BGNVisualization

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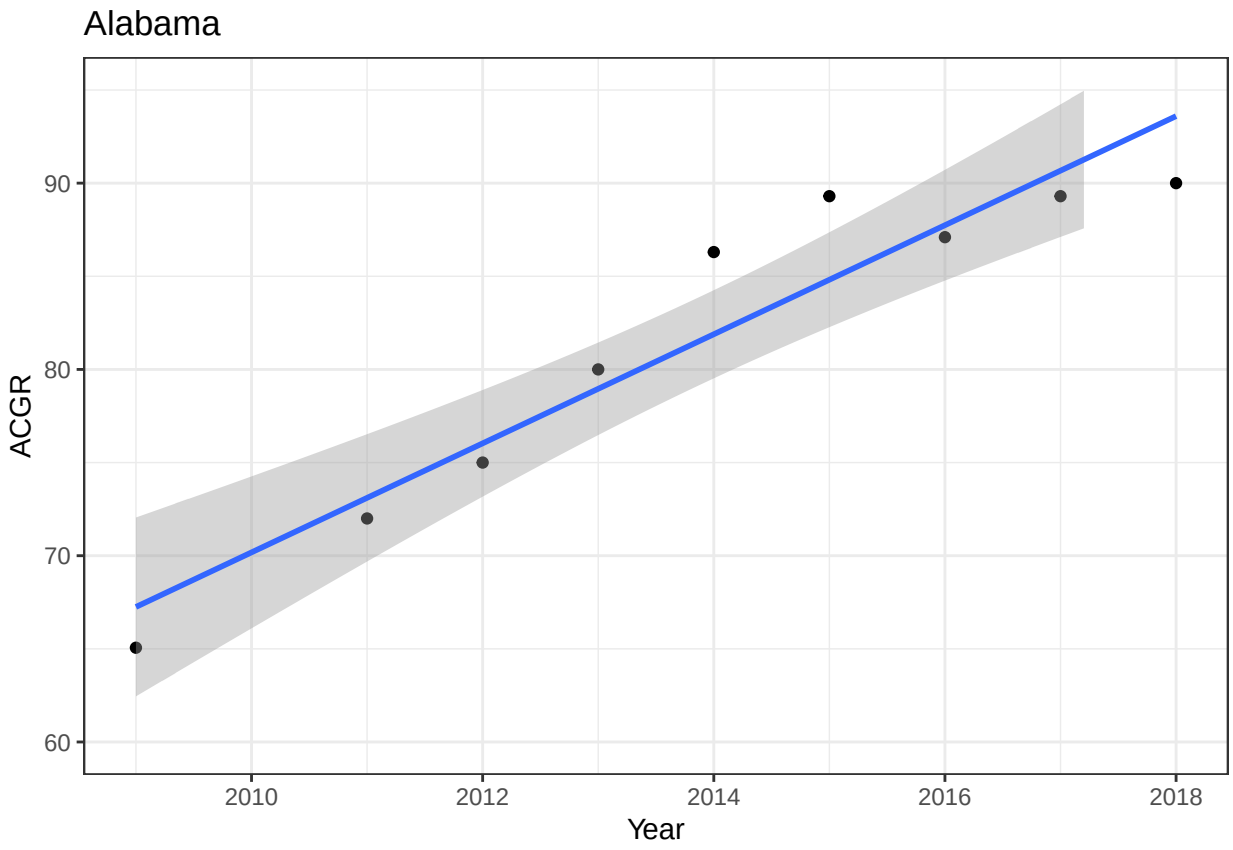
```
ACGR_state_longformat$acgr <- as.numeric(as.character(unlist(ACGR_state_longformat$acgr)))
```

```
## Warning: NAs introduced by coercion
```

```
states = unique(ACGR_state_longformat$state)
state_ACGR_plots = list()

for (state_ in states) {
  state_ACGR_plots[[state_]] = ggplot(ACGR_state_longformat %>% filter(state == state_ & acgr != "NA"),

  print(state_ACGR_plots[state_])

}
```

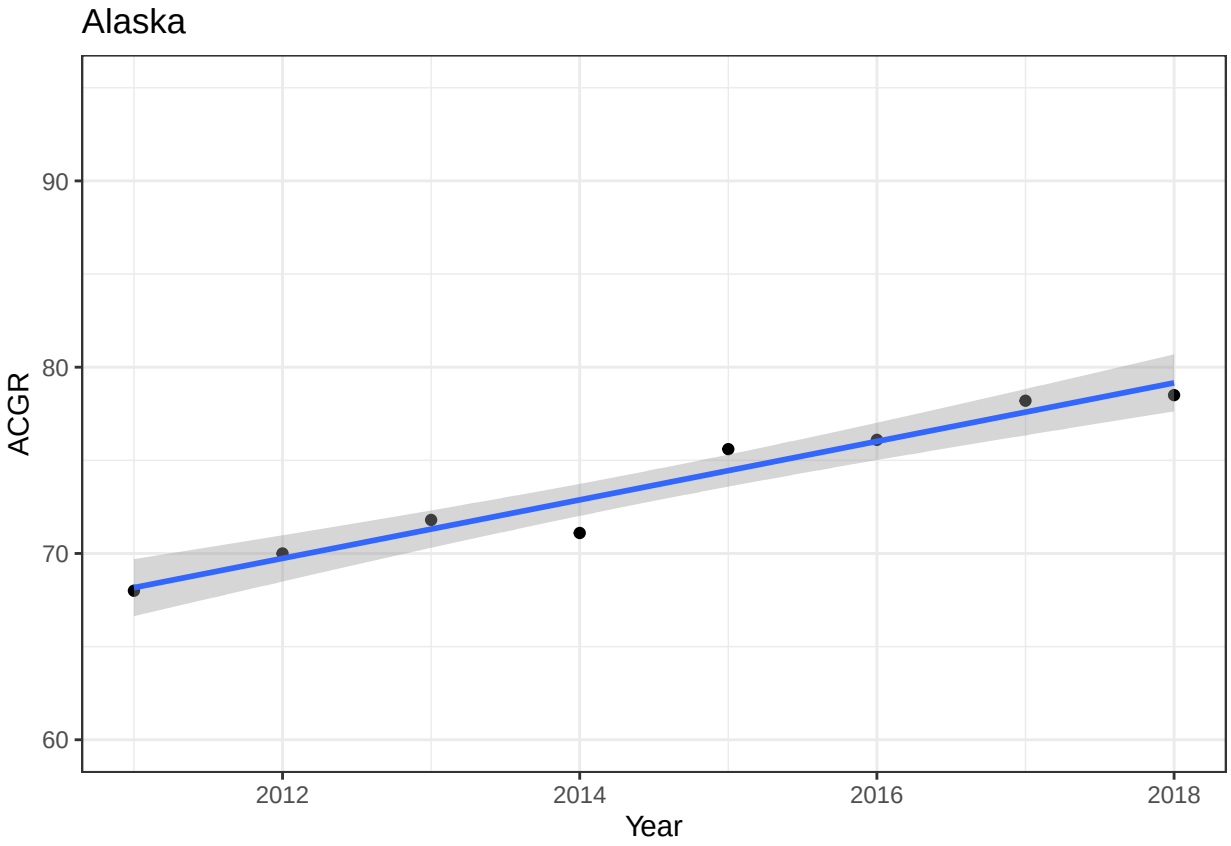
```
## $Alabama
```

```
## `geom_smooth()` using formula 'y ~ x'
```



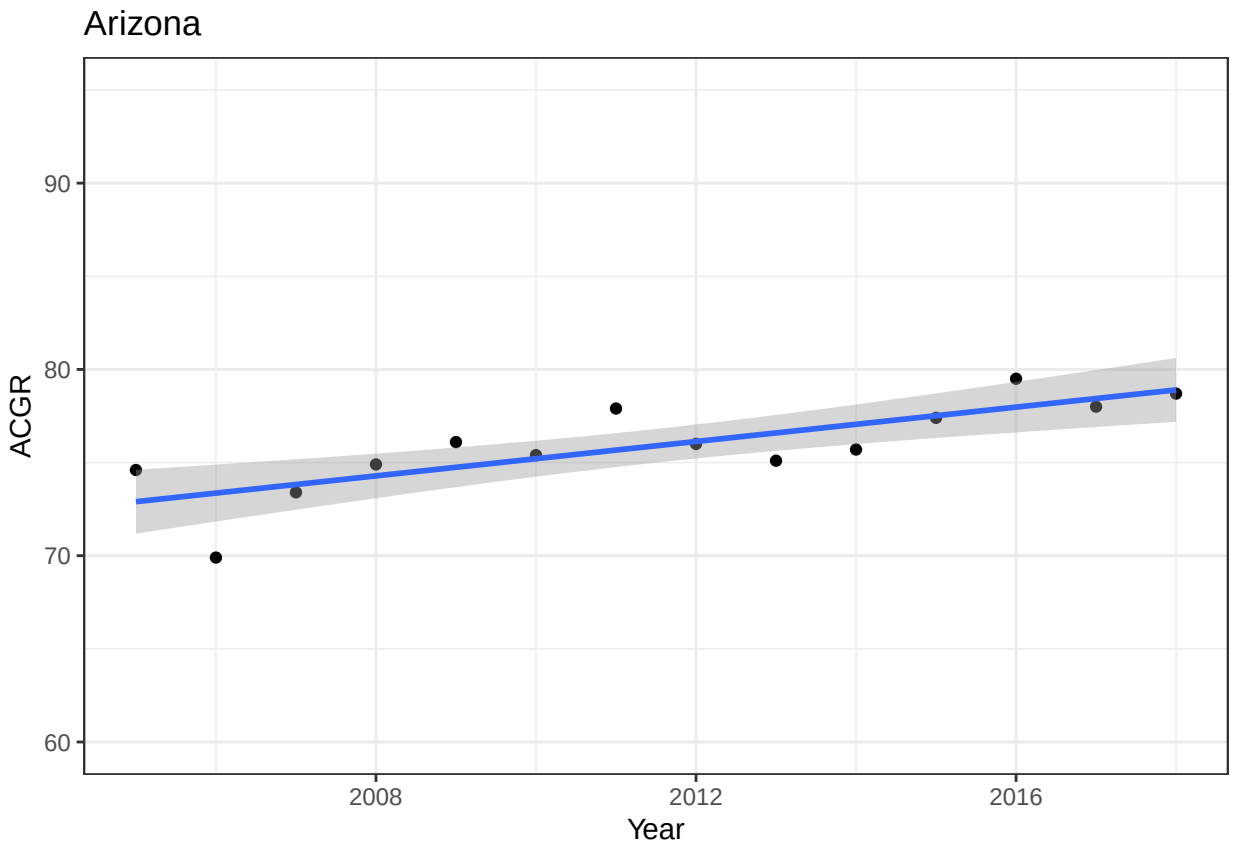
```
##
## $Alaska
```

```
## `geom_smooth()` using formula 'y ~ x'
```



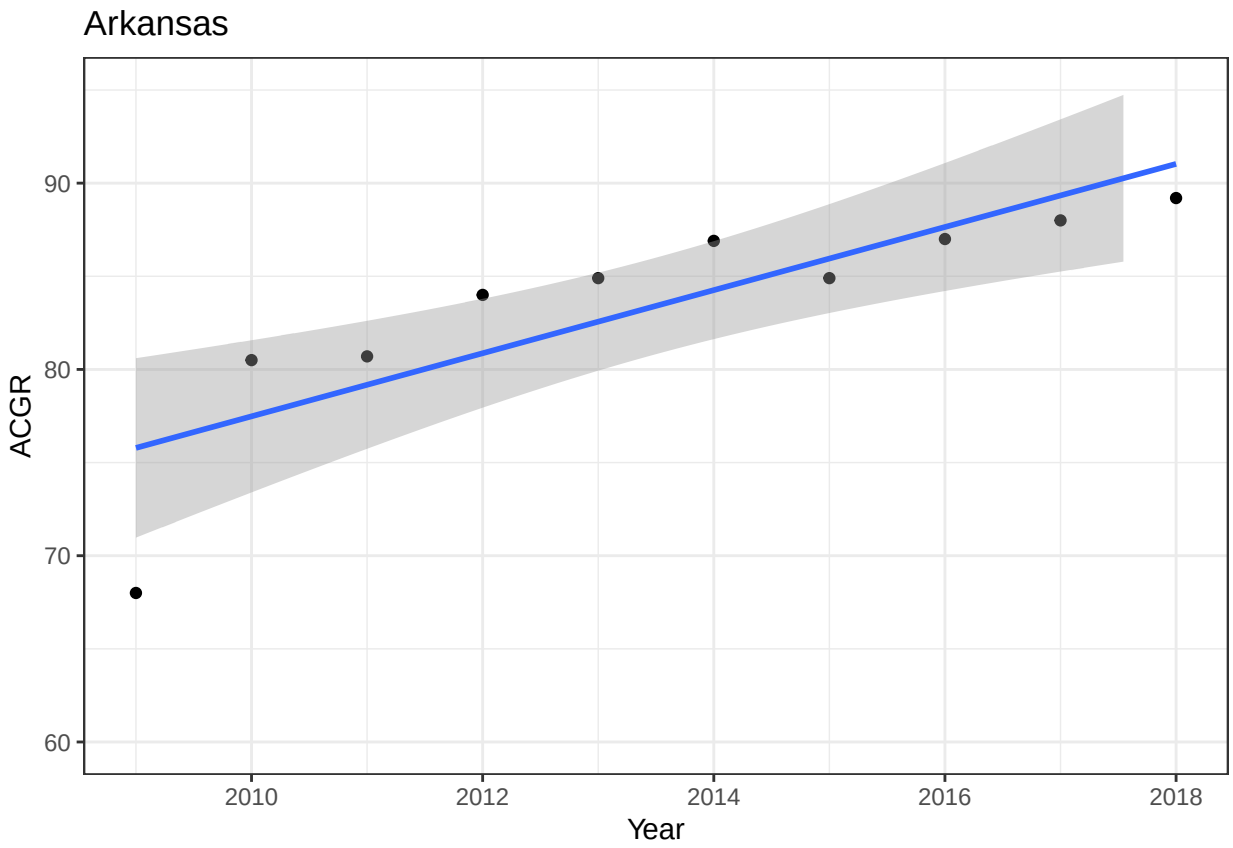

```
##
## $Arizona
```

```
## `geom_smooth()` using formula 'y ~ x'
```



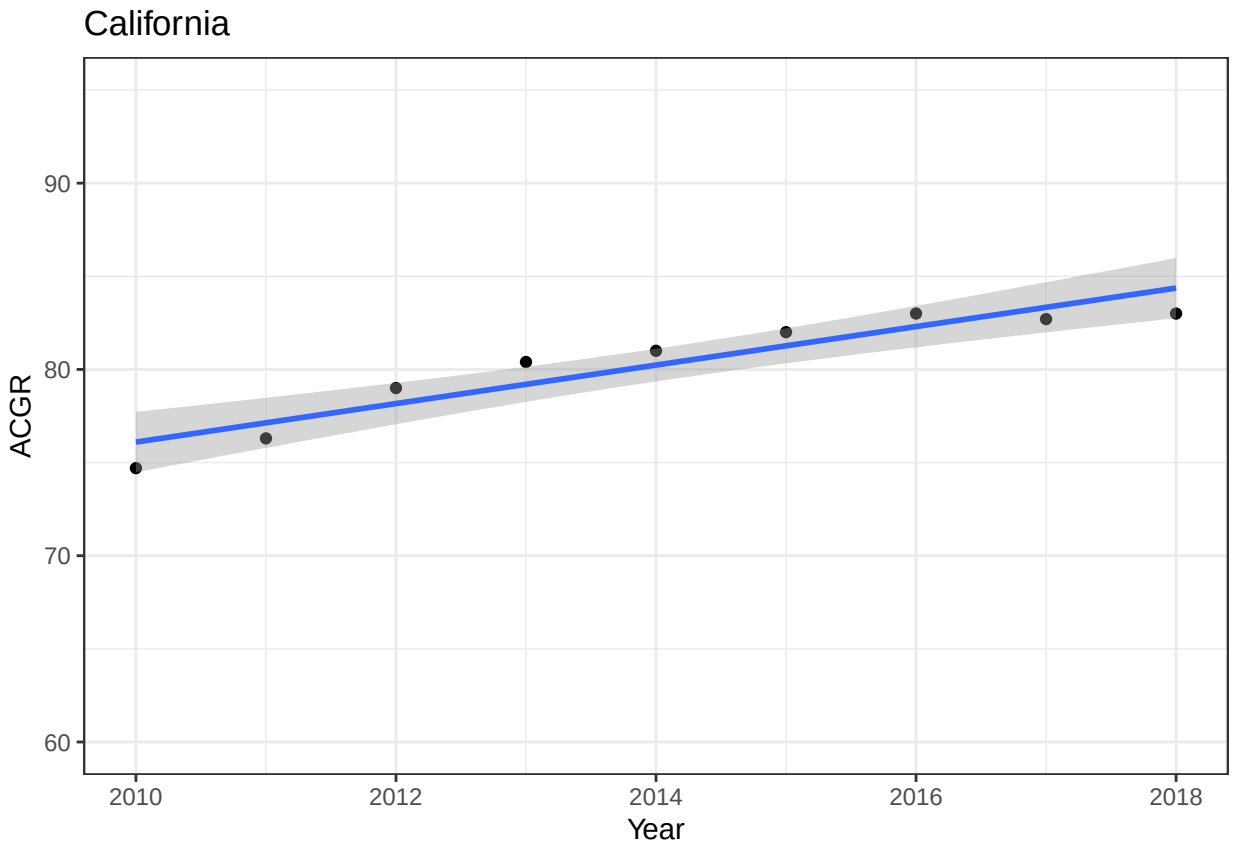

```
##
## $Arkansas
```

```
## `geom_smooth()` using formula 'y ~ x'
```



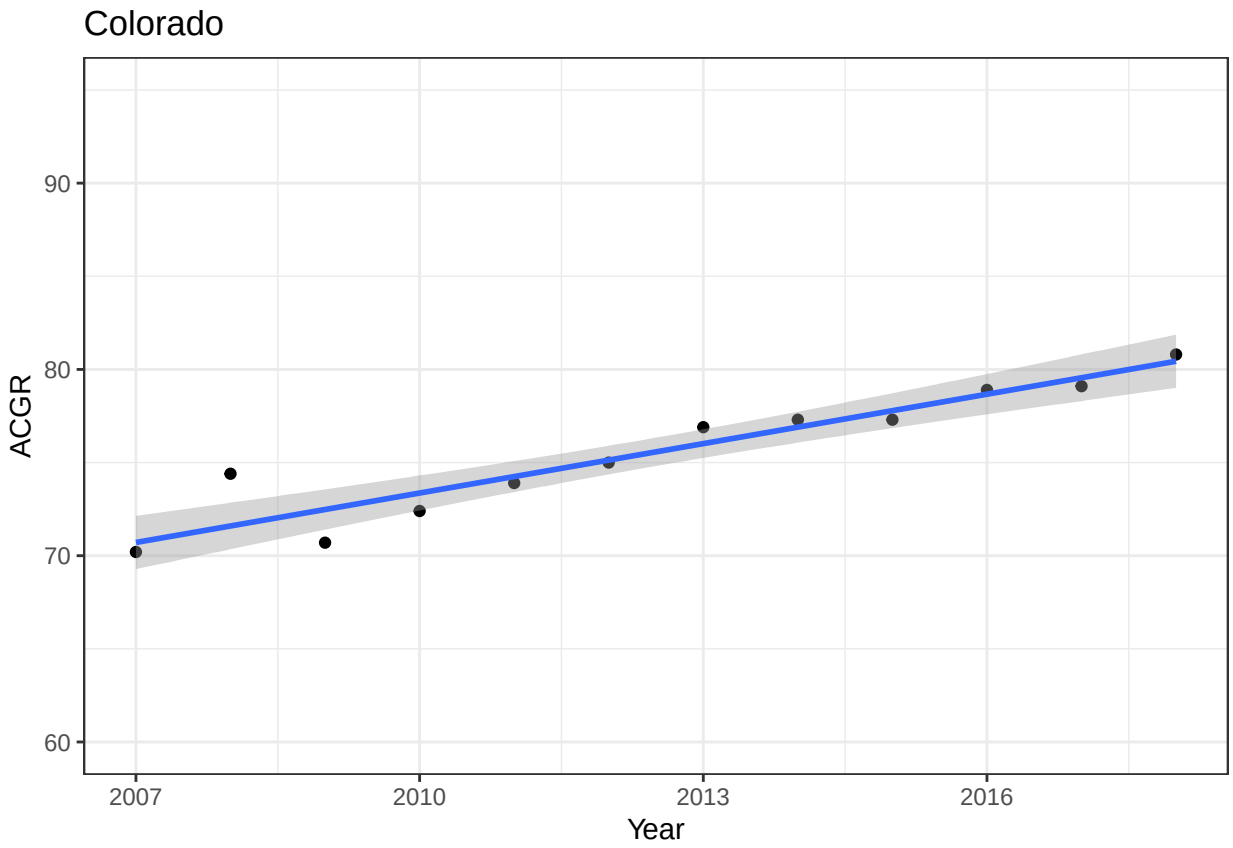

```
##
## $California
```

```
## `geom_smooth()` using formula 'y ~ x'
```



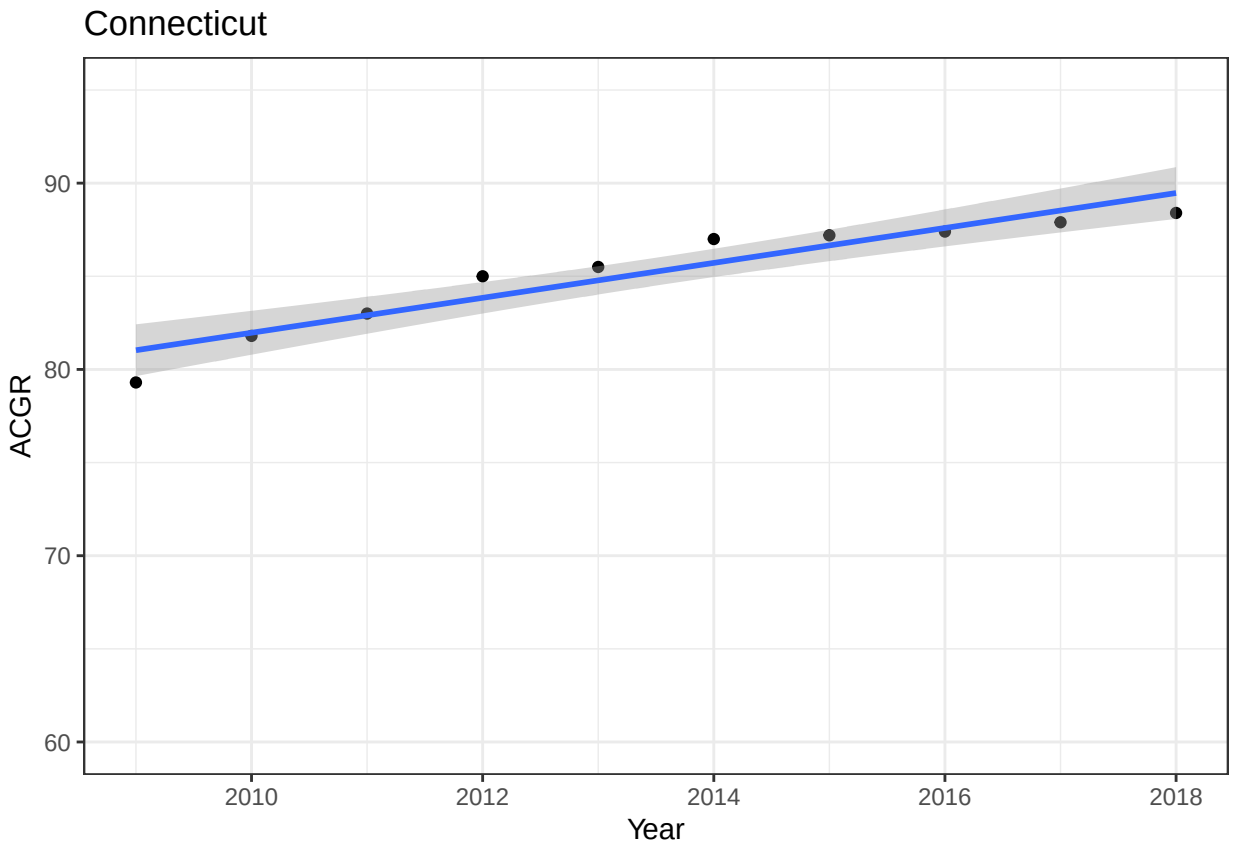

```
##
## $Colorado
```

```
## `geom_smooth()` using formula 'y ~ x'
```



