

Practicum 3: Appendix

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Descriptives and outcomes

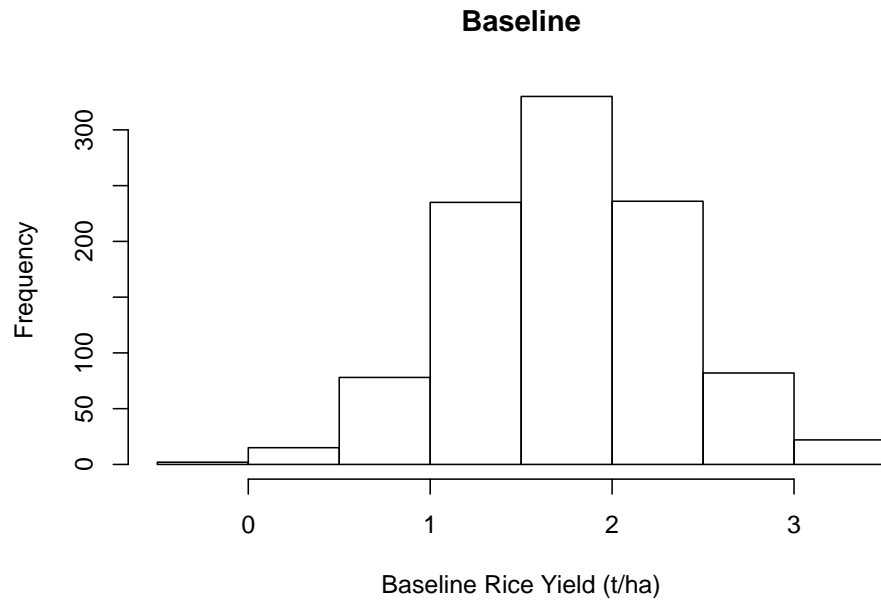
- Population size = 1000
- Initial sample size = 500 (Treatment = 375, Control = 125)
- Final sample size = 360 (Treatment = 270, Control = 90)
- Baseline yield (tons/hectare) is random normal with a mean of 1.75 t/ha and a standard deviation of 0.6 t/ha
- Estimated rate of change (not absolute change) from baseline yield = 0.8 ± 0.4 (sd)
- Treatment effect = 0.15
- Estimators: difference-in-means and difference-in-differences

Declare population

```
set.seed(228)
population <- declare_population(
  villages = add_level(N=1000,
    yield=rnorm(n=N, mean=1.75, sd = 0.6),
    u=rnorm(n=N, mean=0.8, sd=0.4))
)
```

Population descriptives

```
pop <- population()
hist(pop[,2], xlab="Baseline Rice Yield (t/ha)",
  main="Baseline", cex=24)
```



Declare potential outcomes

```
potential_outcomes <-
  declare_potential_outcomes(
    Y_D_0=yield + u,
    Y_D_1=yield + u + 0.15)
```

Potential outcomes descriptives

```
po <- potential_outcomes(pop)
kable(po[1:5,], digits=1) %>%
  kable_styling(bootstrap_options = c("striped", "hover"))
```

villages	yield	u	Y_D_0	Y_D_1
0001	0.7	0.7	1.4	1.6
0002	2.1	1.9	4.0	4.1
0003	1.4	0.8	2.2	2.4
0004	1.2	0.4	1.6	1.8
0005	1.0	1.1	2.1	2.3

Declare sampling

```
sampling <- declare_sampling(n=500)
sam <- sampling(po)
kable(sam[1:5,c(1:2,4:6)], row.names = FALSE, digits = 1) %>%
  kable_styling(bootstrap_options = c("striped", "hover"))
```

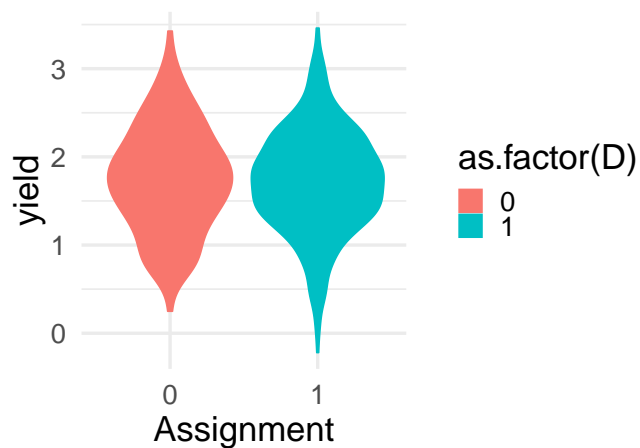
villages	yield	Y_D_0	Y_D_1	S_inclusion_prob
0003	1.4	2.2	2.4	0.5
0004	1.2	1.6	1.8	0.5
0005	1.0	2.1	2.3	0.5
0009	2.7	2.8	3.0	0.5
0010	2.1	3.5	3.7	0.5

