```r
#import libraries
library(cobalt)
```

```
##  cobalt (Version 4.4.0, Build Date: 2022-08-13)
```

```r
library(WeightIt)
library(lmtest)
```

```
## Loading required package: zoo
```

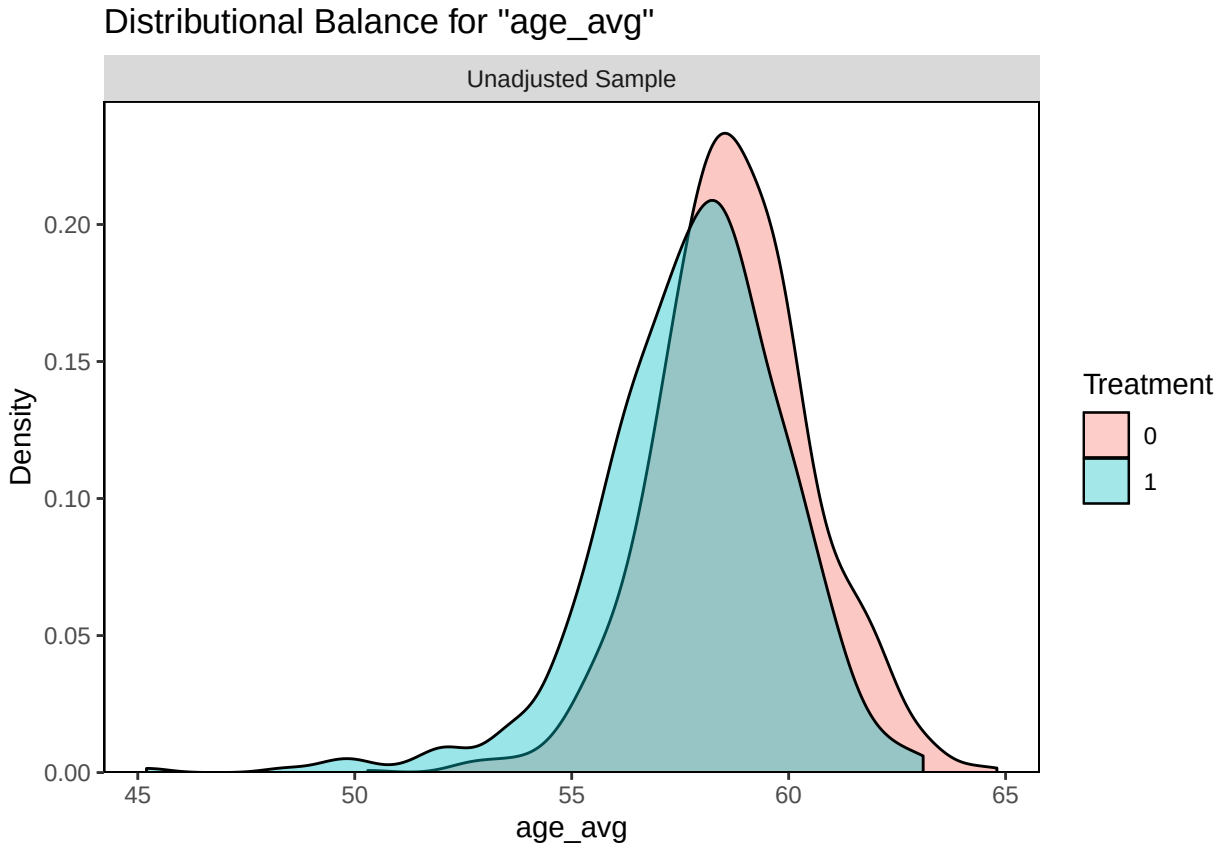
```
##
## Attaching package: 'zoo'
```

```
## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric
```