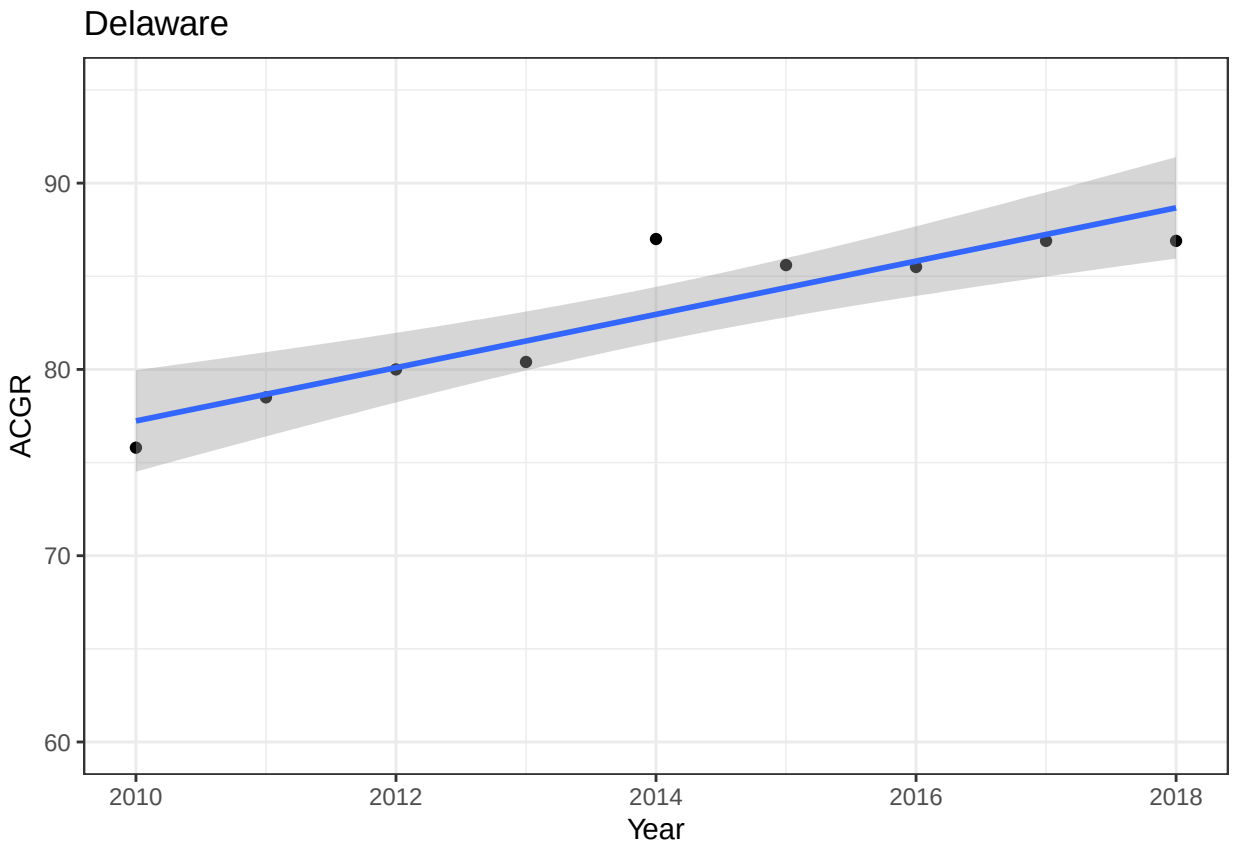

```
##
## $Connecticut
```

```
## `geom_smooth()` using formula 'y ~ x'
```

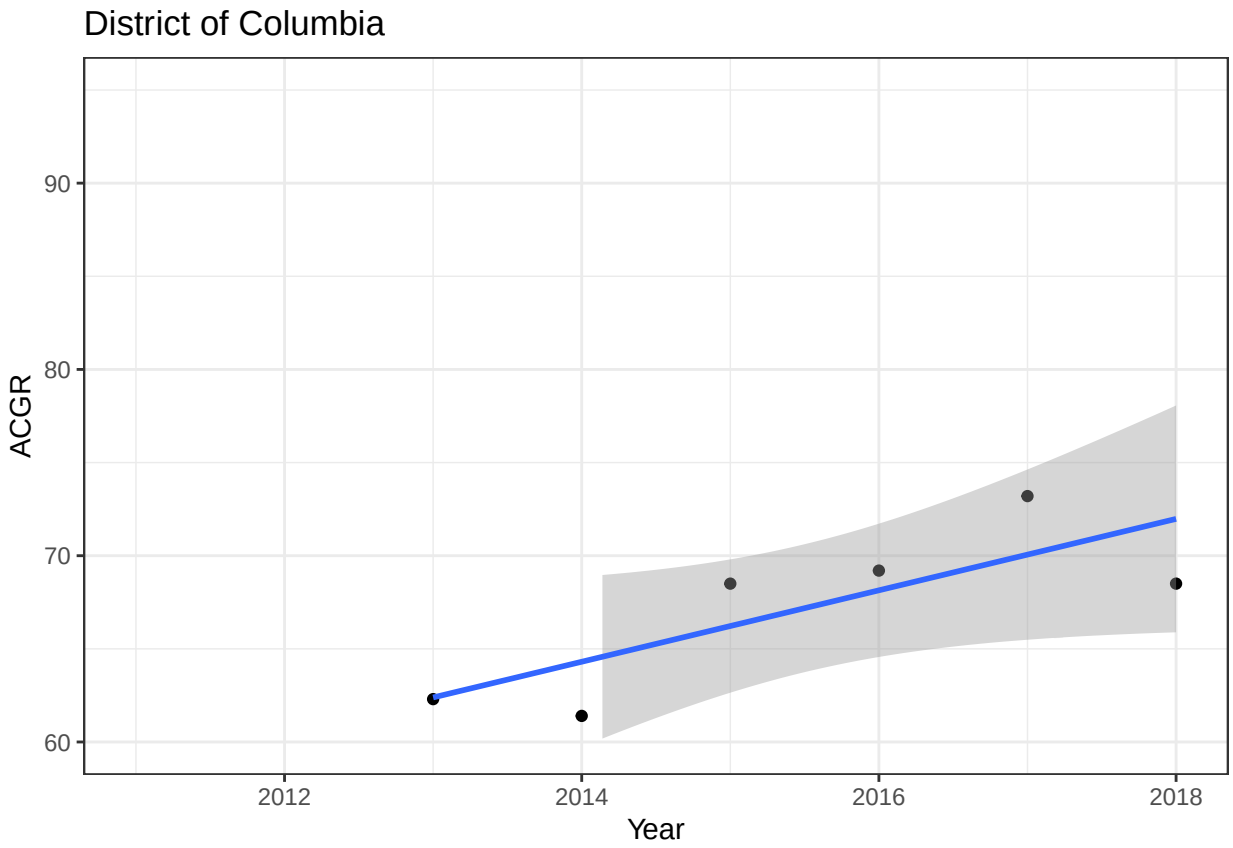



```
##
## $Delaware
```

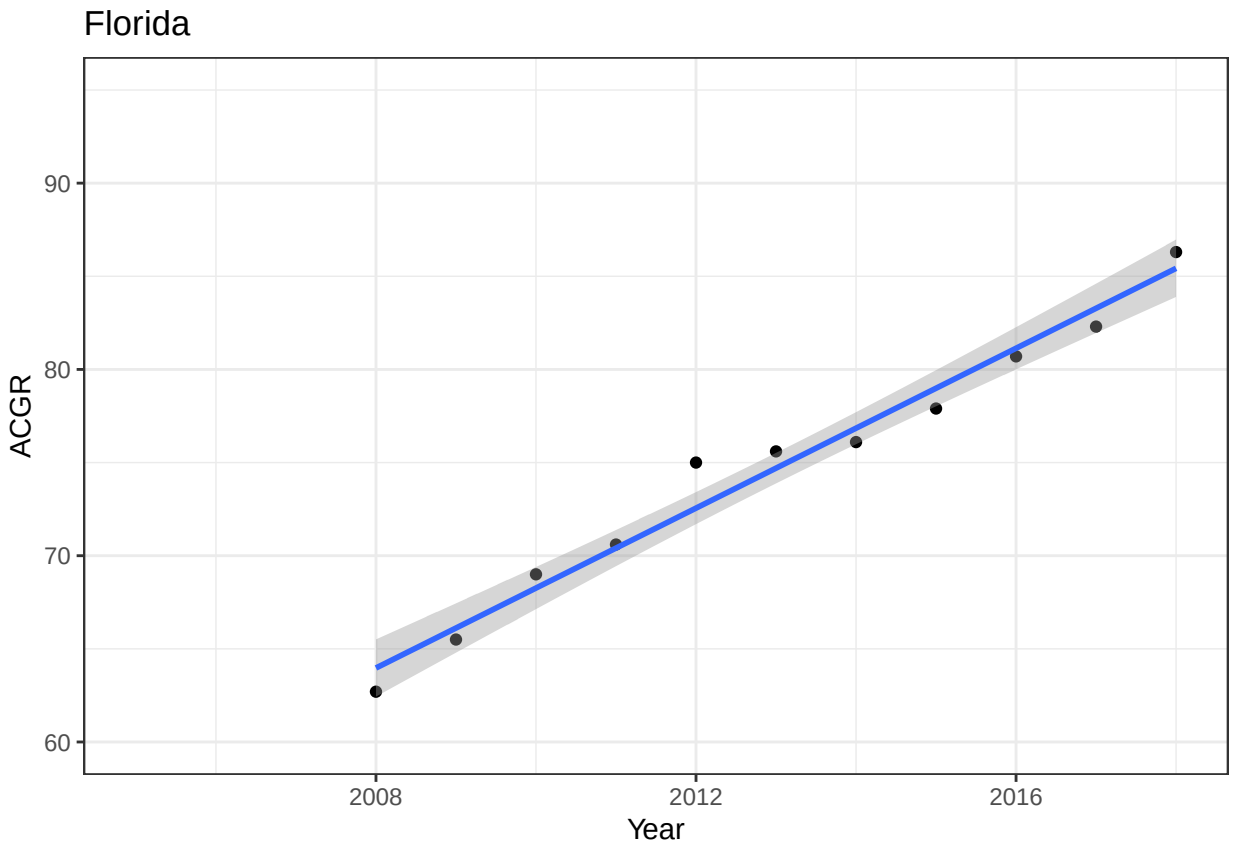
```
## `geom_smooth()` using formula 'y ~ x'
```



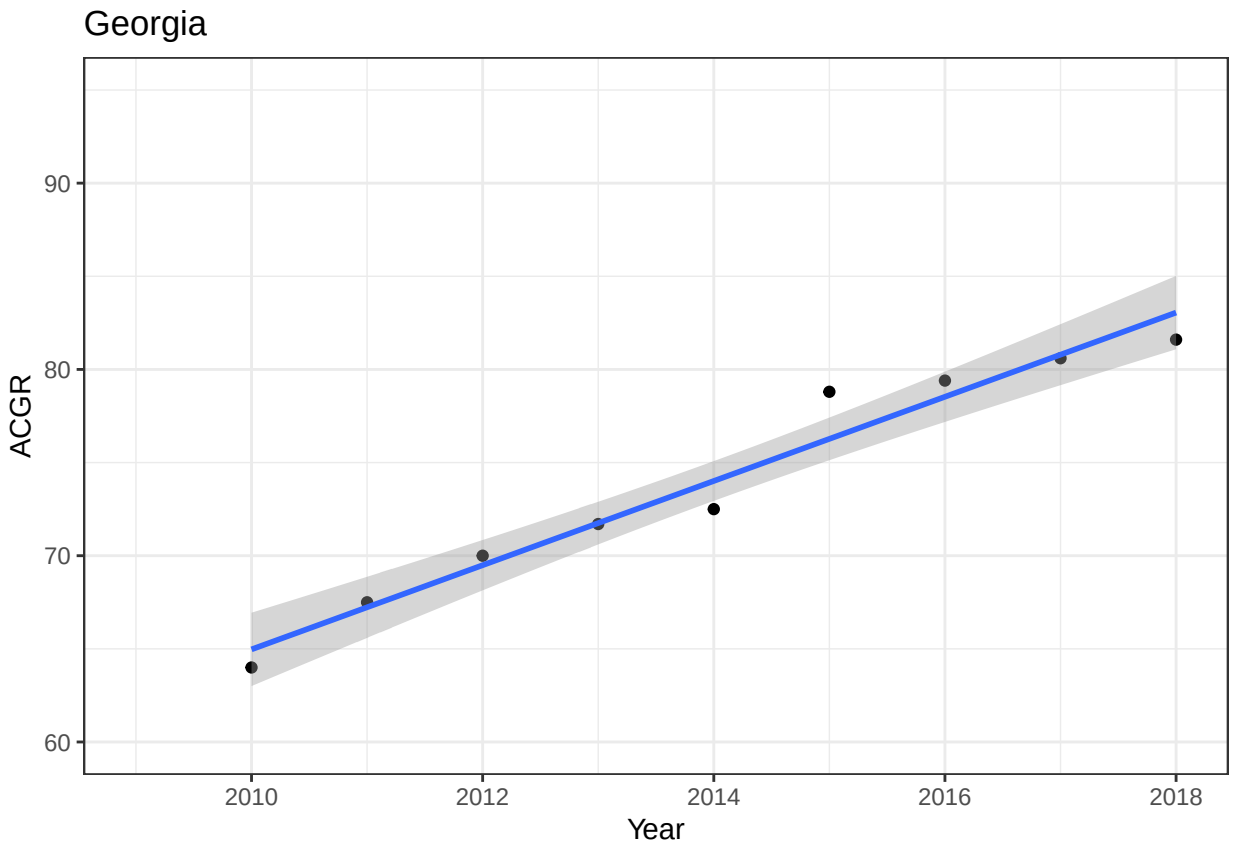

```
##
## $`District of Columbia`
## `geom_smooth()` using formula 'y ~ x'
## Warning: Removed 2 rows containing non-finite values (stat_smooth).
## Warning: Removed 2 rows containing missing values (geom_point).
```



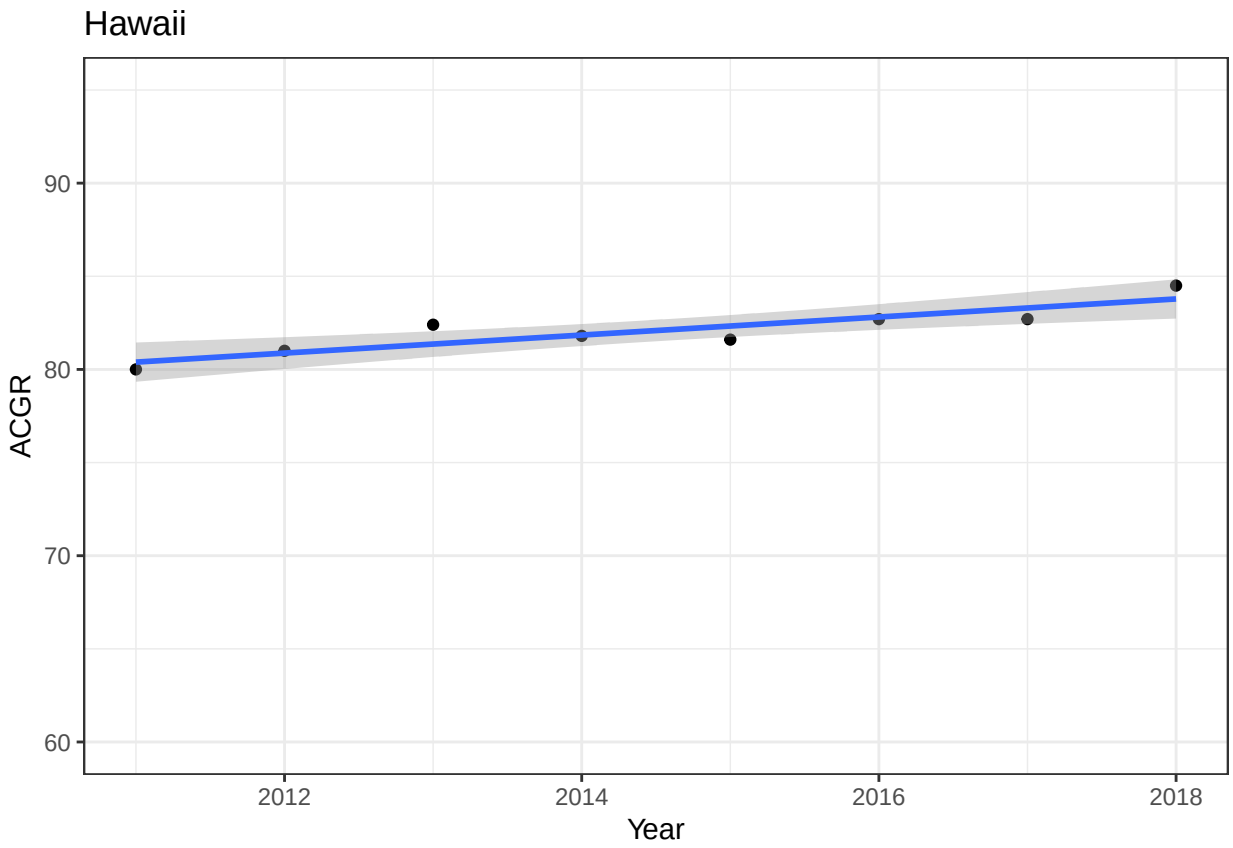

```
##
## $Florida
## `geom_smooth()` using formula 'y ~ x'
## Warning: Removed 3 rows containing non-finite values (stat_smooth).
## Warning: Removed 3 rows containing missing values (geom_point).
```




```
##
## $Georgia
## `geom_smooth()` using formula 'y ~ x'
## Warning: Removed 1 rows containing non-finite values (stat_smooth).
## Warning: Removed 1 rows containing missing values (geom_point).
```

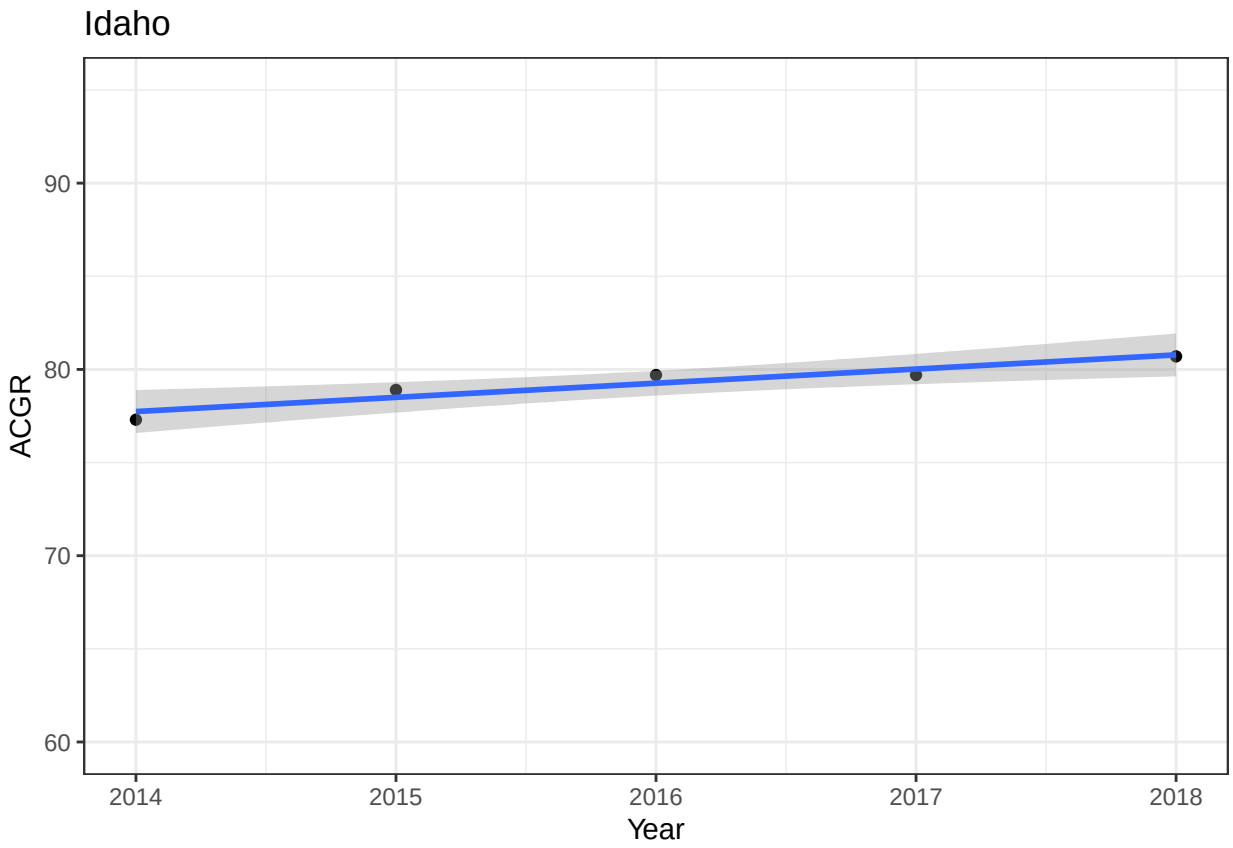



```
##
## $Hawaii

## `geom_smooth()` using formula 'y ~ x'
```



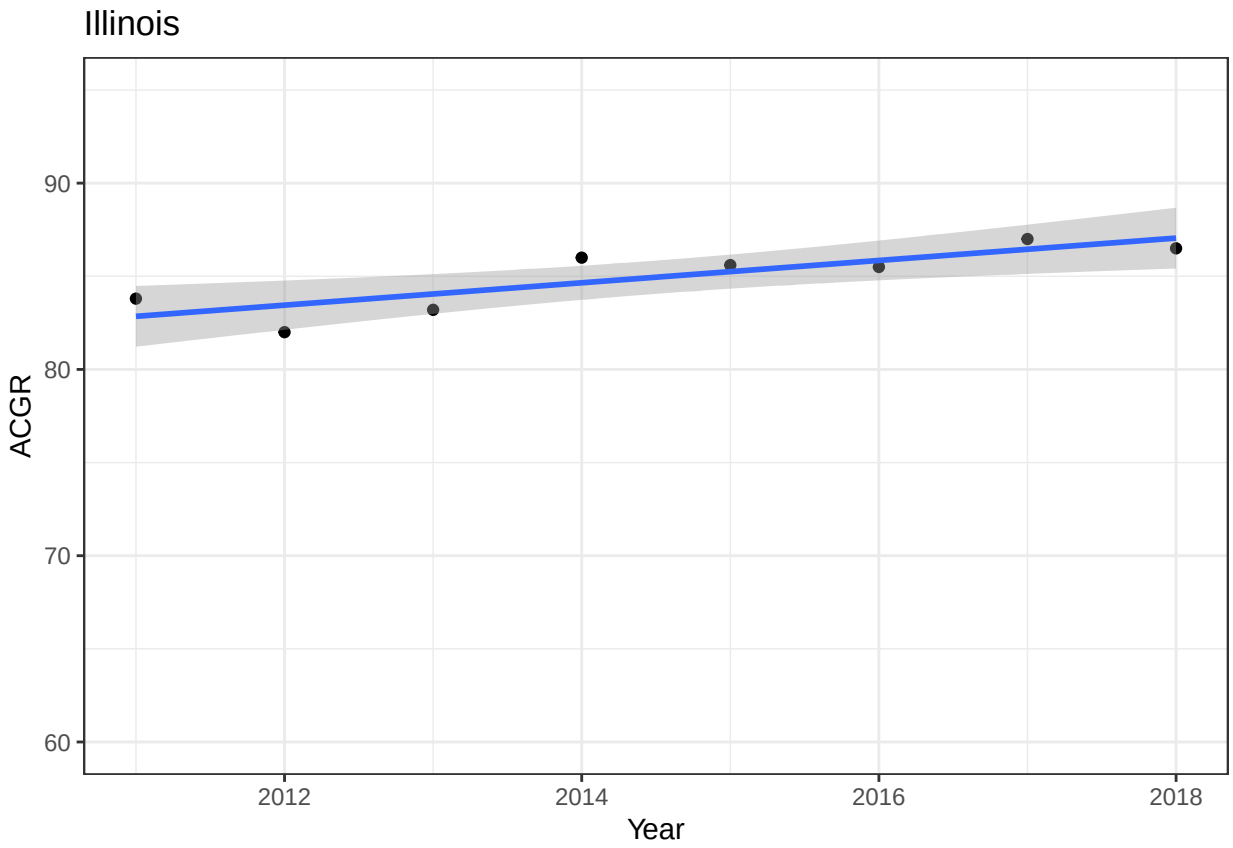

```
##
## $Idaho
```

```
## `geom_smooth()` using formula 'y ~ x'
```