Declare Assignment

```
assigning <- declare_assignment(m = nrow(sam)*(3/4),
                                assignment_variable="D")
assigned <- assigning(sam)
kable(assigned[1:5,c(1:2,4:5,7:8)], digits = 1) %>%
  kable_styling(bootstrap_options = c("striped", "hover"))
```

villages	yield	Y_D_0	Y_D_1	D	D_cond_prob
0003	1.4	2.2	2.4	1	0.8
0004	1.2	1.6	1.8	1	0.8
0005	1.0	2.1	2.3	1	0.8
0009	2.7	2.8	3.0	1	0.8
0010	2.1	3.5	3.7	1	0.8

Assessing balance



Declare reveal

```
revealing <- declare_reveal(assignment_variables=D)
```

Declare estimand

```
estimand <- declare_estimand(ATE = 0.15)
estimand(po)
```

```
##   estimand_label estimand
## 1             ATE      0.15
```

Declare estimator

```
dim <- declare_estimator(Y ~ D, estimand = estimand,
                          model = difference_in_means, label = "DIM")

did <- declare_estimator(Y - yield ~ D,
                          estimand = estimand,
                          model = difference_in_means, label = "DID")
```

Declare design

```
design <- population + potential_outcomes + sampling +  
  assigning + revealing + estimand + dim + did
```

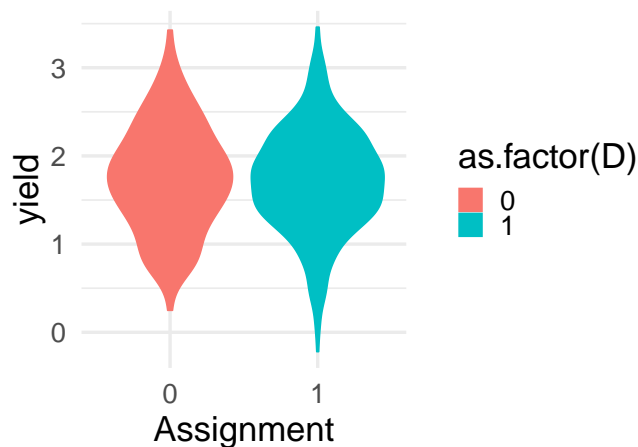
Diagnose design

```
diagnosis <- diagnose_design(design, sims=1000)  
  
kable1 <- diagnosis$diagnosands_df[,c(1,3,5,9,11)] %>%  
  kable() %>%  
  kable_styling(bootstrap_options = c("striped", "hover"))  
  
# save_kable(kable1, "kable_500.jpeg")  
  
kable1
```

design_label	estimator_label	bias	power	coverage
design	DID	0.0017574	0.955	0.955
design	DIM	0.0016840	0.527	0.934

Changing sample size to 360

```
sampling2 <- declare_sampling(n=360)  
sam2 <- sampling2(po)  
  
assigning2 <- declare_assignment(m = nrow(sam2)*(3/4),  
  assignment_variable="D")  
  
assigned2 <- assigning2(sam2)  
  
ggplot(data=assigned2, aes(x=as.factor(D), y=yield)) +  
  geom_violin(aes(fill=as.factor(D), color=as.factor(D))) +  
  theme_minimal(base_size = 24) + xlab("Assignment")
```



```
# dev.copy(png, 'violin2.png')  
  
dim <- declare_estimator(Y ~ D, estimand = estimand,  
  model = difference_in_means, label = "DIM")
```

```

did <- declare_estimator(Y ~ yield ~ D, estimand = estimand,
  model = difference_in_means, label = "DID")

design2 <- population + potential_outcomes + sampling2 +
  assigning2 + revealing + estimand + dim + did

diagnosis2 <- diagnose_design(design2, sims=1000)

kable2 <- diagnosis2$diagnosands_df[,c(1,3,5,9,11)] %>%
  kable() %>%
  kable_styling(bootstrap_options = c("striped", "hover"))

# save_kable(kable2, "kable_360.jpeg")

kable2

```

design_label	estimator_label	bias	power	coverage
design2	DID	0.0006351	0.866	0.953
design2	DIM	-0.0048192	0.381	0.949