controls)),
  cluster = "psdpsch98",
  weights = deworming$weight)

summary(model)
```

```
## R^2= 0.07103
##
##               Estimate Std. Error   t value    Pr(>|t|)
## (Intercept)    5.535869e-01 0.0428745094  12.9117963 3.861856e-38
## treatment      6.547062e-02 0.0343669594   1.9050453 5.677418e-02
```

## BMI	5.031535e-05	0.0004835742	0.1040489	9.171306e-01
## saturation_dm	2.361949e-01	0.1615823533	1.4617616	1.438066e-01
## demeaned_popT_6k	6.389072e-03	0.0096340051	0.6631793	5.072157e-01
## zoneidI2	-2.099851e-02	0.0539227766	-0.3894183	6.969668e-01
## zoneidI3	-3.204086e-02	0.0564256804	-0.5678418	5.701424e-01
## zoneidI4	-6.631414e-02	0.0420056195	-1.5786969	1.144056e-01
## zoneidI5	-4.800881e-02	0.0415380824	-1.1557781	2.477719e-01
## zoneidI6	-9.572677e-02	0.0441460903	-2.1684089	3.012759e-02
## zoneidI7	-1.657817e-02	0.0394938621	-0.4197657	6.746566e-01
## zoneidI8	-3.853736e-02	0.0359104956	-1.0731503	2.832037e-01
## pup_pop	-4.514183e-02	0.0578363234	-0.7805099	4.350908e-01
## month_interviewI2	-2.201490e-02	0.0372344513	-0.5912508	5.543524e-01
## month_interviewI3	2.111711e-02	0.0462636202	0.4564518	6.480651e-01
## month_interviewI4	2.681867e-02	0.0455560624	0.5886960	5.560652e-01
## month_interviewI5	8.556406e-02	0.0349825970	2.4459037	1.444896e-02
## month_interviewI6	-3.070777e-02	0.0356320416	-0.8618021	3.887964e-01
## month_interviewI7	6.276595e-02	0.0365435680	1.7175650	8.587599e-02
## month_interviewI8	1.756060e-02	0.0337730375	0.5199590	6.030921e-01
## month_interviewI9	-6.421549e-02	0.0335336462	-1.9149571	5.549798e-02
## month_interviewI10	-1.514748e-02	0.0370899935	-0.4083980	6.829815e-01
## month_interviewI11	3.718342e-02	0.0375911577	0.9891533	3.225881e-01
## month_interviewI12	9.027188e-02	0.0445472985	2.0264276	4.272098e-02
## cost_sharing	-3.986747e-02	0.0268342882	-1.4856914	1.373608e-01
## std98_base_I2	4.298428e-02	0.0303574649	1.4159378	1.567937e-01
## std98_base_I3	1.003575e-01	0.0344601827	2.9122749	3.588068e-03
## std98_base_I4	9.113439e-02	0.0274968453	3.3143579	9.185386e-04
## std98_base_I5	9.628811e-02	0.0313493095	3.0714586	2.130157e-03
## std98_base_I6	9.136947e-02	0.0265130797	3.4462038	5.685215e-04
## female_baseline	-1.818531e-01	0.0191561749	-9.4931854	2.240799e-21
## avgtest96	1.396096e-01	0.0389484214	3.5844741	3.377581e-04
## treatment:BMI	-6.233804e-04	0.0006214238	-1.0031485	3.157892e-01

```

model <- lm.cluster(data = deworming,
  formula = as.formula(paste("total_hours ~ treatment * BMI +", controls)),
  cluster = "psdpsch98",
  weights = deworming$weight)

summary(model)

```

## R ² = 0.0601				
##				
##	Estimate	Std. Error	t value	Pr(> t)
## (Intercept)	13.50525307	2.39254986	5.64471124	1.654587e-08
## treatment	-0.08807024	1.32216985	-0.06661038	9.468919e-01
## BMI	-0.01185702	0.00795430	-1.49064276	1.360553e-01
## saturation_dm	9.14797537	7.82400692	1.16921872	2.423155e-01
## demeaned_popT_6k	0.17865632	0.36507337	0.48937101	6.245791e-01
## zoneidI2	1.19198206	2.30905613	0.51622048	6.057004e-01
## zoneidI3	0.43577971	2.32919981	0.18709417	8.515868e-01
## zoneidI4	2.77665925	2.24488061	1.23688504	2.161298e-01
## zoneidI5	1.56571010	1.99267220	0.78573390	4.320234e-01
## zoneidI6	3.15765232	1.90213389	1.66005786	9.690281e-02
## zoneidI7	-0.42206929	2.01006667	-0.20997776	8.336850e-01
## zoneidI8	1.18849228	1.93314914	0.61479596	5.386895e-01
## pup_pop	-2.04011136	2.92220372	-0.69814139	4.850888e-01
## month_interviewI2	0.49695193	2.36151385	0.21043786	8.333259e-01

## month_interviewI3	-0.07874510	1.70394118	-0.04621351	9.631401e-01
## month_interviewI4	2.32142803	2.18220024	1.06380156	2.874186e-01
## month_interviewI5	0.43092732	1.89169285	0.22779984	8.198019e-01
## month_interviewI6	-0.18308257	1.80455823	-0.10145562	9.191888e-01
## month_interviewI7	0.33091493	1.86673386	0.17726947	8.592967e-01
## month_interviewI8	2.69541204	1.65496084	1.62868630	1.033794e-01
## month_interviewI9	3.34520747	1.76722218	1.89291845	5.836872e-02
## month_interviewI10	4.28160344	1.99470021	2.14648969	3.183393e-02
## month_interviewI11	2.16612547	1.66627303	1.29998232	1.936070e-01
## month_interviewI12	2.36694311	2.30869590	1.02522949	3.052549e-01
## cost_sharing	-1.64424476	0.84899263	-1.93670086	5.278192e-02
## std98_base_I2	2.77568930	1.19497558	2.32280002	2.018990e-02
## std98_base_I3	5.22062567	1.41278058	3.69528414	2.196410e-04
## std98_base_I4	9.12371865	1.72074782	5.30218231	1.144265e-07
## std98_base_I5	11.65337805	1.36540937	8.53471368	1.405029e-17
## std98_base_I6	10.35197157	1.48655608	6.96372759	3.313851e-12
## female_baseline	-6.70677094	0.97131436	-6.90484068	5.025980e-12
## avgtest96	-0.51408388	1.51685141	-0.33891512	7.346737e-01
## treatment:BMI	0.07479562	0.03886328	1.92458342	5.428150e-02