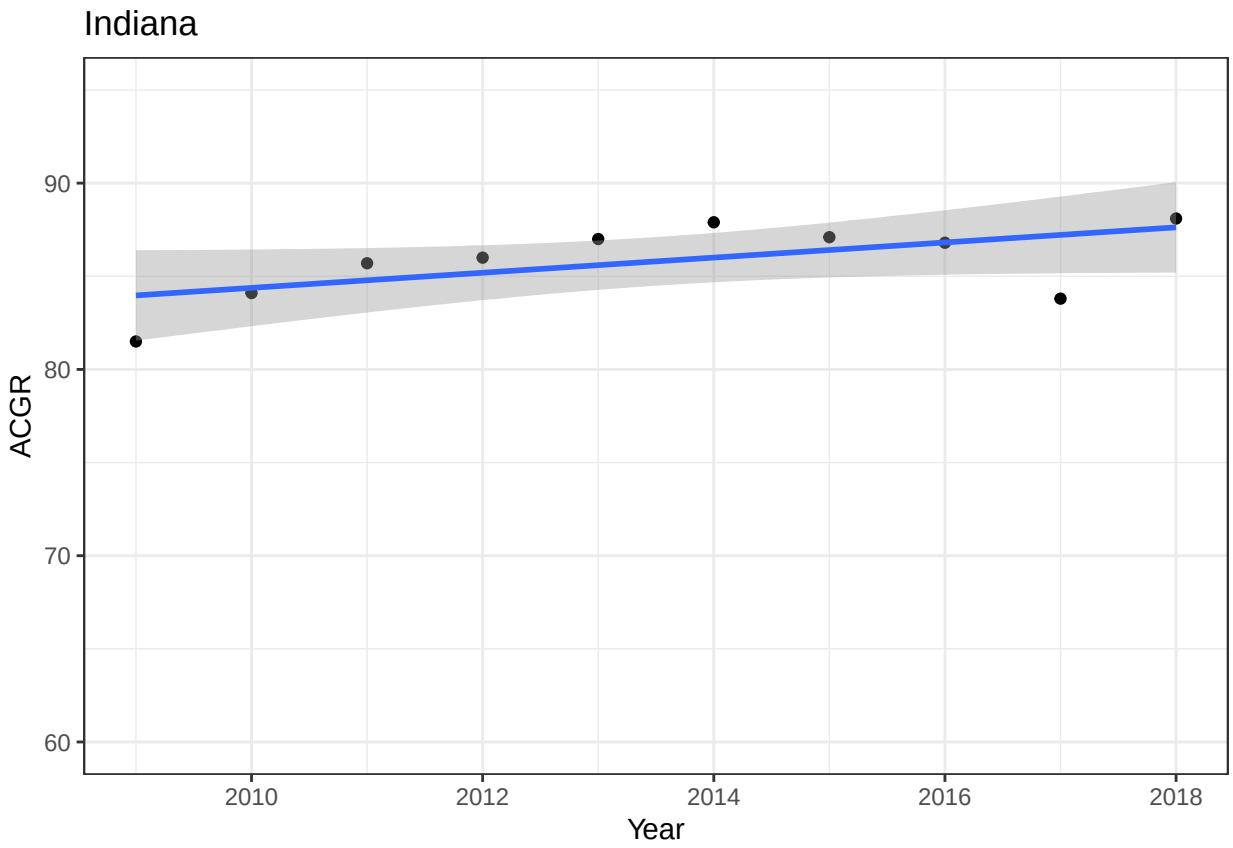

```
##
## $Illinois
```

```
## `geom_smooth()` using formula 'y ~ x'
```



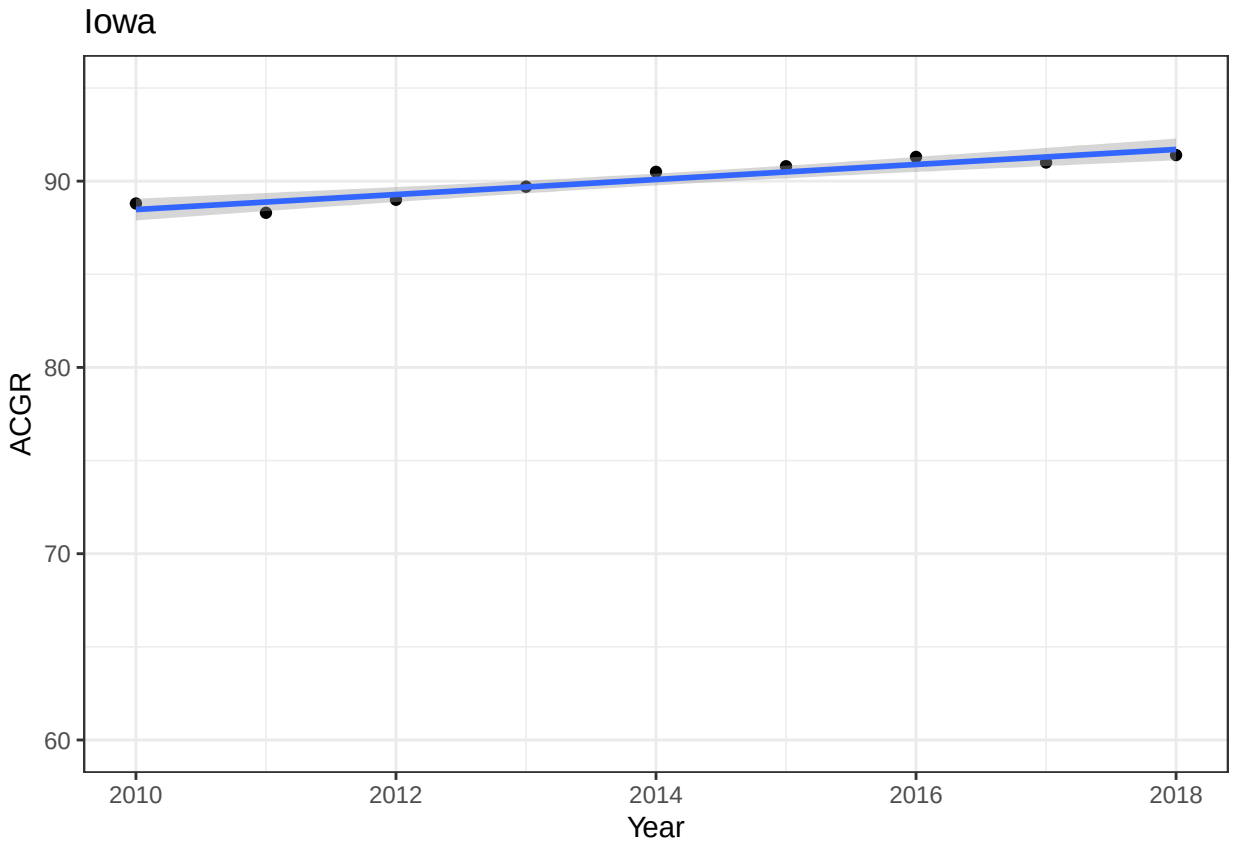

```
##
## $Indiana
```

```
## `geom_smooth()` using formula 'y ~ x'
```

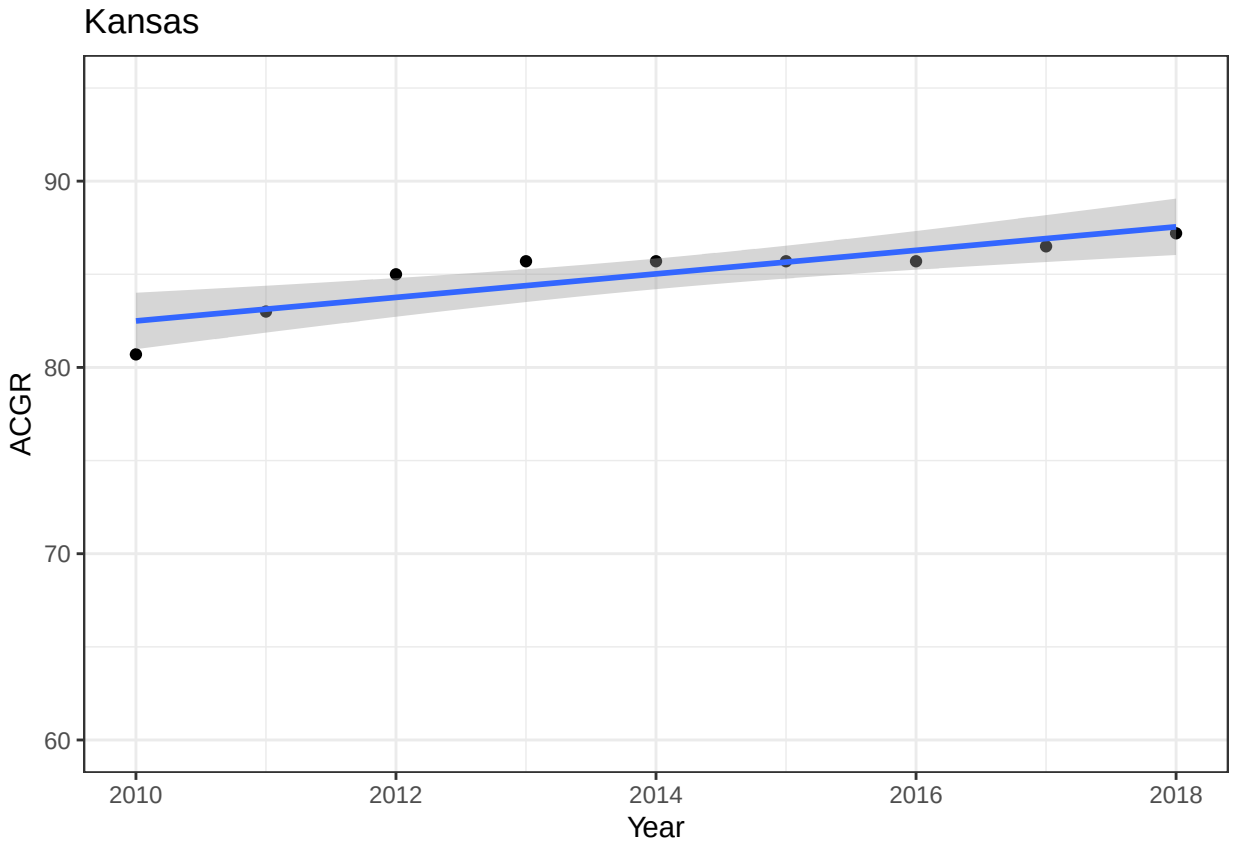



```
##
## $Iowa
```

```
## `geom_smooth()` using formula 'y ~ x'
```

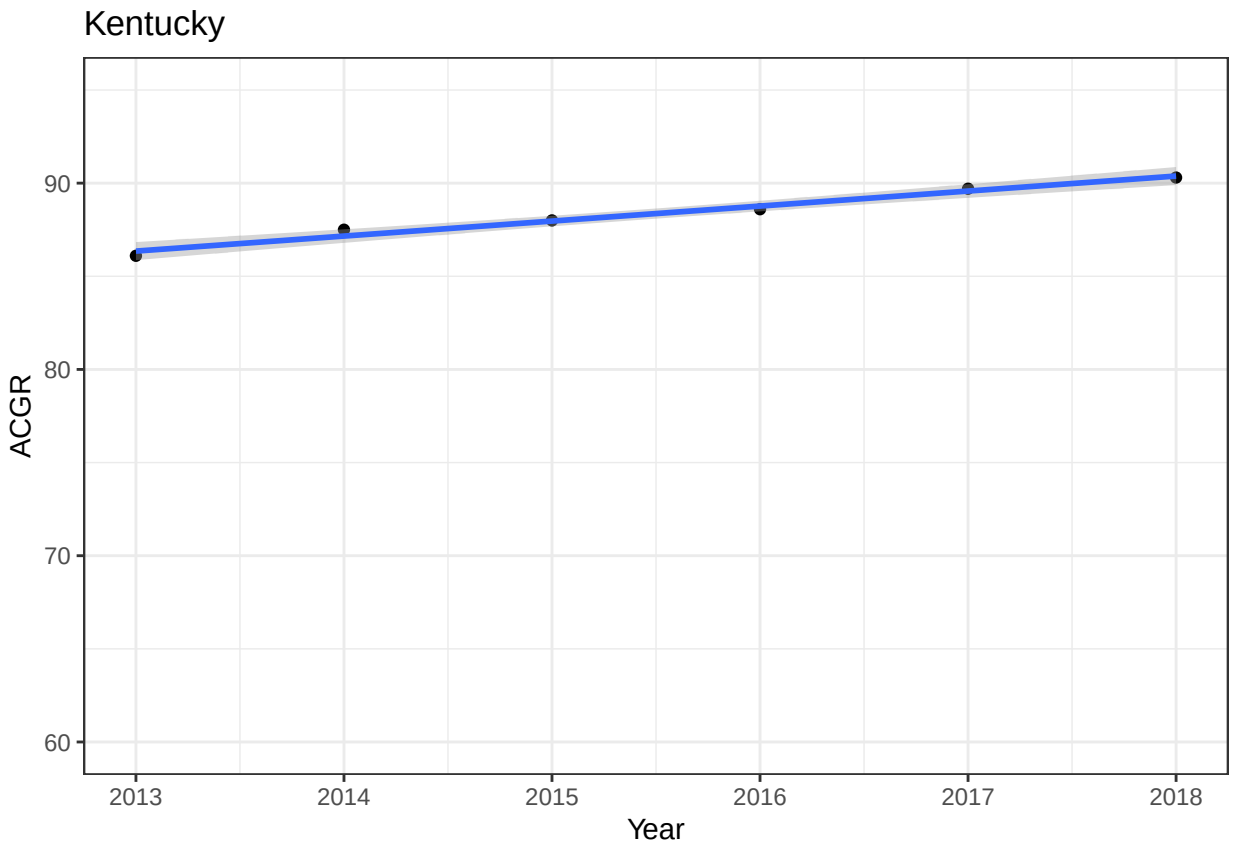



```
##
## $Kansas

## `geom_smooth()` using formula 'y ~ x'
```



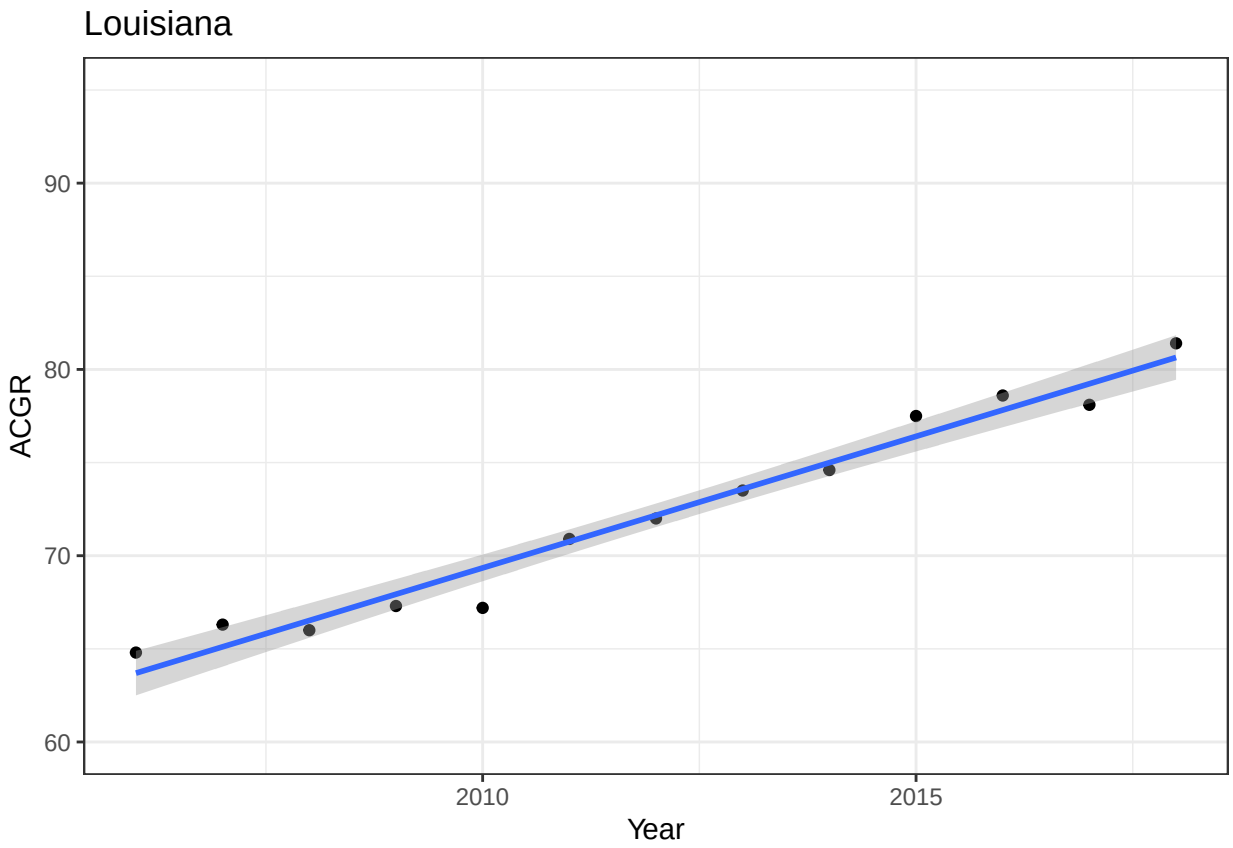

```
##
## $Kentucky
```

```
## `geom_smooth()` using formula 'y ~ x'
```



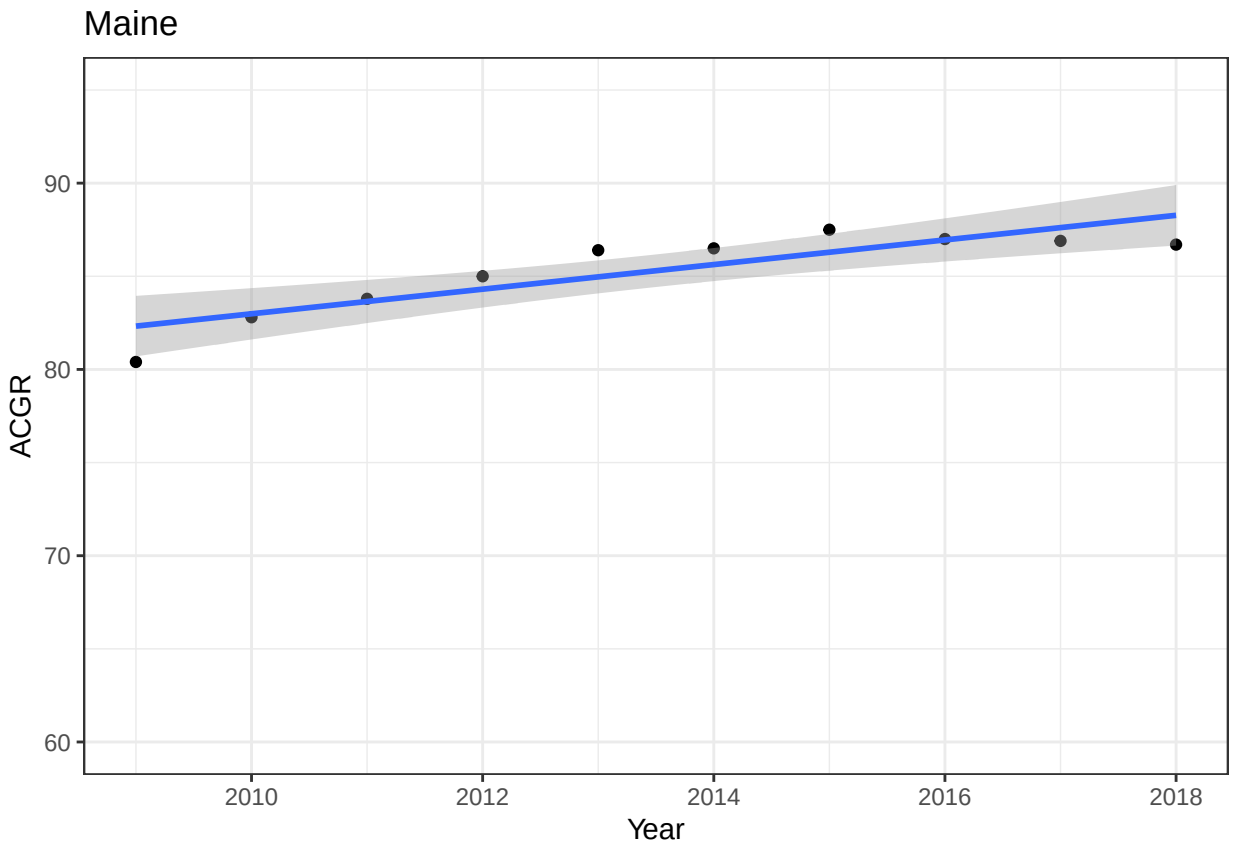

```
##
## $Louisiana
```

```
## `geom_smooth()` using formula 'y ~ x'
```



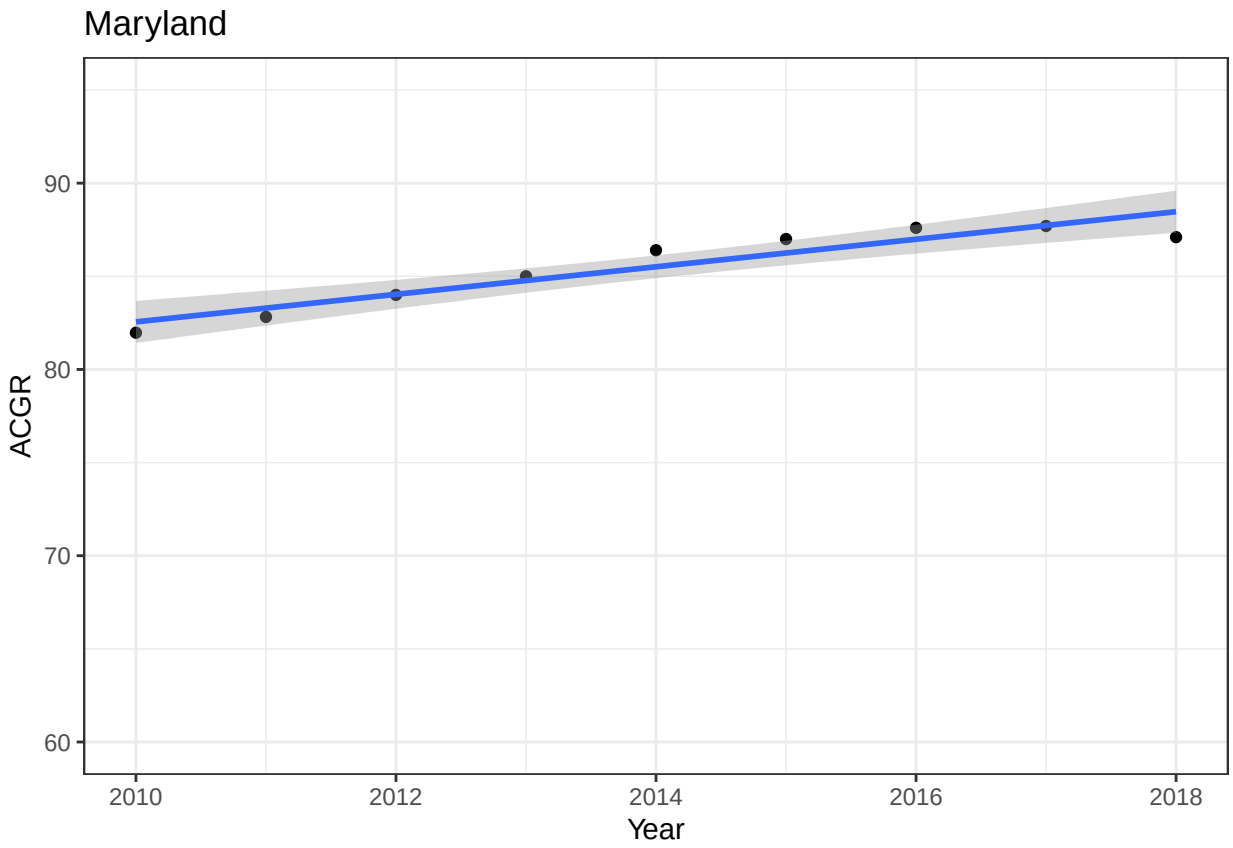

```
##
## $Maine
```

```
## `geom_smooth()` using formula 'y ~ x'
```