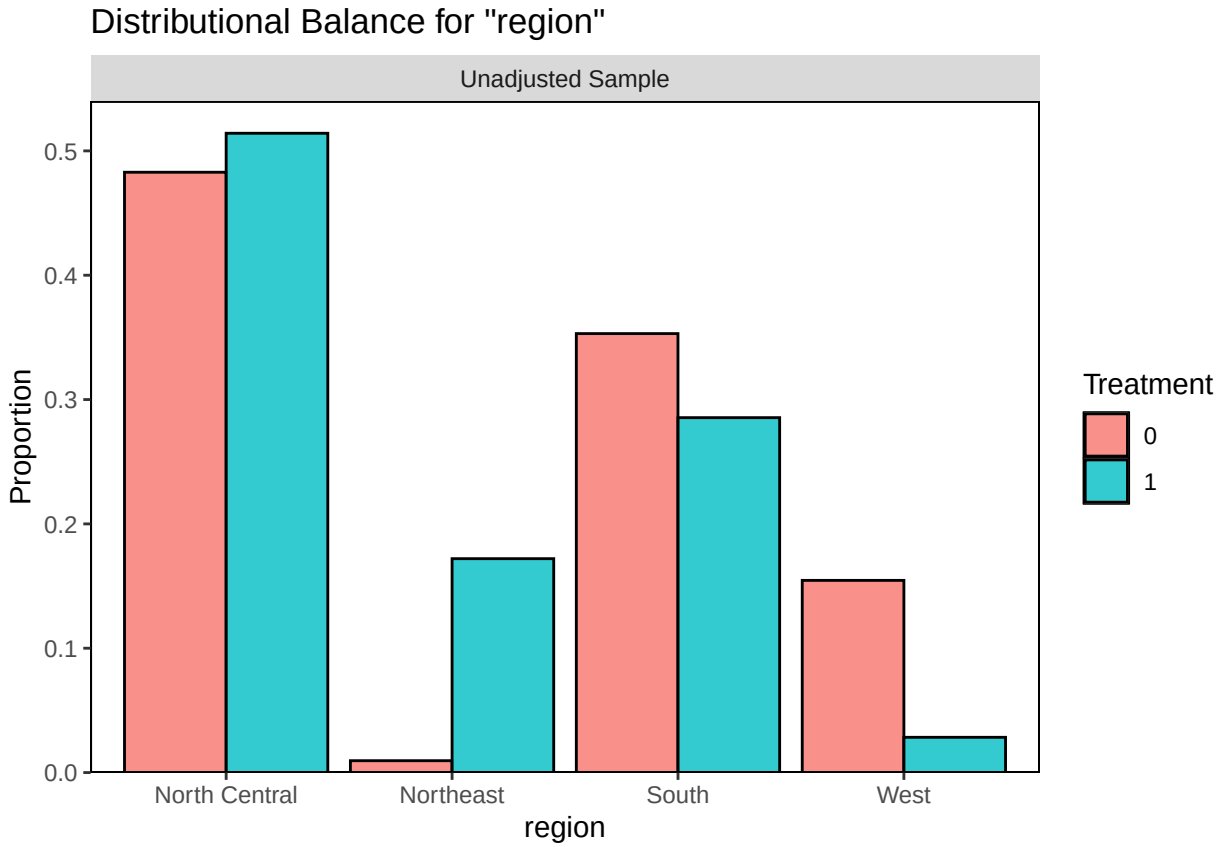
```r
library(sandwich)

farms_df <- read.csv("farms.csv")
head(farms_df)
```

```
##   total_yield cover_10 region total_avg age_avg experience_avg insurance_avg
## 1    61.33234        0  South     0.305    57.2           21.6     0.2543968
## 2    47.47099        1  South     0.208    61.2           24.9     0.6386207
## 3    46.27485        0  South     0.307    61.0           24.5     0.4223478
## 4    81.77405        0  South     0.254    58.8           23.9     1.0557846
## 5    81.04827        0  South     0.117    58.0           23.9     0.2556000
## 6    58.26087        0  South     0.292    62.5           23.6     0.6138043
##   easement_p conservation_till_avg fertilizer_per_area
## 1  1.8867925                   145            20.26741
## 2  1.5439430                   553            74.62687
## 3  0.8032129                    63            15.08367
## 4  1.1844332                   391            60.03353
## 5  0.5053341                    27            22.93760
## 6  2.3454158                   579            25.26148
```

```r
#balance plot for the average age
bal.plot(
  x = cover_10 ~ age_avg,
  data = farms_df,
  var.name = "age_avg"
)
```




```
#balance plot for the different regions
bal.plot(
  x = cover_10 ~ region,
  data = farms_df,
  var.name = "region"
)
```




```
#balance table to show SMD (Standardized Mean Differences) and Variance Ratios for all predictor variab
bal.tab(
  x = cover_10 ~ age_avg + region,
  data = farms_df,
  binary = "std",
  disp.v.ratio = TRUE
)
```

```
## Note: 's.d.denom' not specified; assuming pooled.
```

```
## Balance Measures
##                          Type Diff.Un V.Ratio.Un
## age_avg              Contin. -0.4668     1.4521
## region_North Central  Binary  0.0627          .
## region_Northeast      Binary  0.5896          .
## region_South          Binary -0.1454          .
## region_West           Binary -0.4488          .
##
## Sample sizes
##     Control Treated
## All    1048     529
```

The SMDs are outside of the recommended -0.1 and 0.1 range.

The variance ratio for age_avg is within the recommended range of 0.5 - 2.0