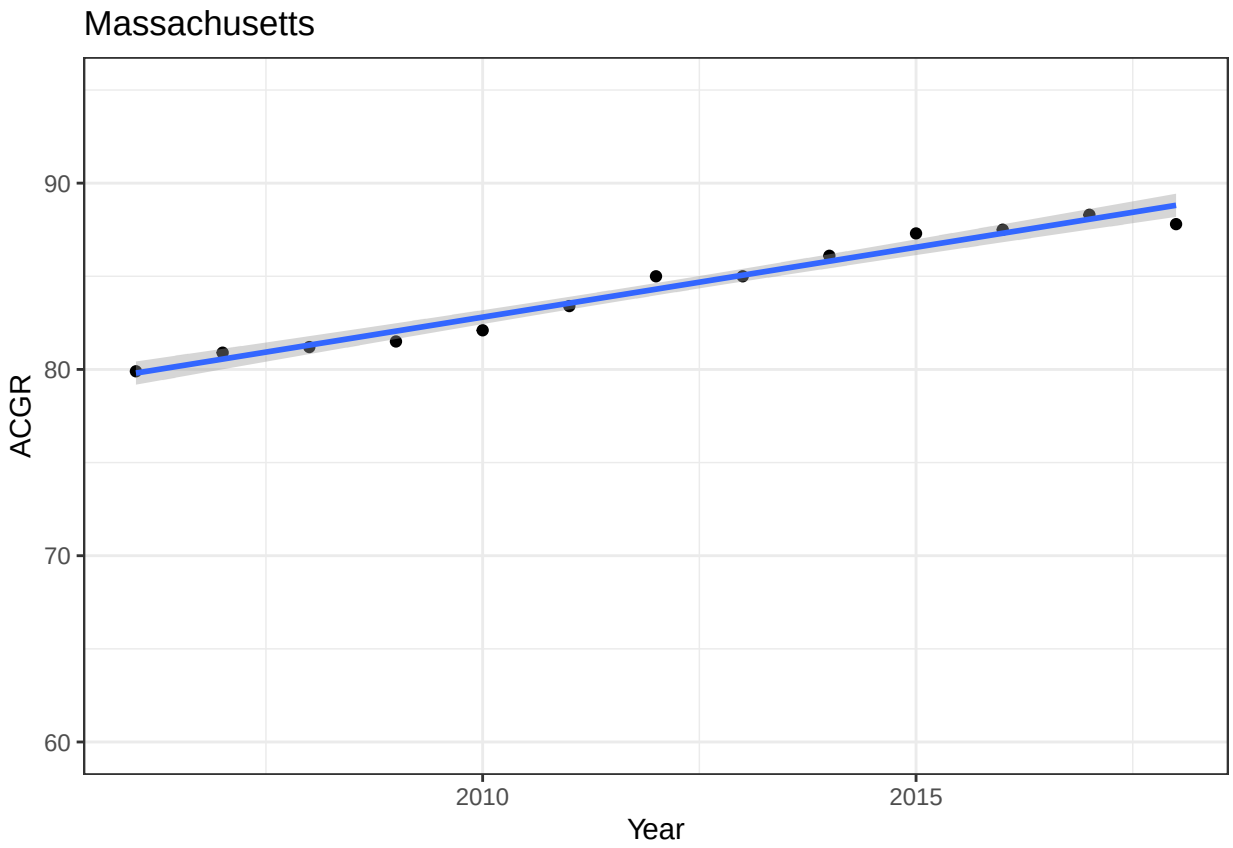



```
##
## $Maryland
```

```
## `geom_smooth()` using formula 'y ~ x'
```

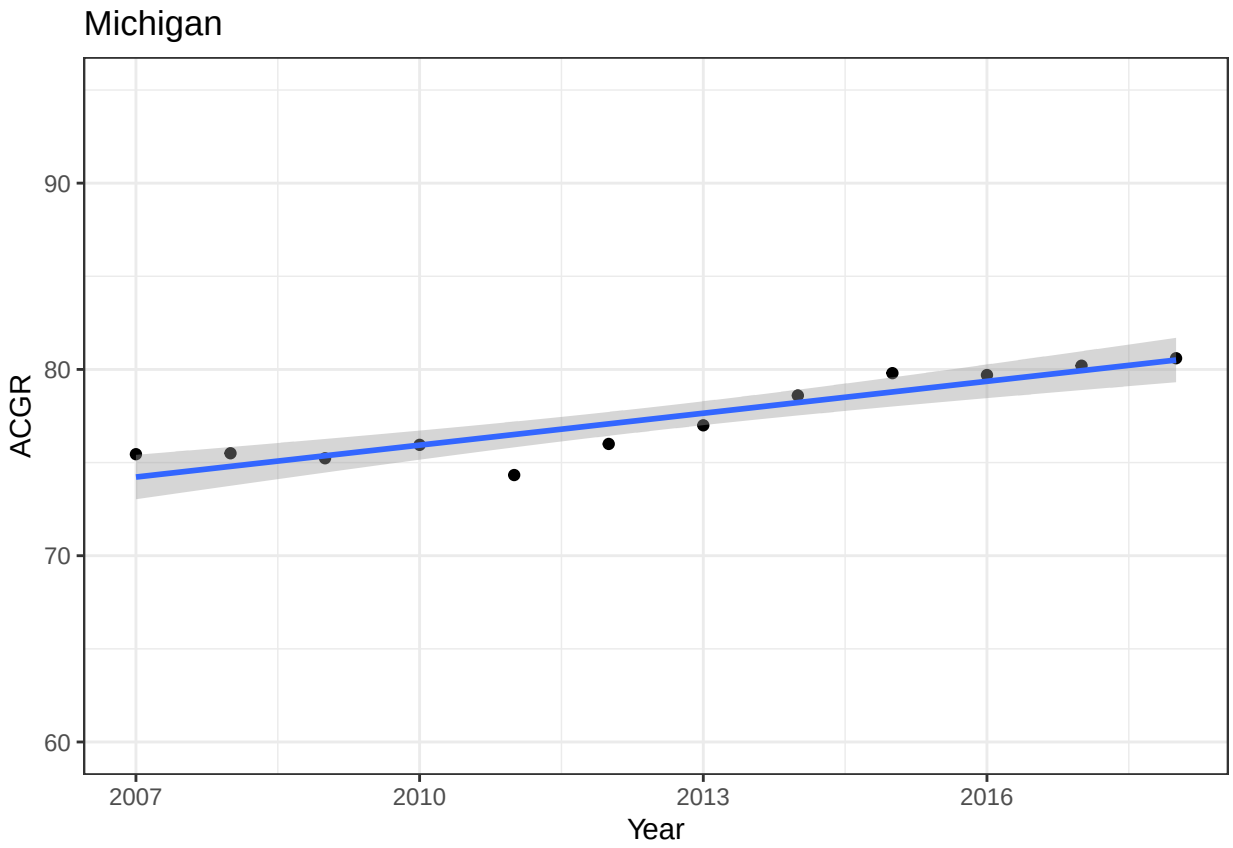



```
##
## $Massachusetts

## `geom_smooth()` using formula 'y ~ x'
```



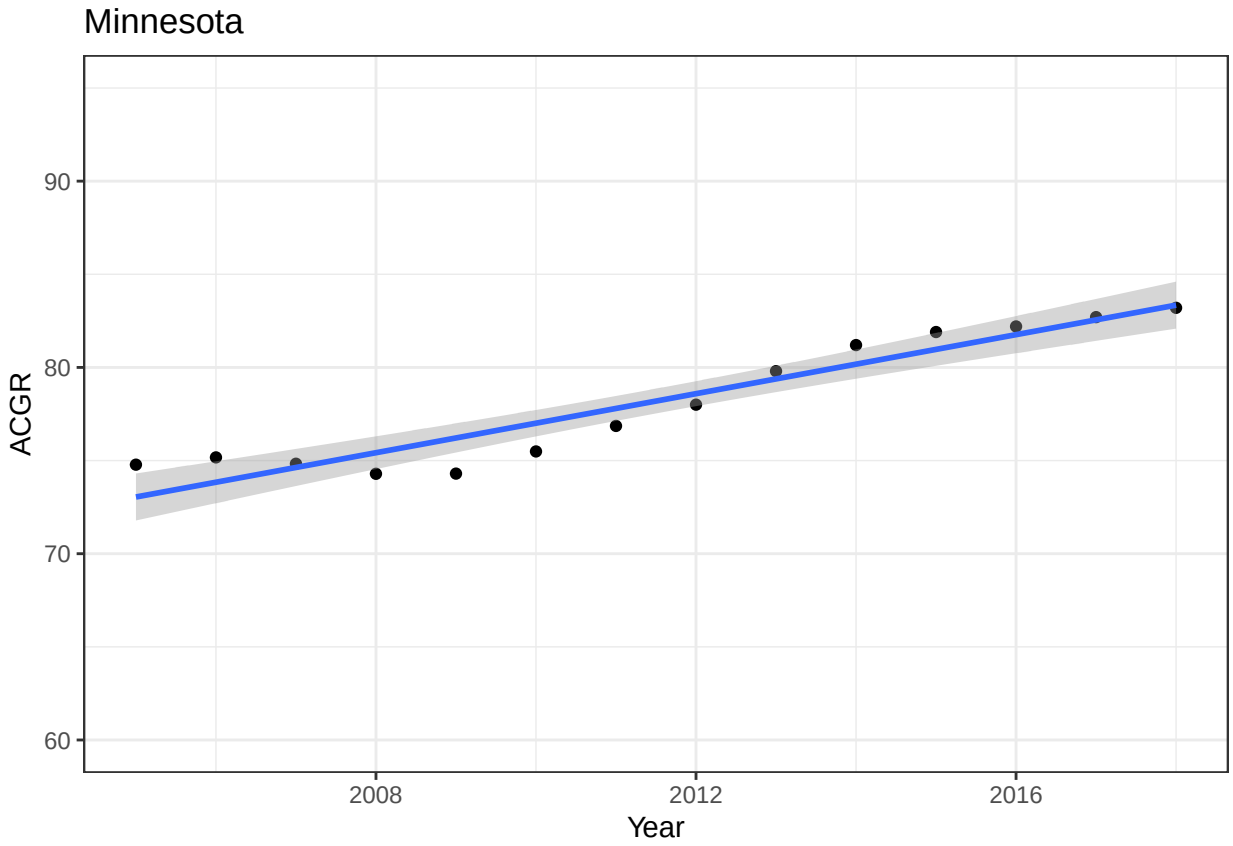

```
##
## $Michigan
```

```
## `geom_smooth()` using formula 'y ~ x'
```



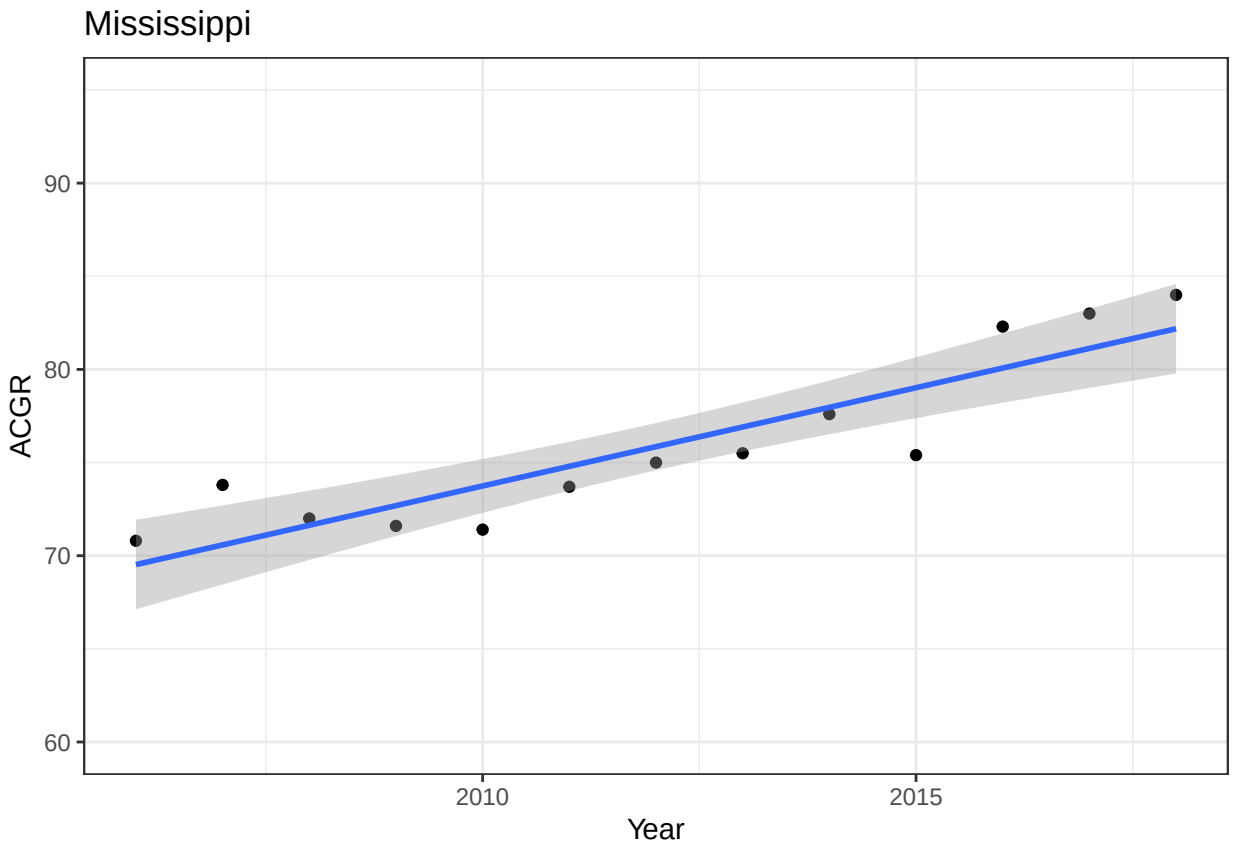

```
##
## $Minnesota
```

```
## `geom_smooth()` using formula 'y ~ x'
```



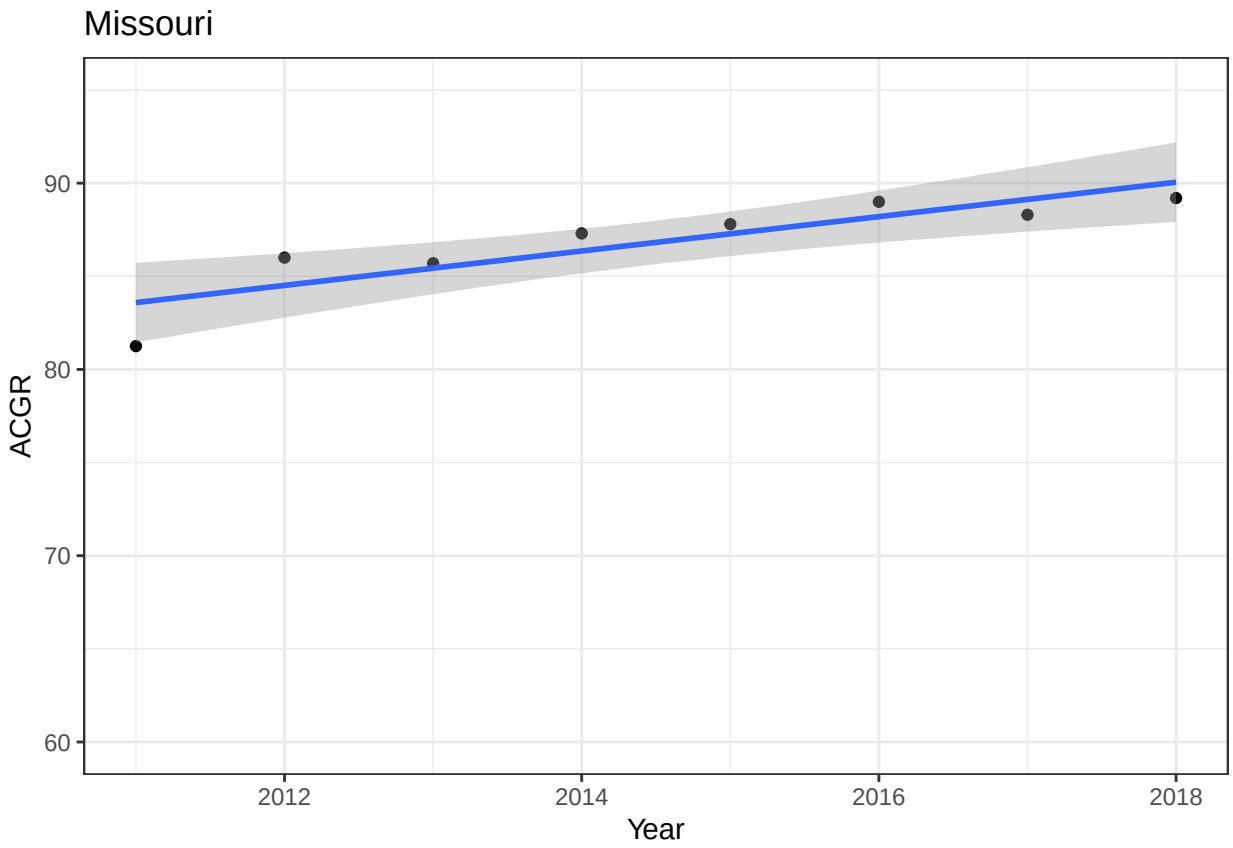

```
##
## $Mississippi
```

```
## `geom_smooth()` using formula 'y ~ x'
```



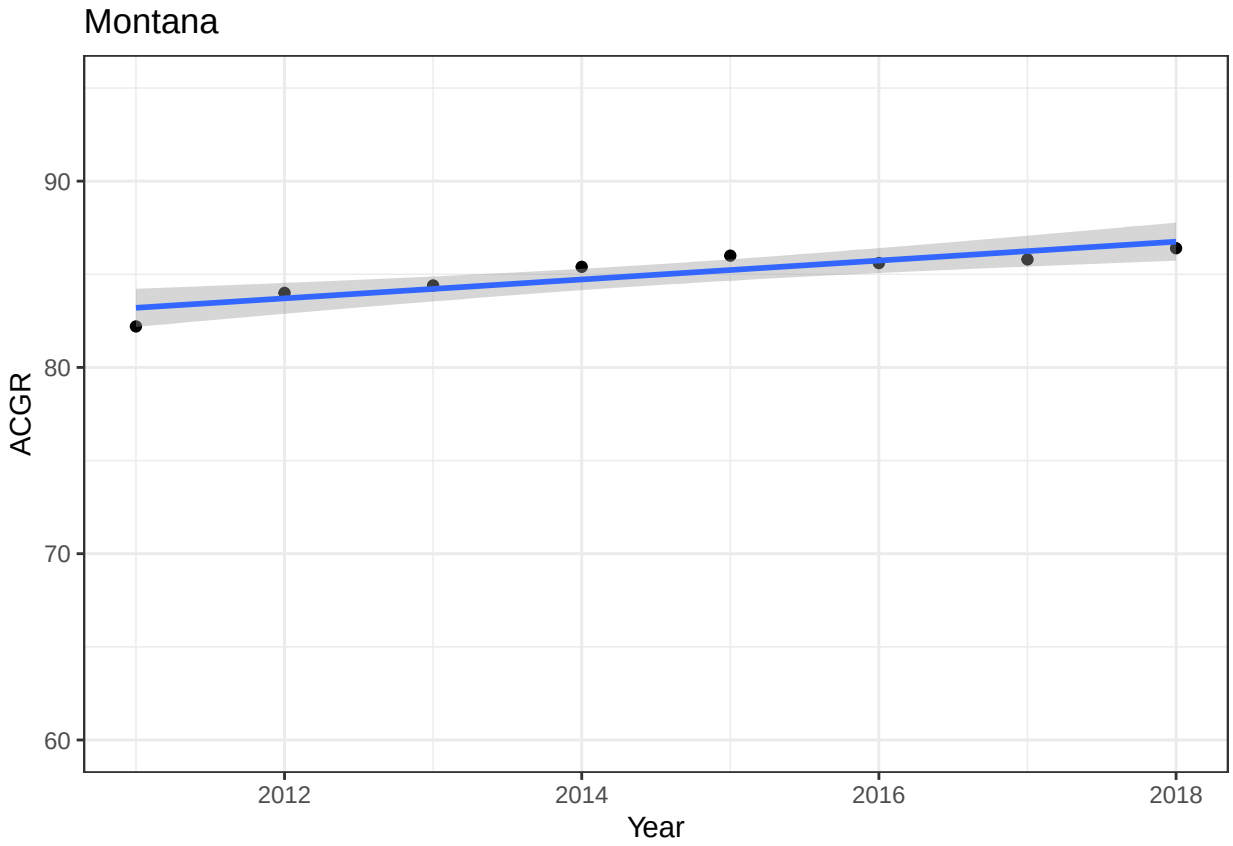

```
##
## $Missouri
```

```
## `geom_smooth()` using formula 'y ~ x'
```



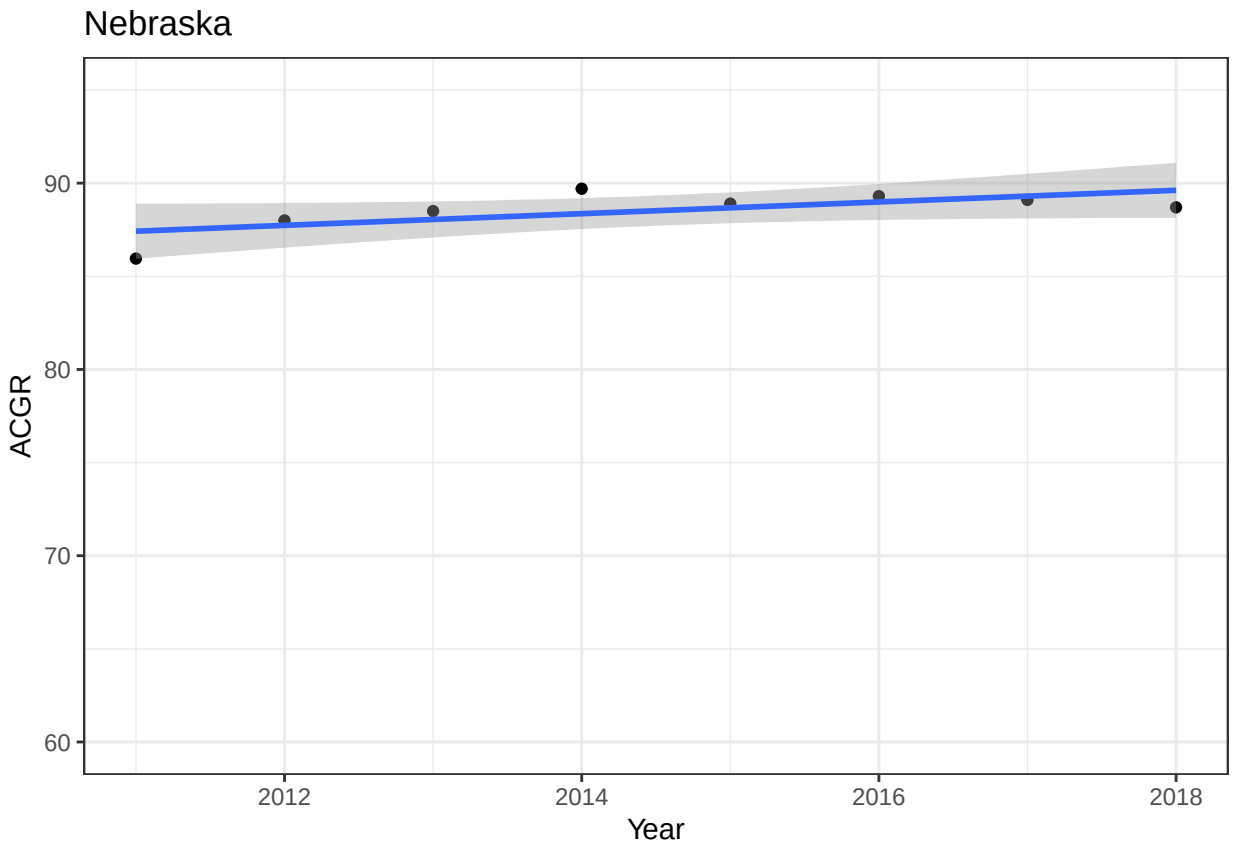

```
##
## $Montana
```

```
## `geom_smooth()` using formula 'y ~ x'
```



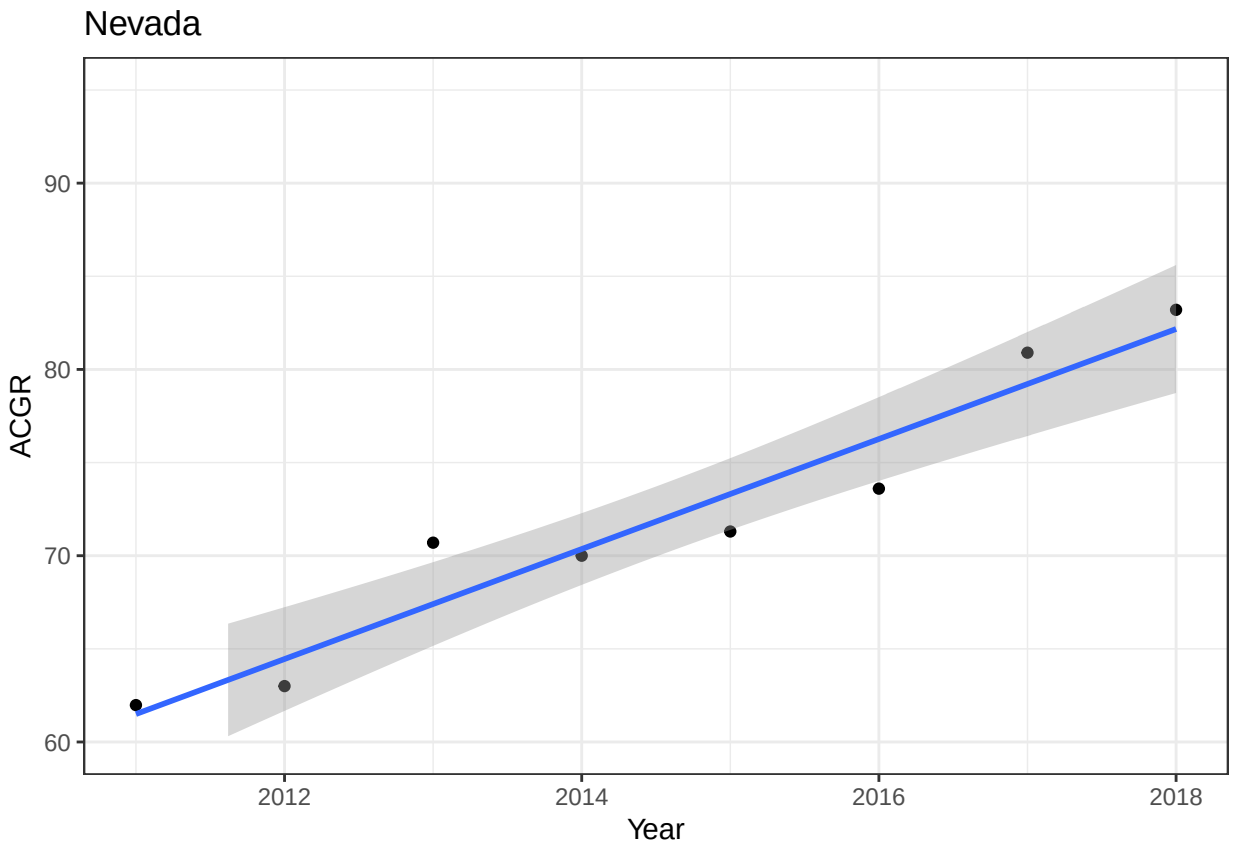

```
##
## $Nebraska
```

```
## `geom_smooth()` using formula 'y ~ x'
```



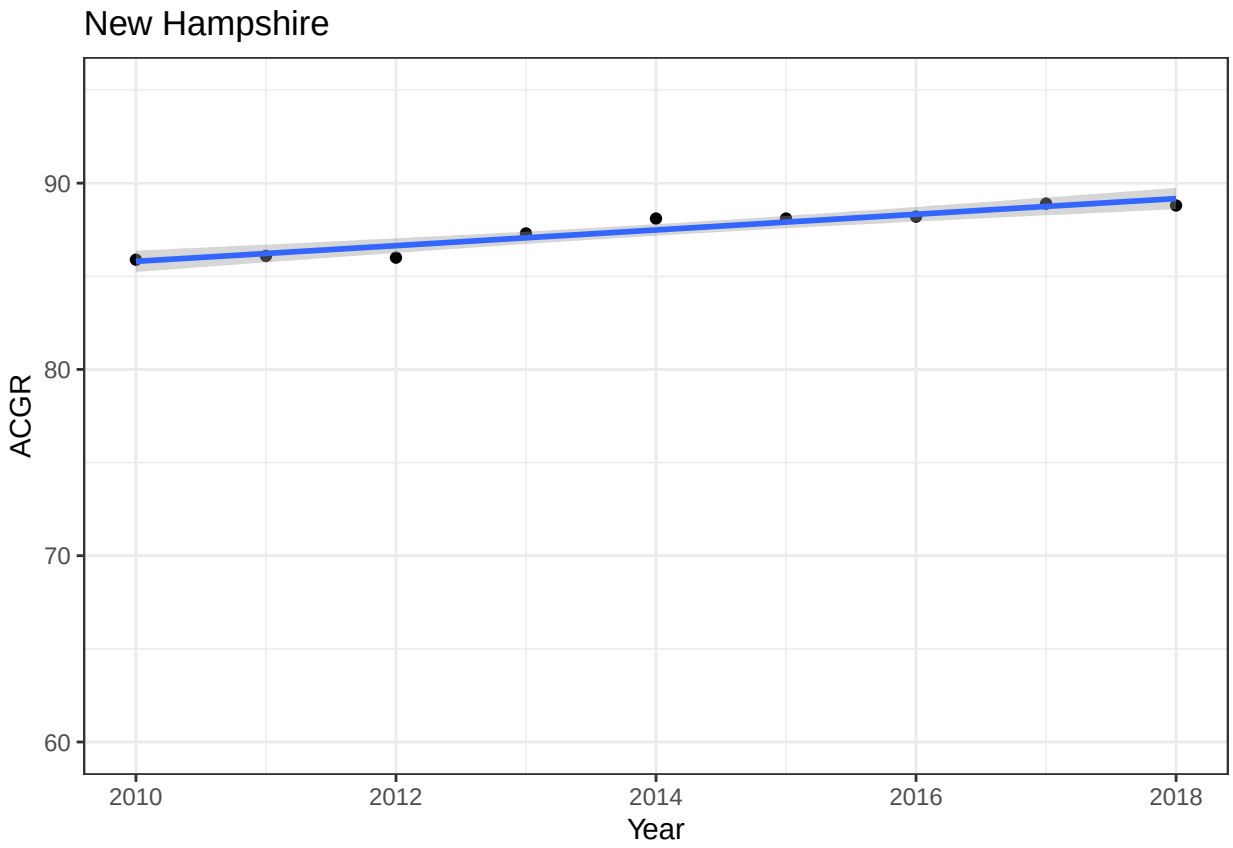

```
##
## $Nevada
```

```
## `geom_smooth()` using formula 'y ~ x'
```



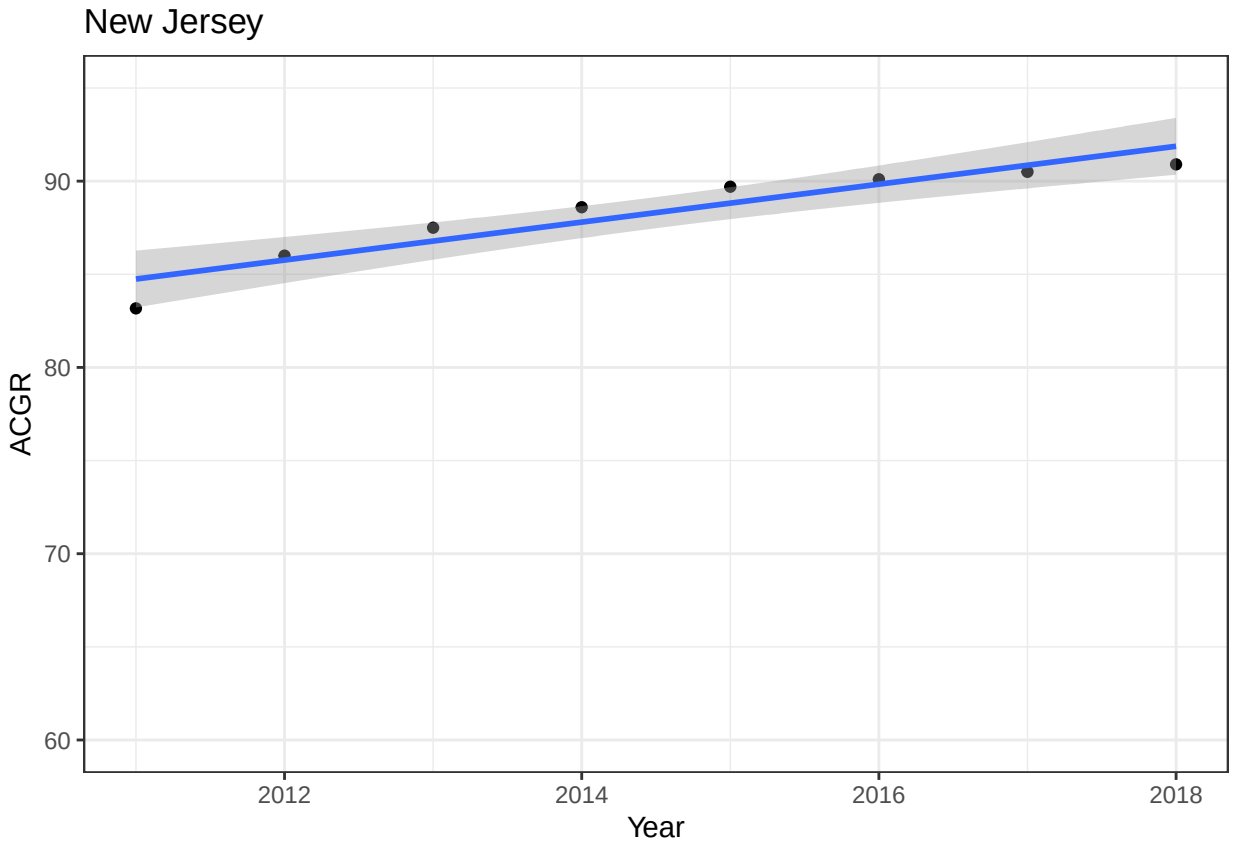

```
##
## $`New Hampshire`
```

```
## `geom_smooth()` using formula 'y ~ x'
```



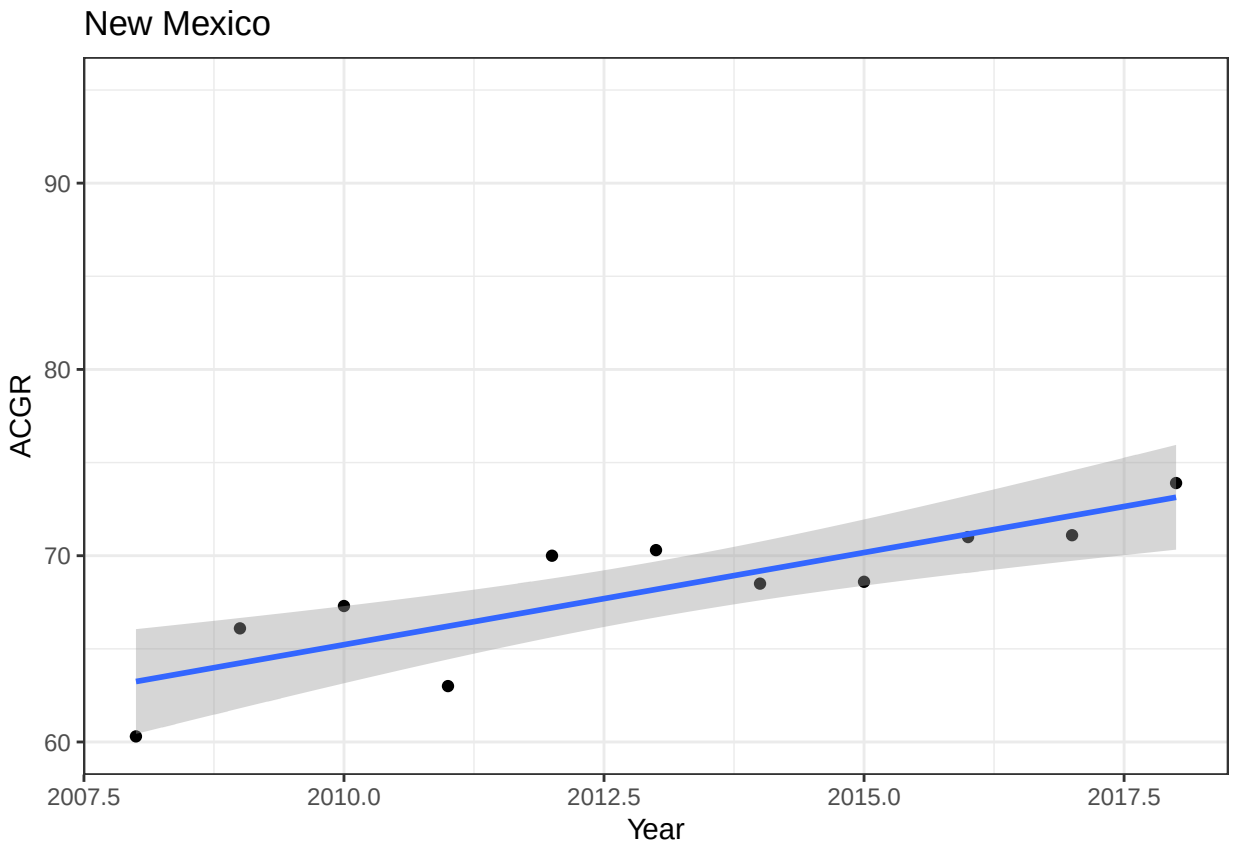

```
##
## $`New Jersey`
```

```
## `geom_smooth()` using formula 'y ~ x'
```



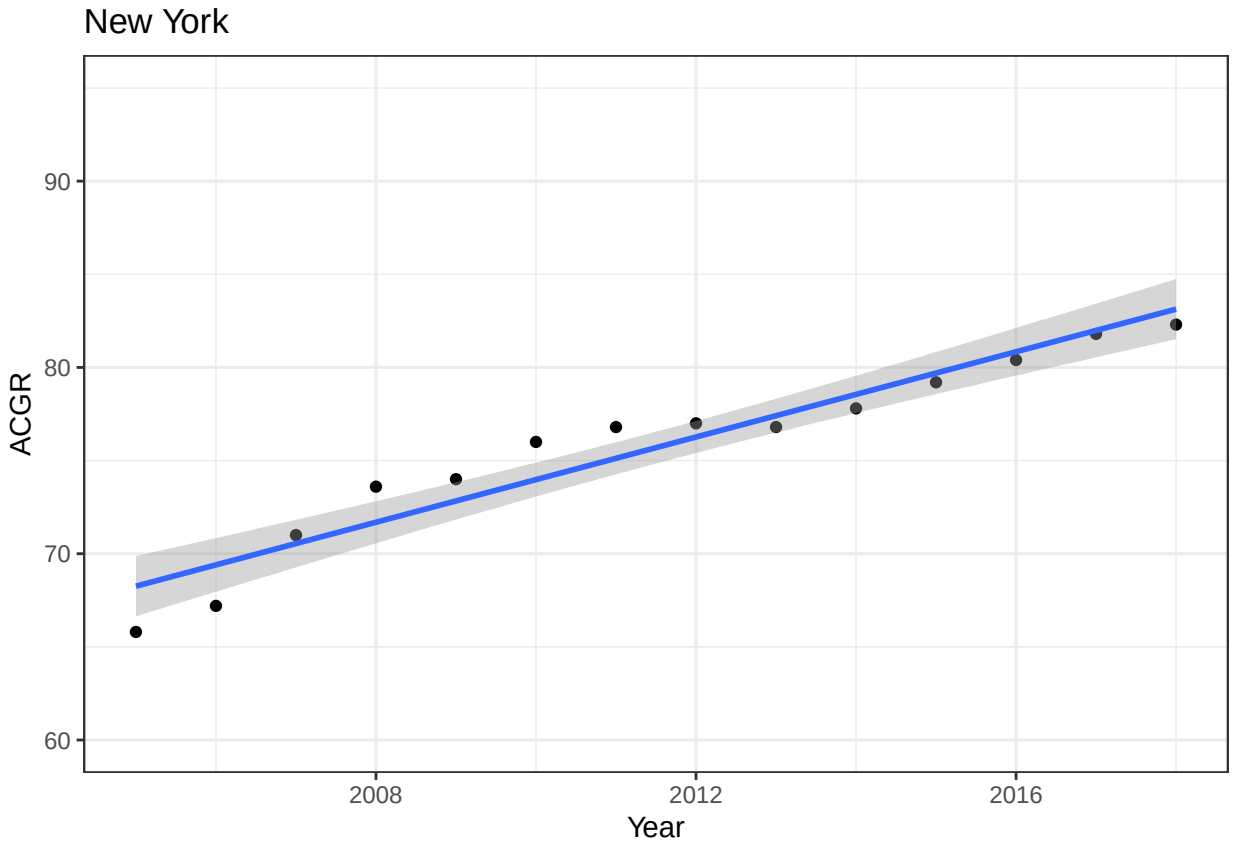

```
##
## $`New Mexico`
```

```
## `geom_smooth()` using formula 'y ~ x'
```



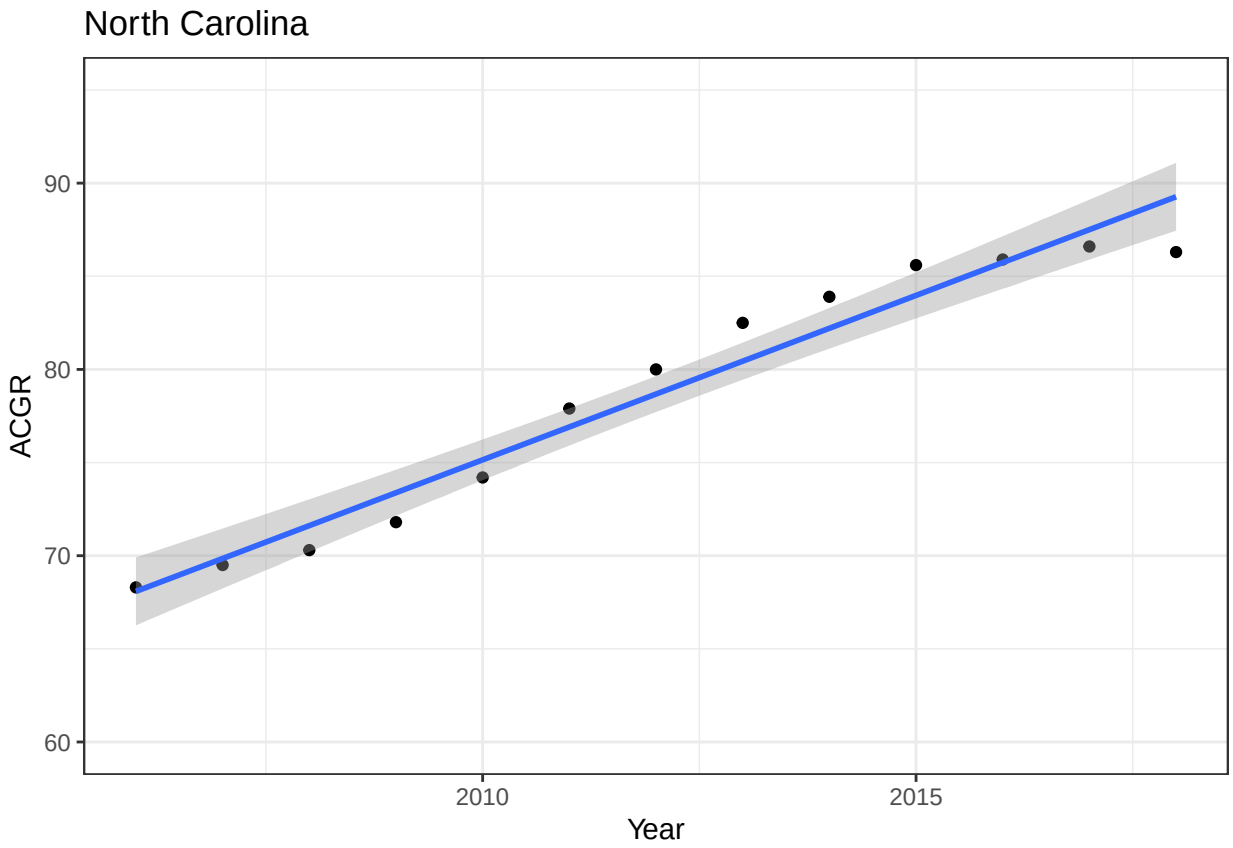

```
##
## $`New York`
```

```
## `geom_smooth()` using formula 'y ~ x'
```



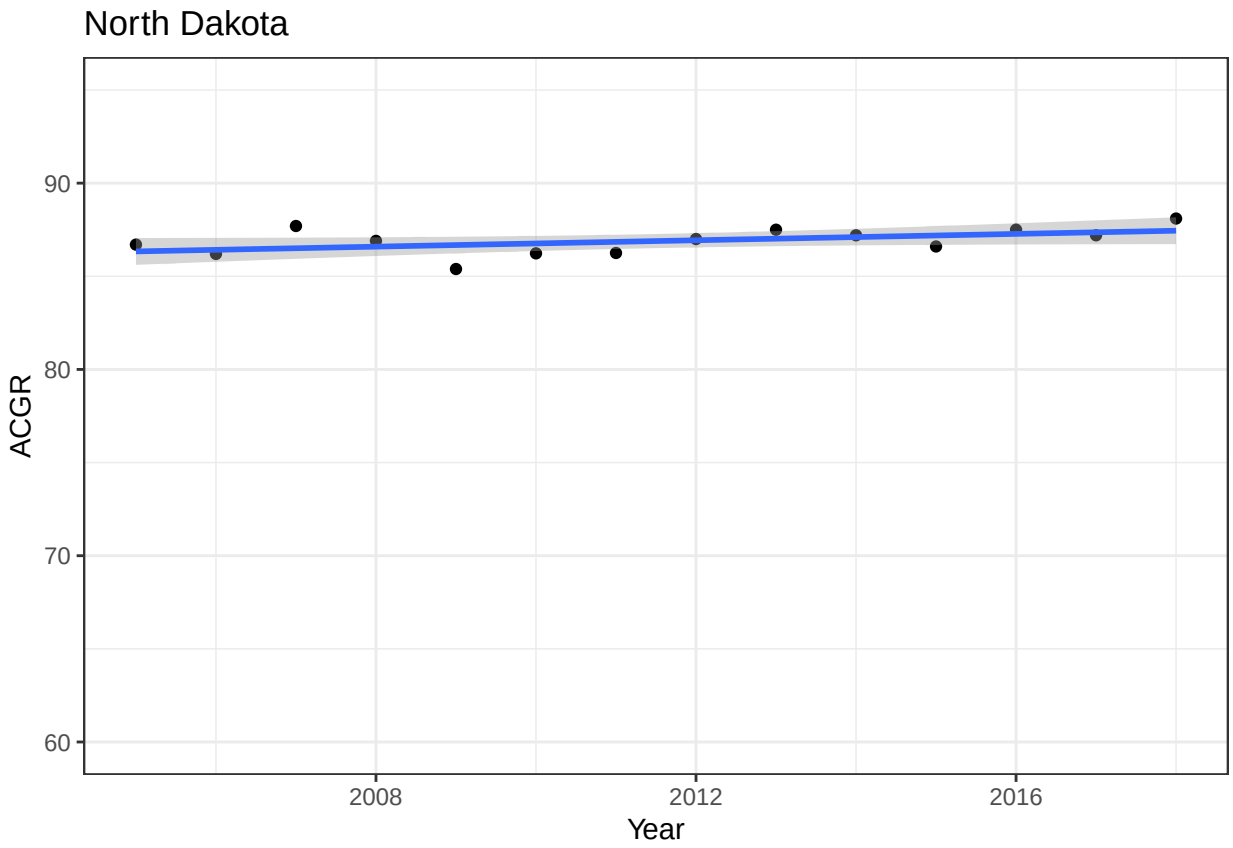

```
##
## $`North Carolina`
```

```
## `geom_smooth()` using formula 'y ~ x'
```



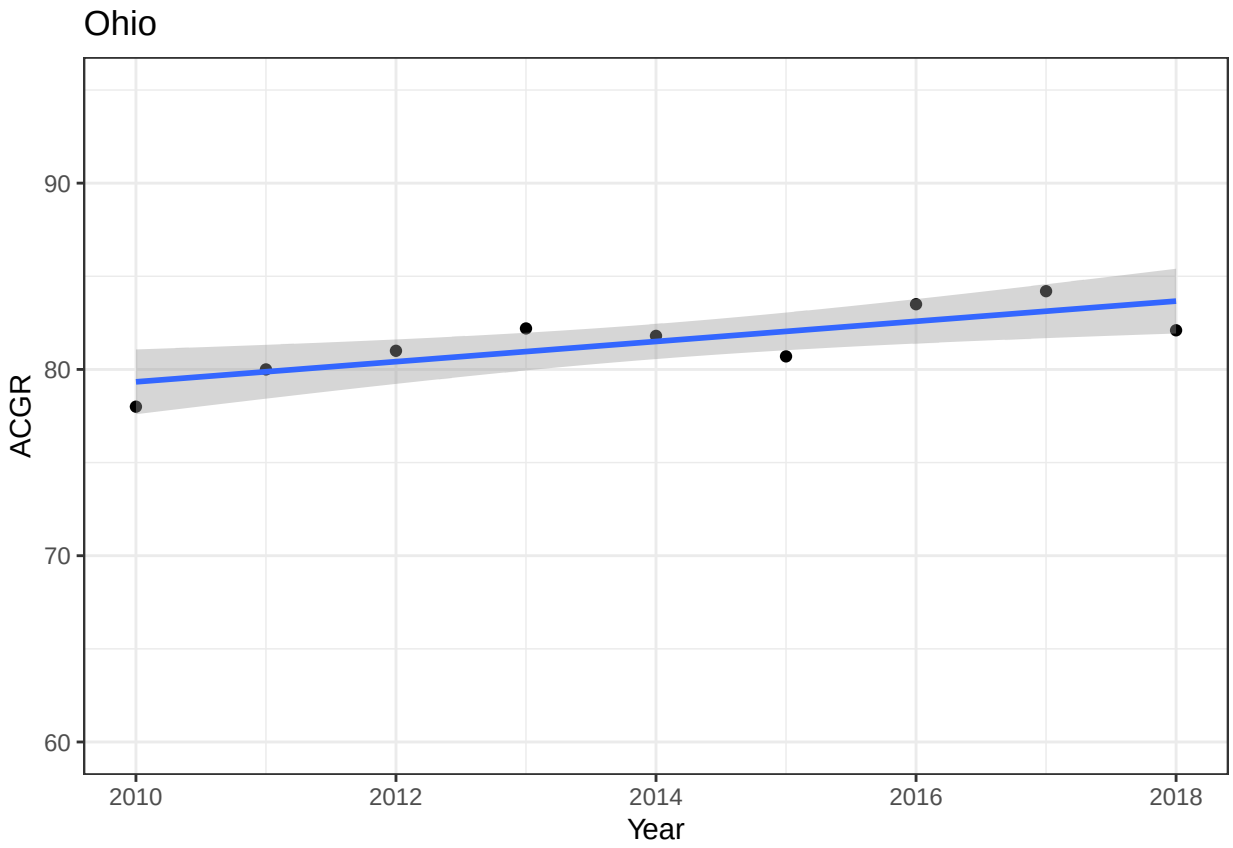

```
##
## $`North Dakota`
```

```
## `geom_smooth()` using formula 'y ~ x'
```



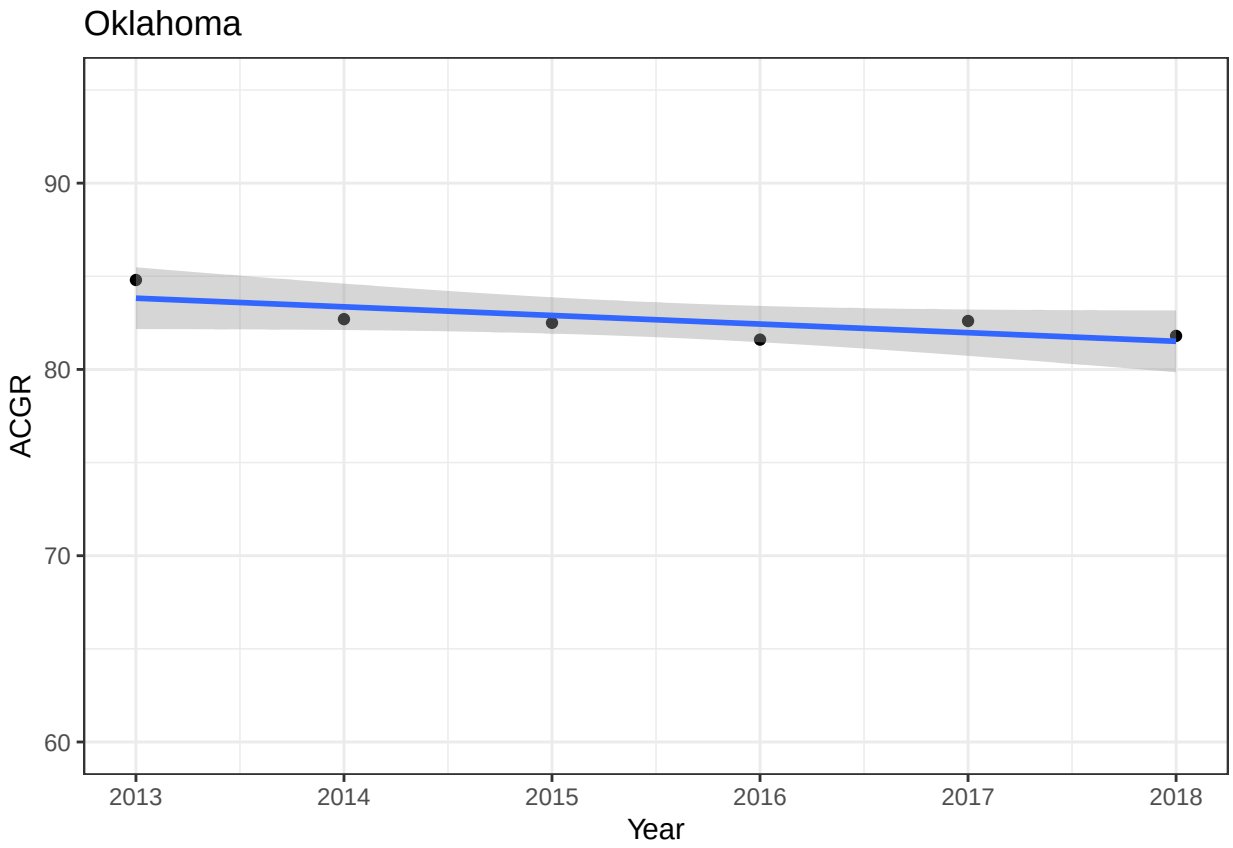

```
##
## $Ohio
```

```
## `geom_smooth()` using formula 'y ~ x'
```



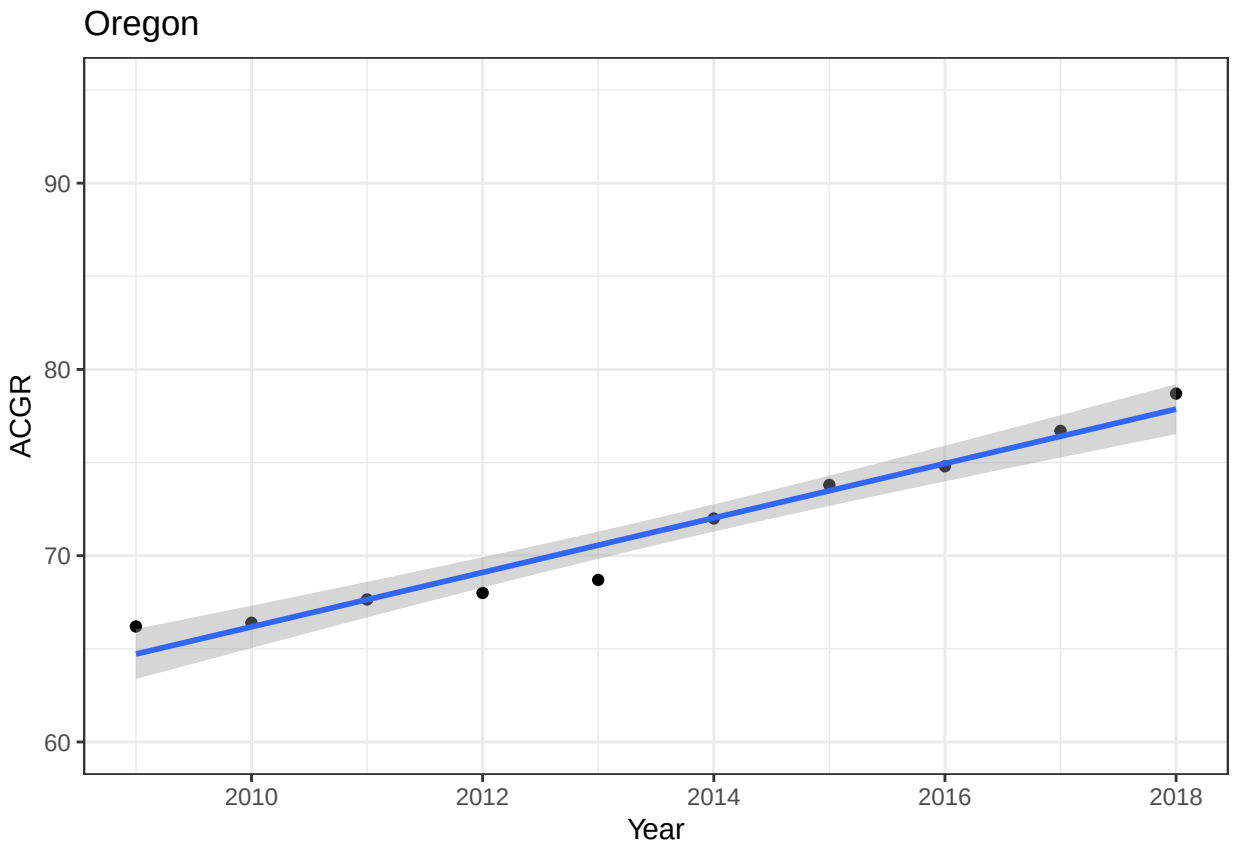

```
##
## $Oklahoma
```

```
## `geom_smooth()` using formula 'y ~ x'
```



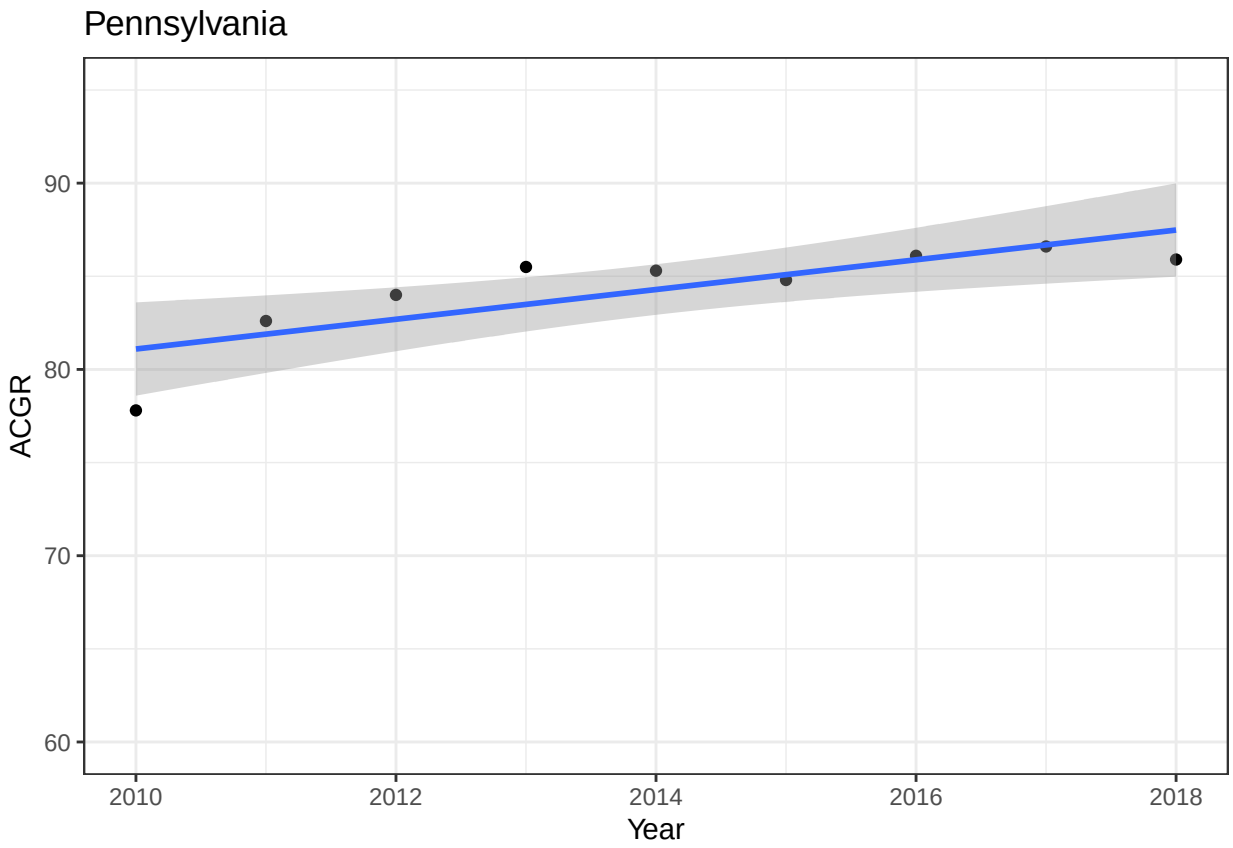

```
##
## $Oregon
```

```
## `geom_smooth()` using formula 'y ~ x'
```



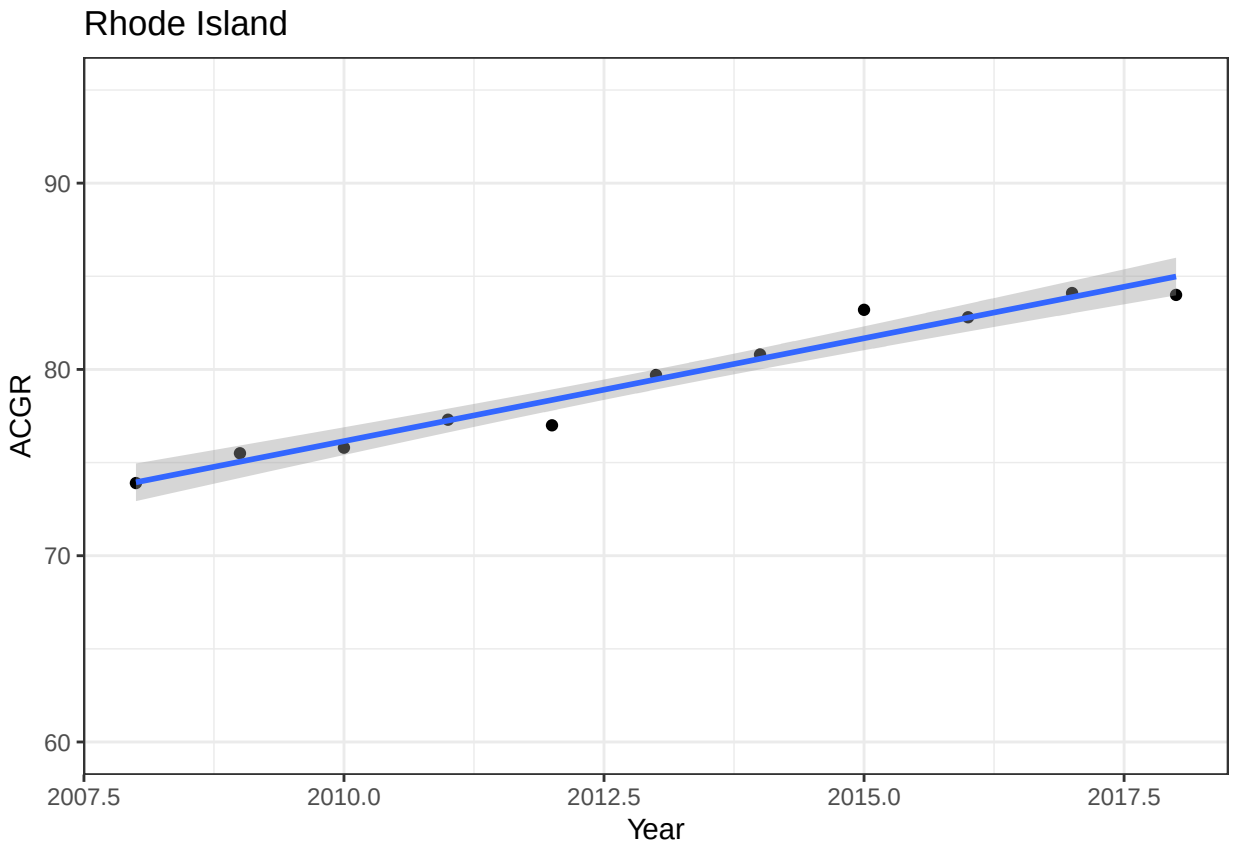

```
##
## $Pennsylvania
```

```
## `geom_smooth()` using formula 'y ~ x'
```



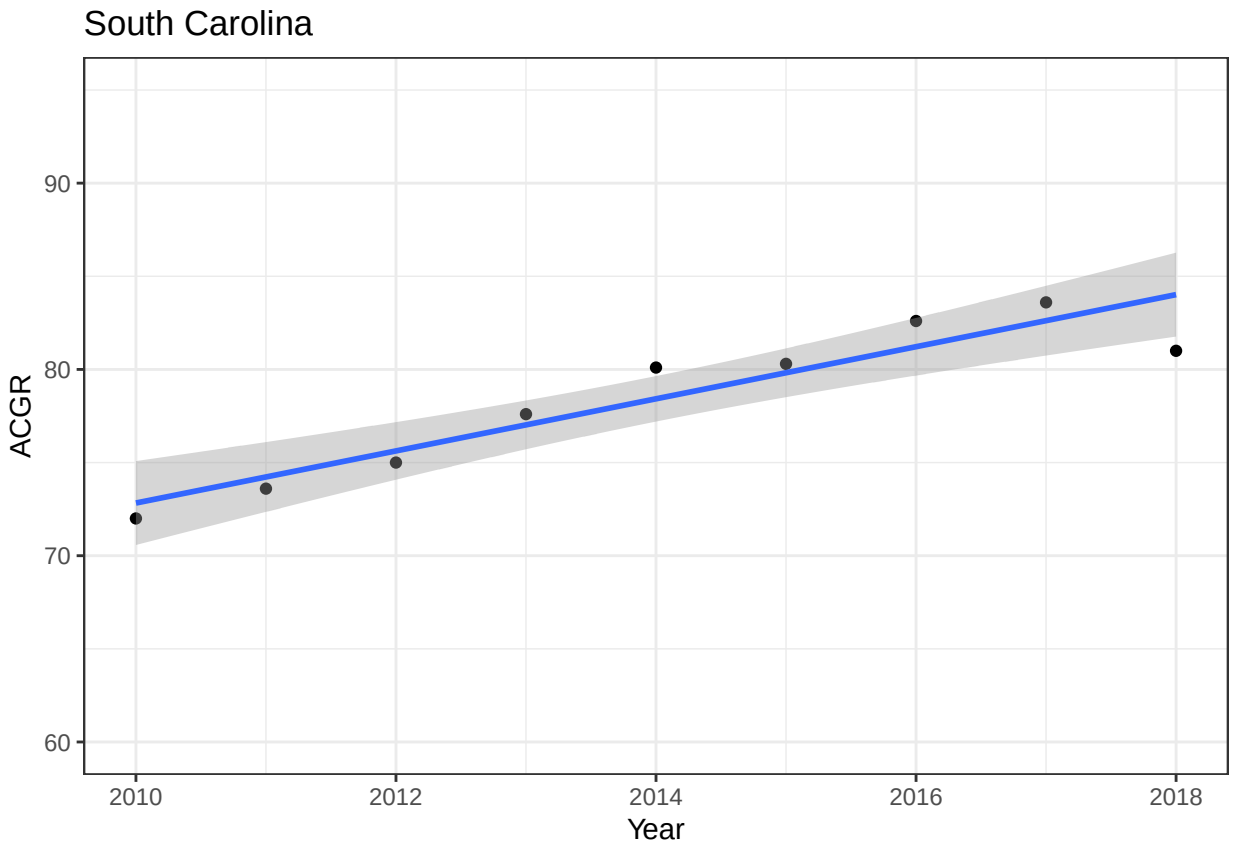

```
##
## $`Rhode Island`
```

```
## `geom_smooth()` using formula 'y ~ x'
```



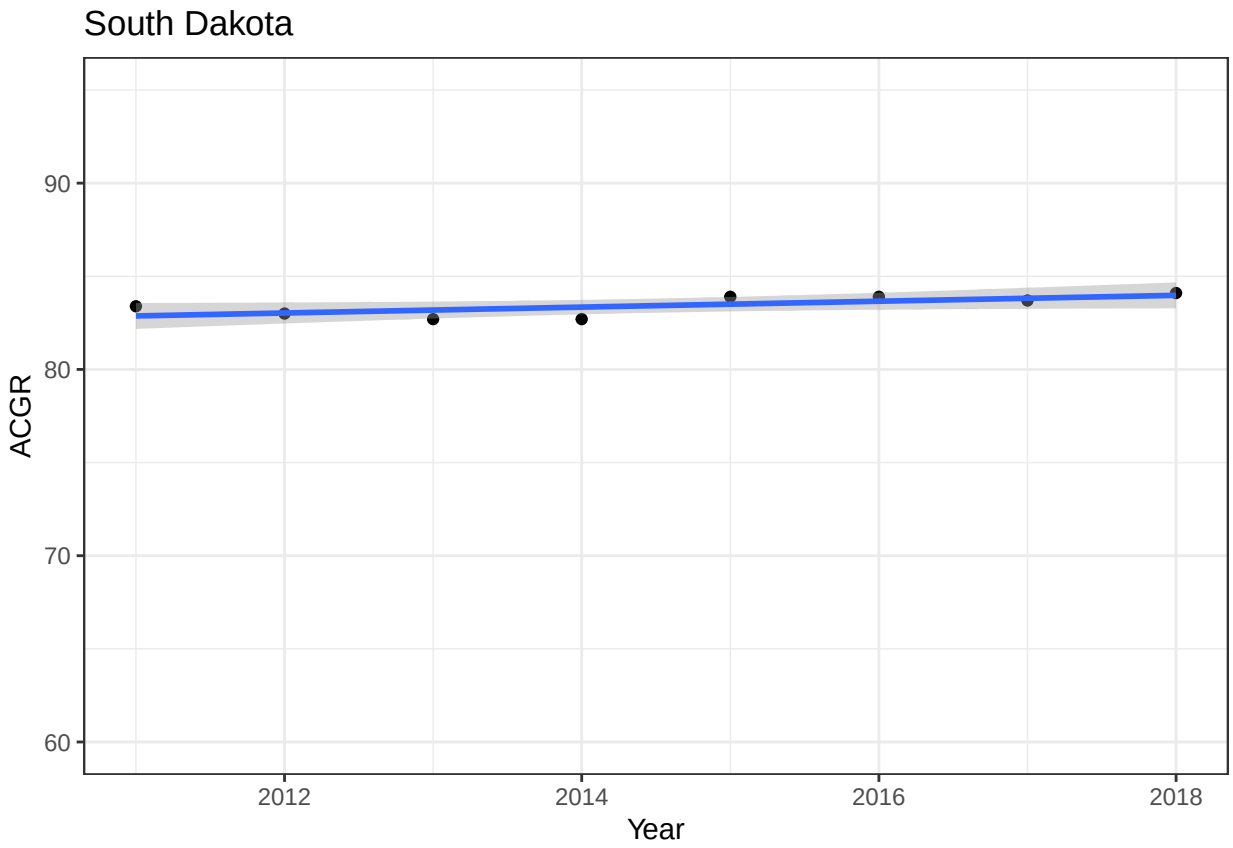

```
##
## $`South Carolina`
```

```
## `geom_smooth()` using formula 'y ~ x'
```



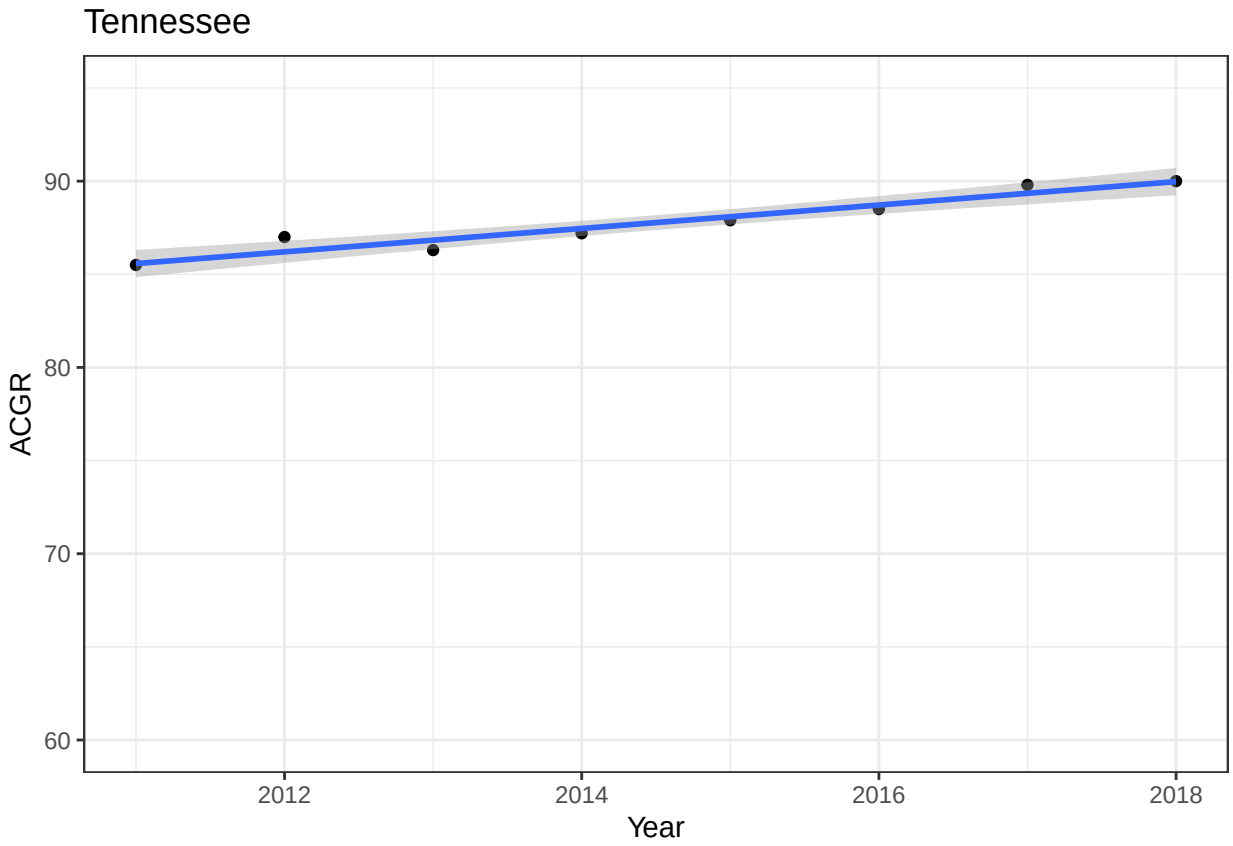

```
##
## $`South Dakota`
```

```
## `geom_smooth()` using formula 'y ~ x'
```



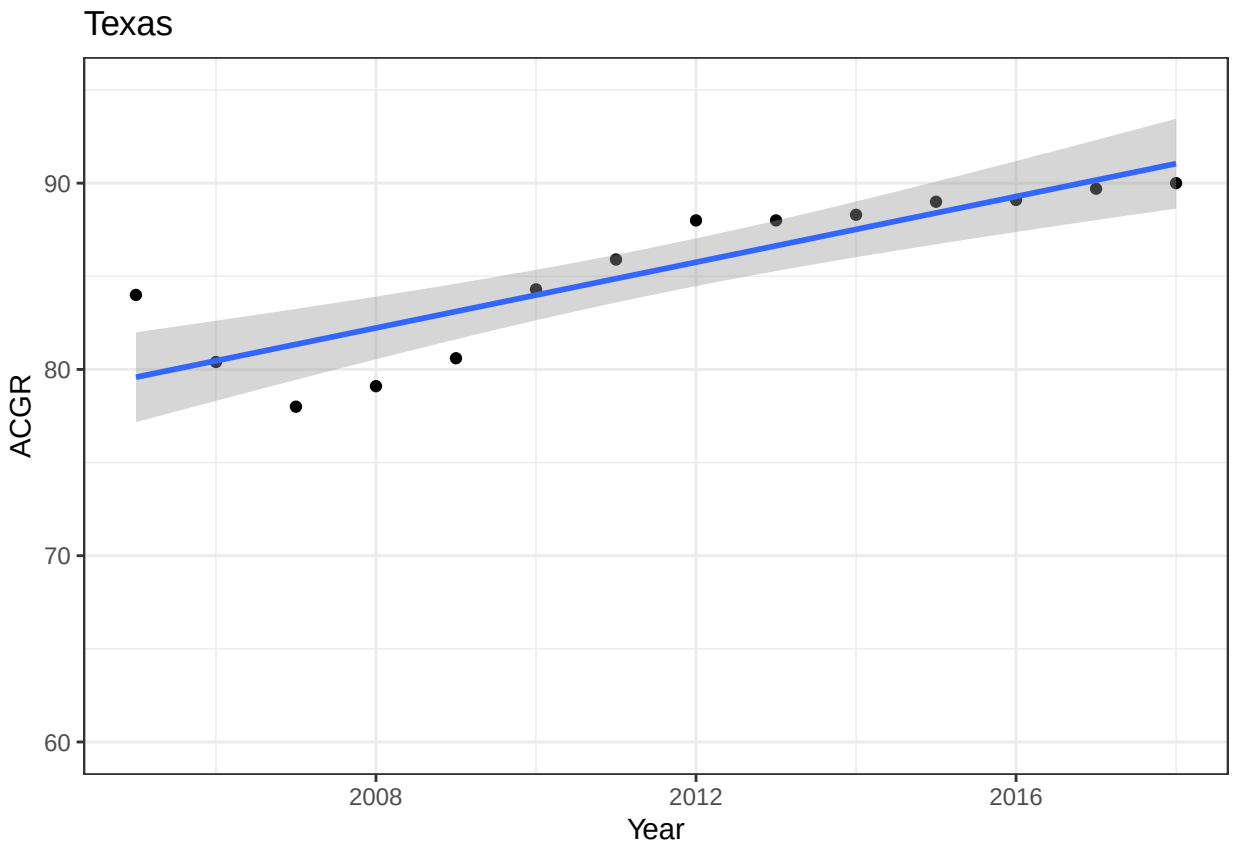

```
##
## $Tennessee
```

```
## `geom_smooth()` using formula 'y ~ x'
```



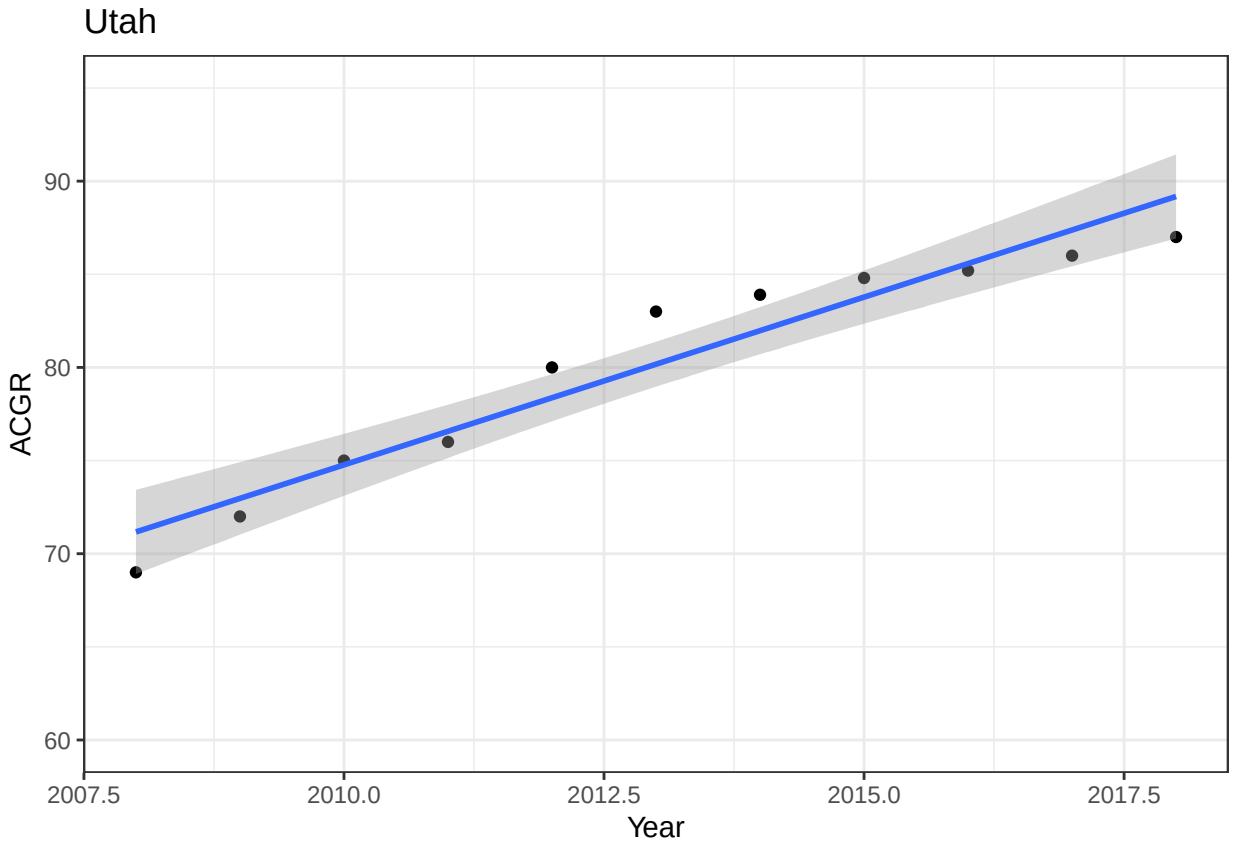

```
##
## $Texas
```

```
## `geom_smooth()` using formula 'y ~ x'
```



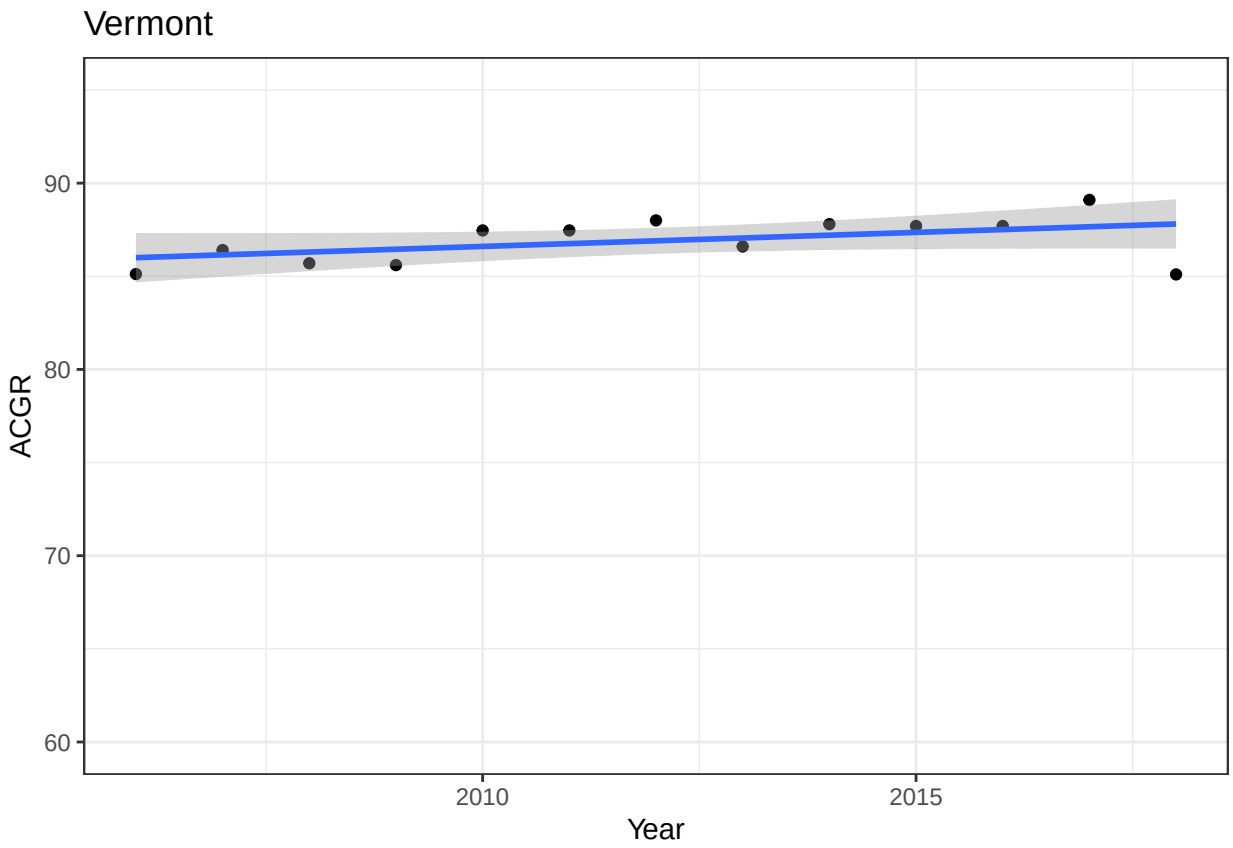

```
##
## $Utah
```

```
## `geom_smooth()` using formula 'y ~ x'
```



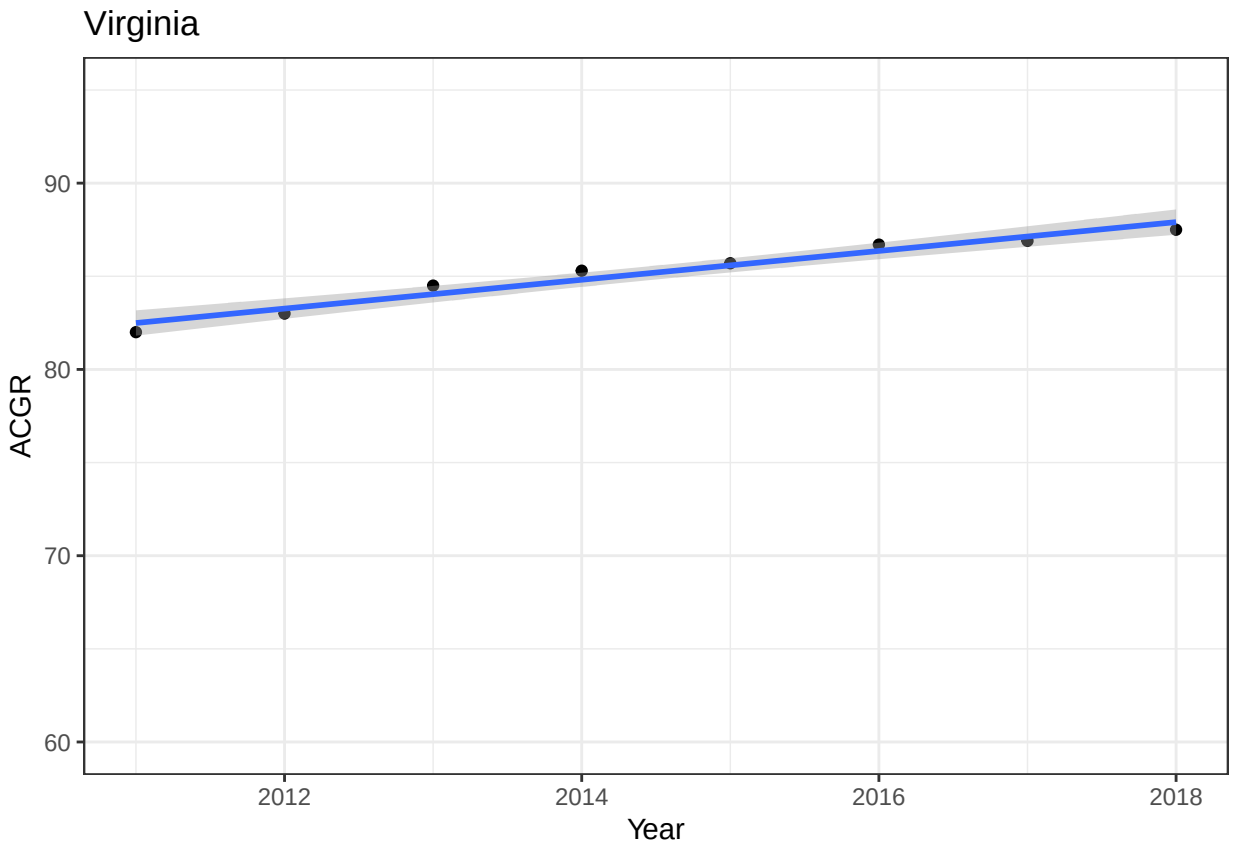

```
##
## $Vermont
```

```
## `geom_smooth()` using formula 'y ~ x'
```



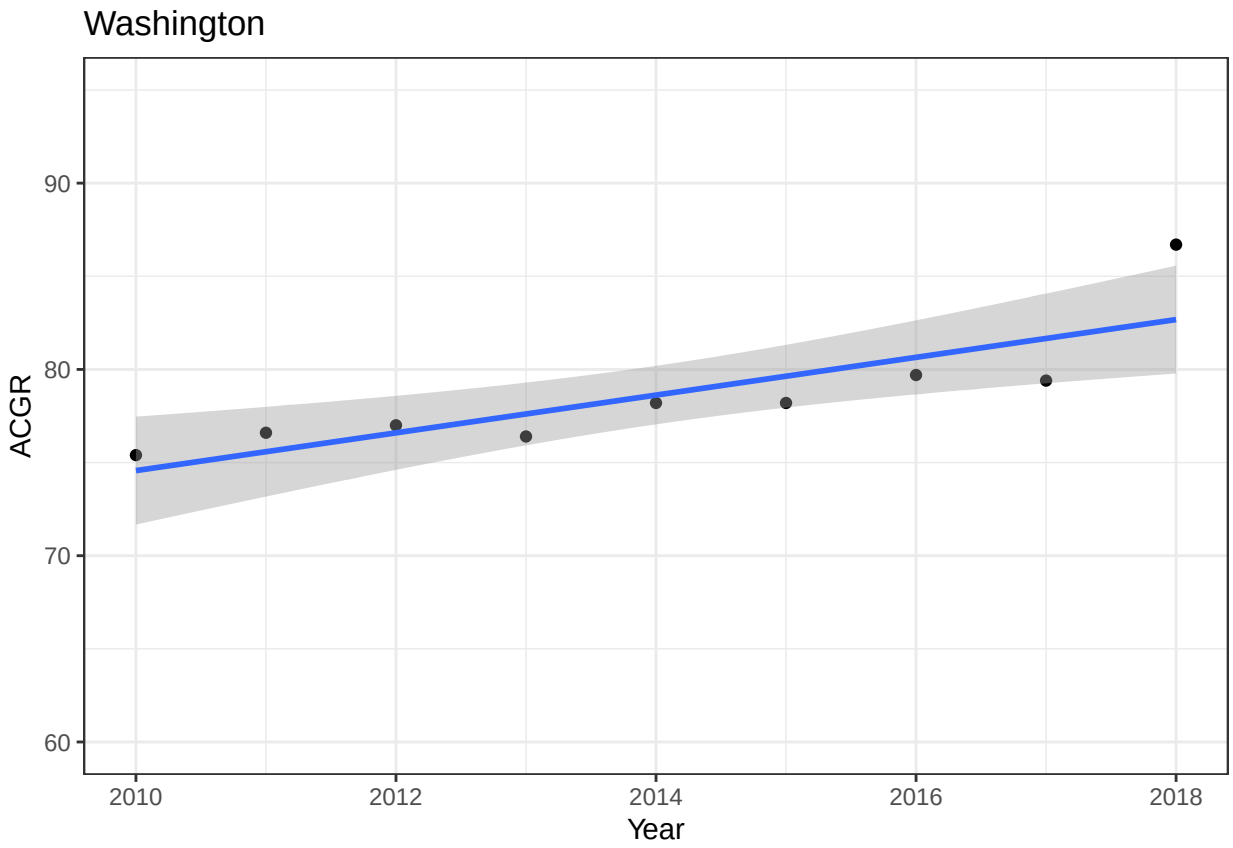

```
##
## $Virginia
```

```
## `geom_smooth()` using formula 'y ~ x'
```



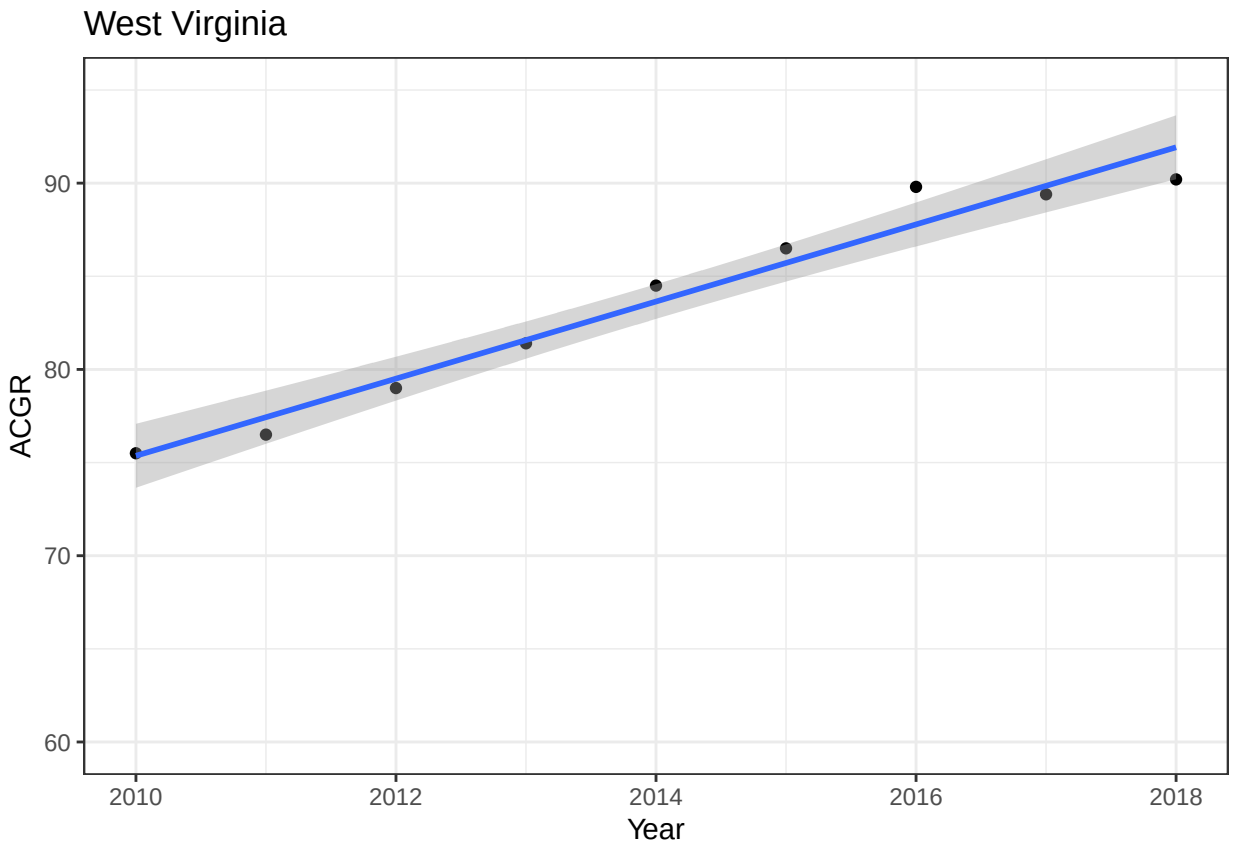

```
##
## $Washington
```

```
## `geom_smooth()` using formula 'y ~ x'
```



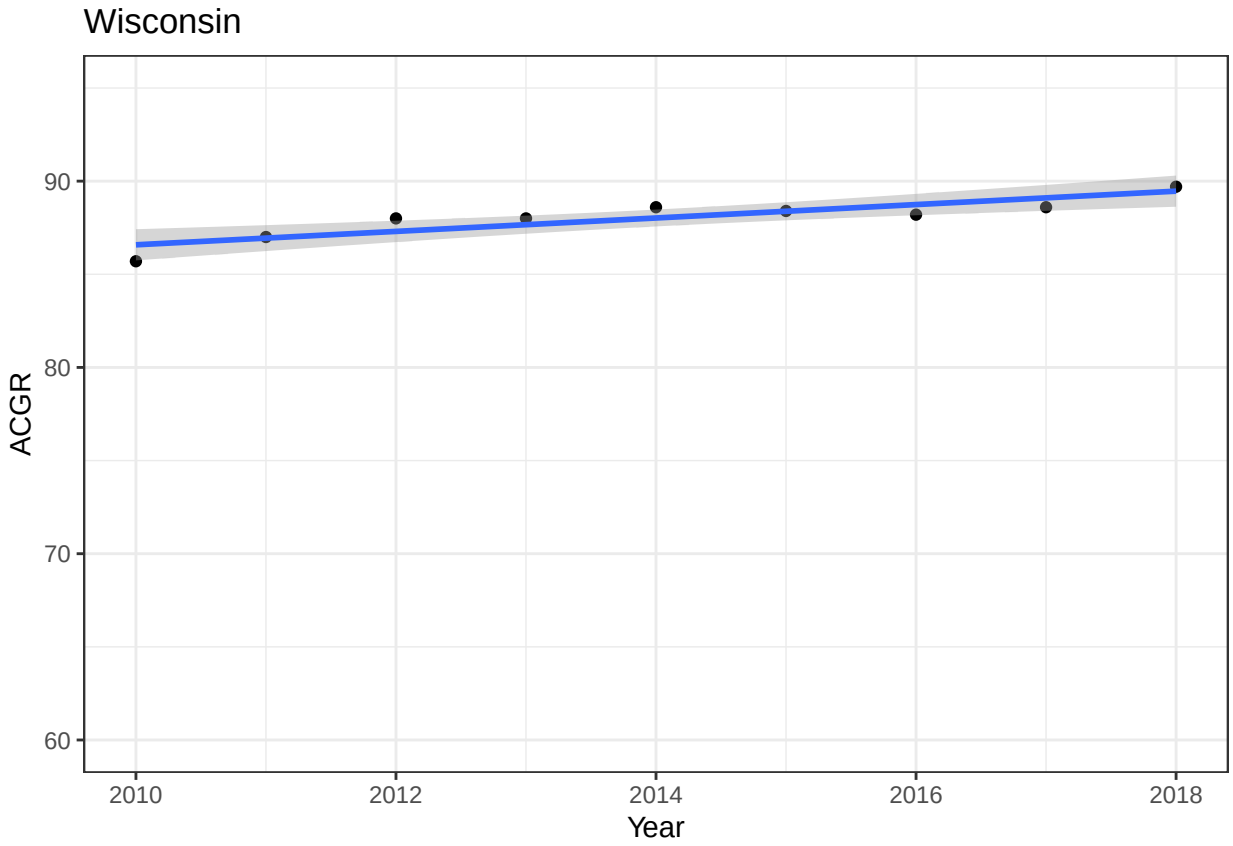

```
##
## $`West Virginia`
```

```
## `geom_smooth()` using formula 'y ~ x'
```



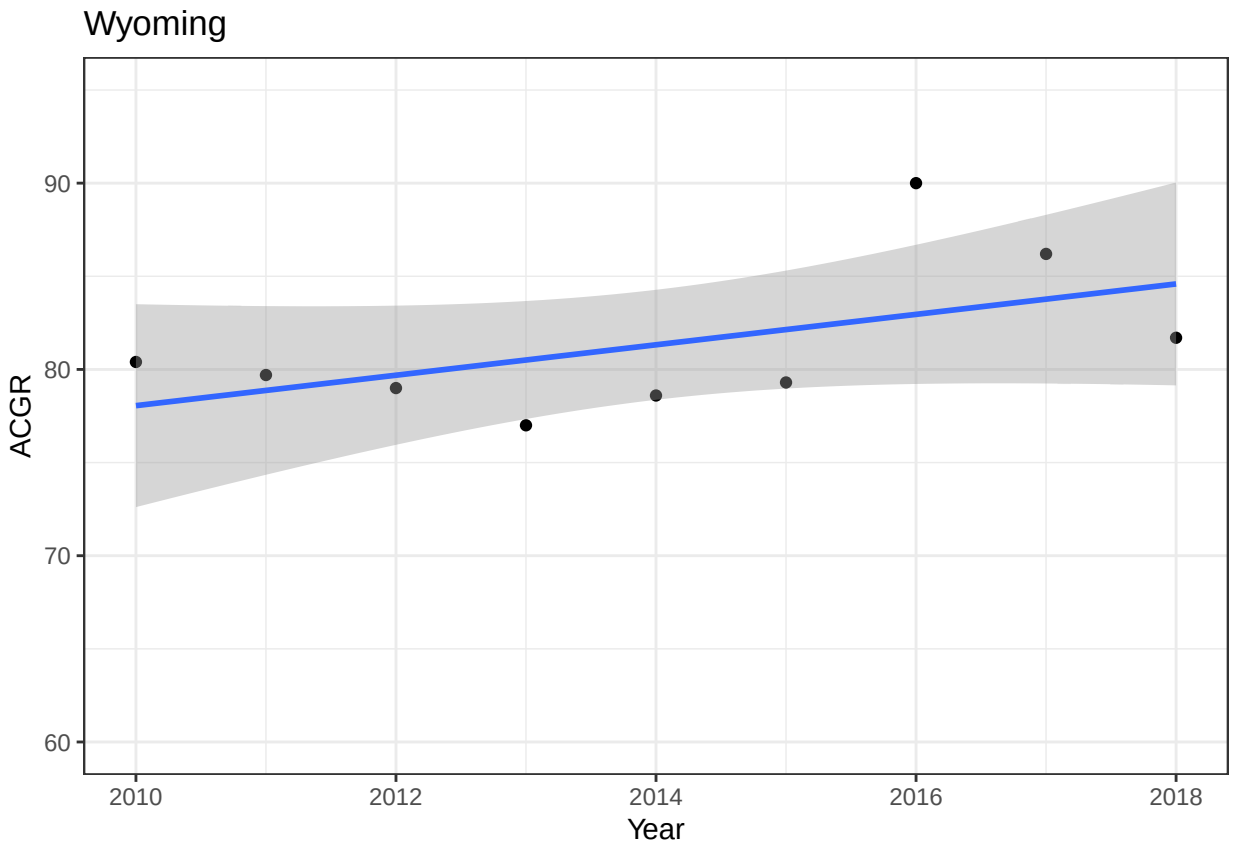

```
##
## $Wisconsin
```

```
## `geom_smooth()` using formula 'y ~ x'
```



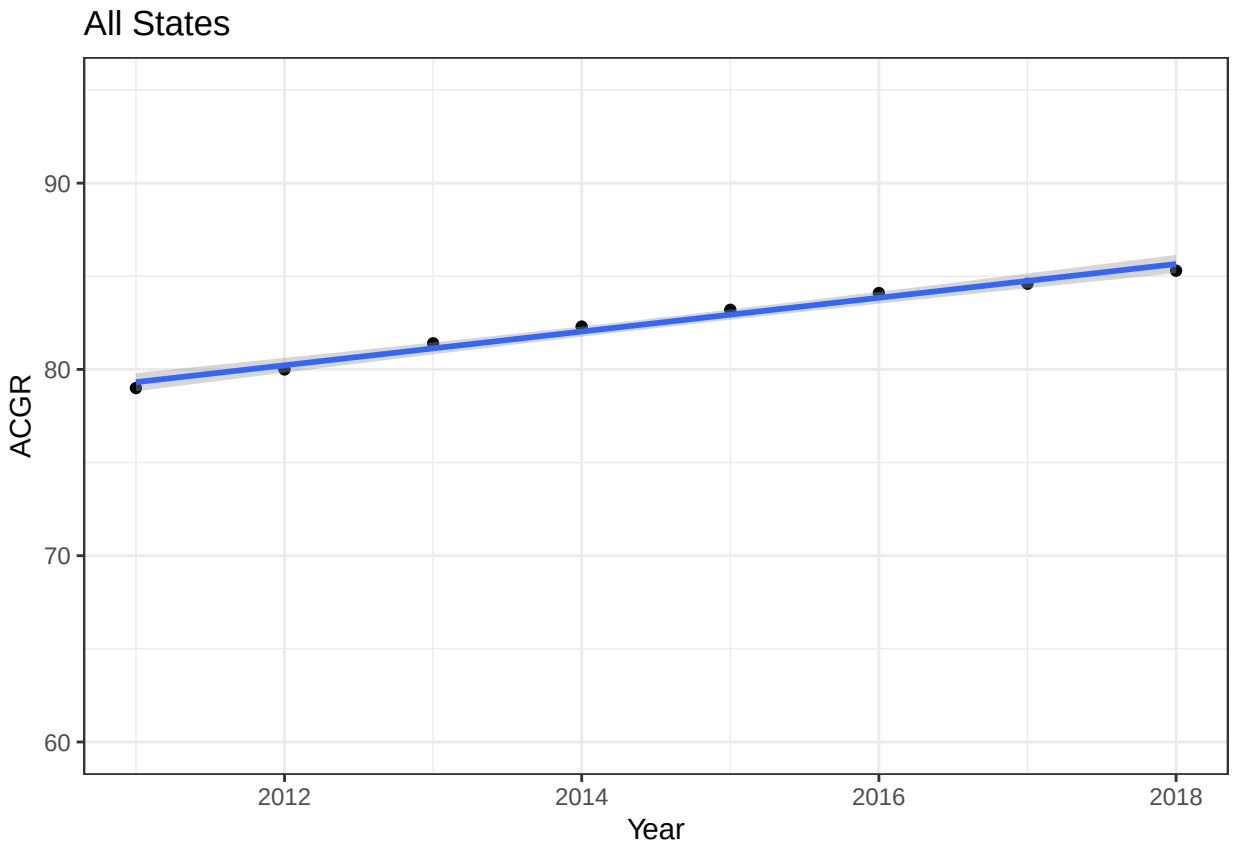

```
##
## $Wyoming
```

```
## `geom_smooth()` using formula 'y ~ x'
```




```
##
## $`All States`
```

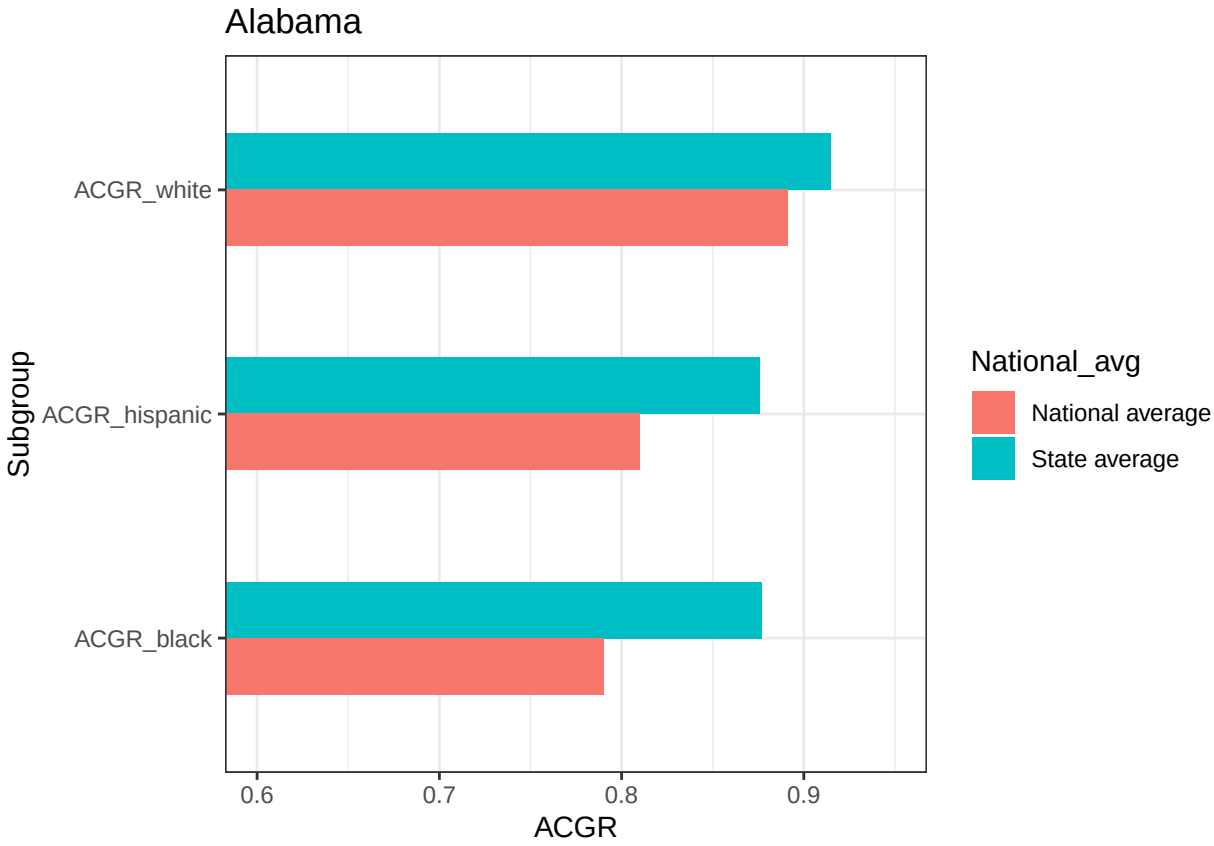
```
## `geom_smooth()` using formula 'y ~ x'
```



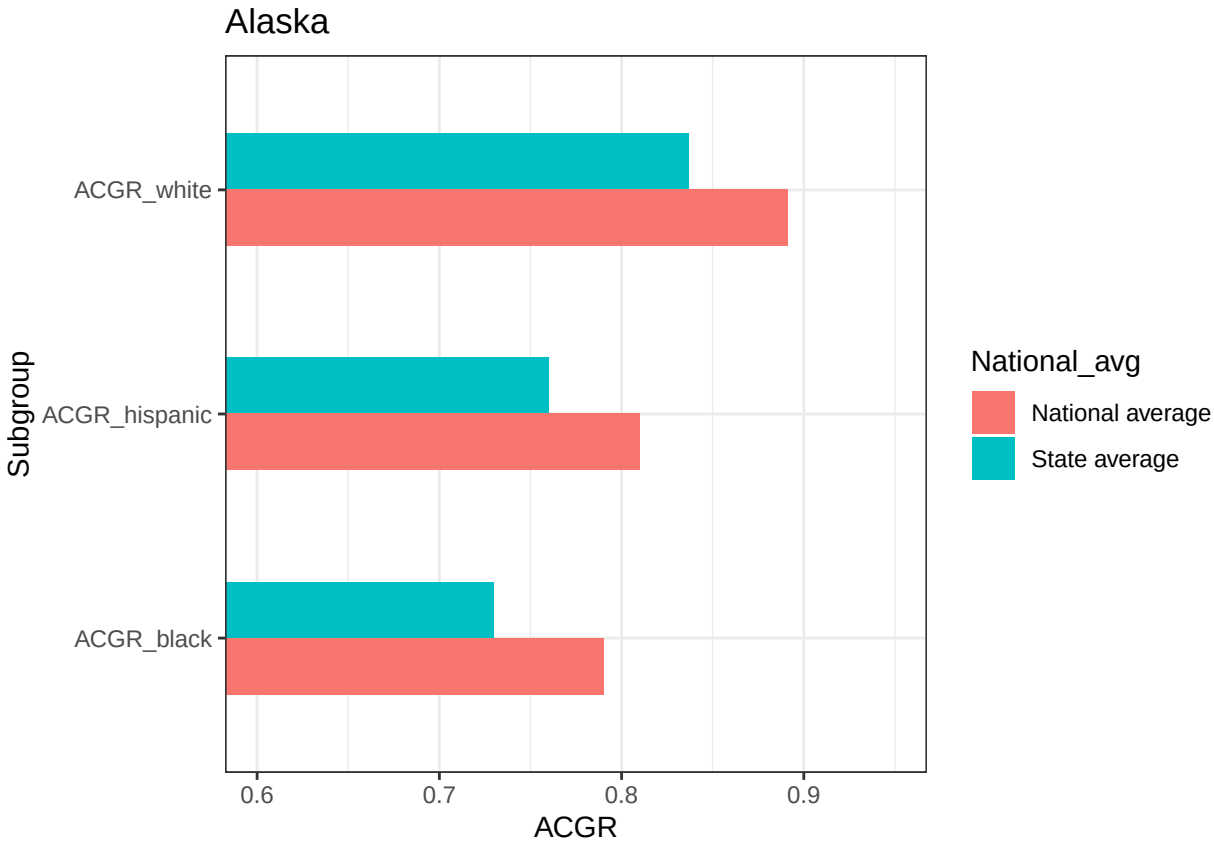

```
acgr_long_subgroups <- acgr %>%
  gather(race, acgr, ACGR_black:ACGR_white) %>%
  select(statename, race, acgr)

acgr_long_subgroups$race <- as.factor(acgr_long_subgroups$race)
```

```
acgr_long_subgroups <- acgr_long_subgroups %>%
  mutate(National_avg = case_when(
    statename == "United States" ~ "National average",
    statename != "United States" ~ "State average") %>%
      as.factor() %>%
      structure(levels = c("National average", "State average"))
  )


states2 = unique(acgr_long_subgroups$statename)
state_subgroup_bar = list()

for (i in states2) {
  state_subgroup_bar[[i]] = ggplot(acgr_long_subgroups %>% filter(statename == i|statename == "United S

  print(state_subgroup_bar[i])

}
```

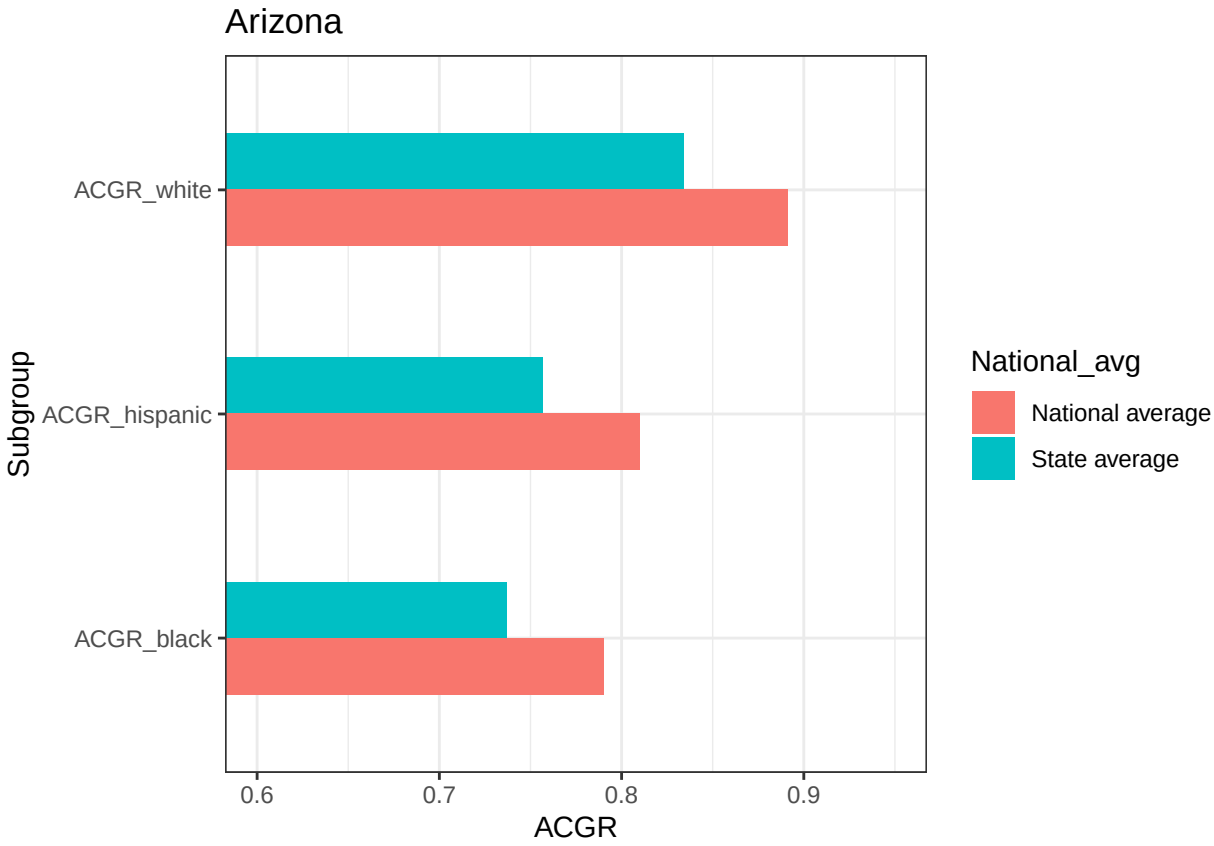
```
## $Alabama
```


Alabama
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

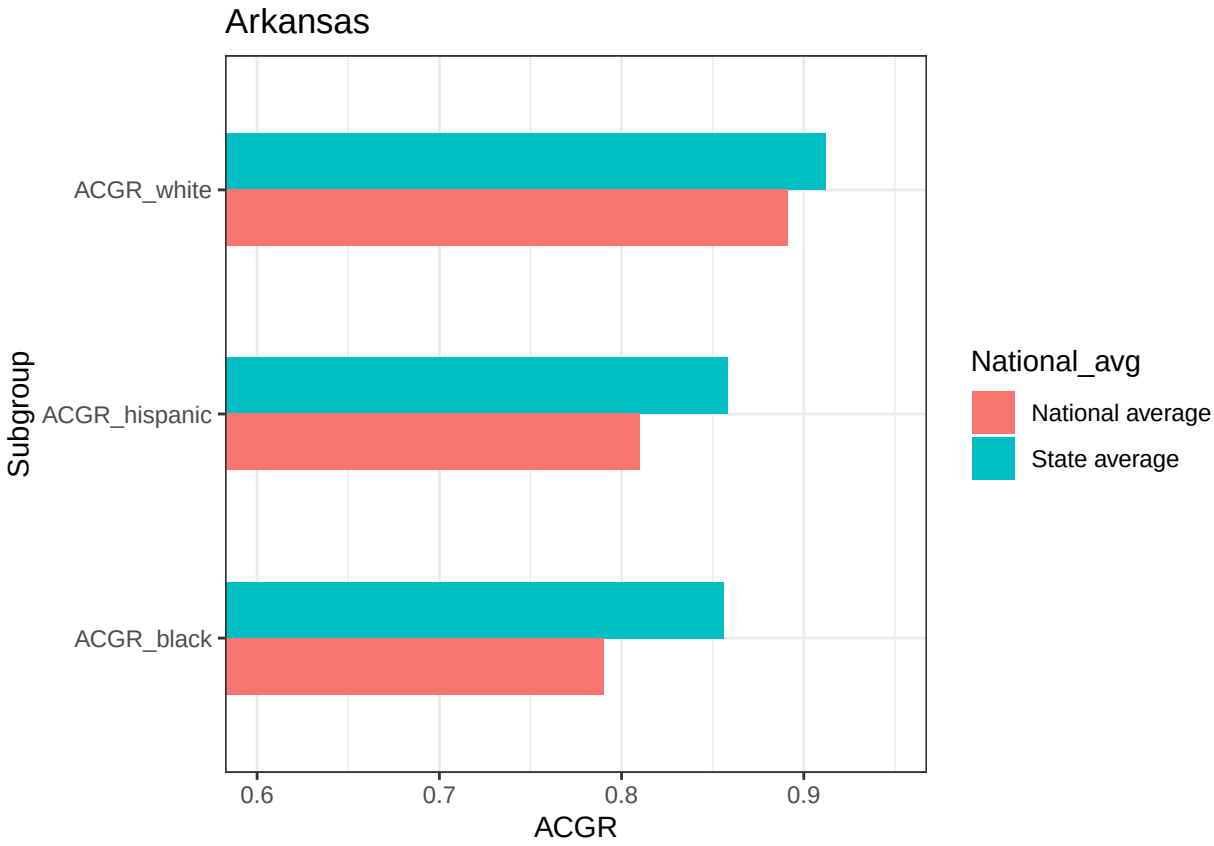
```
##
## $Alaska
```


Alaska
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

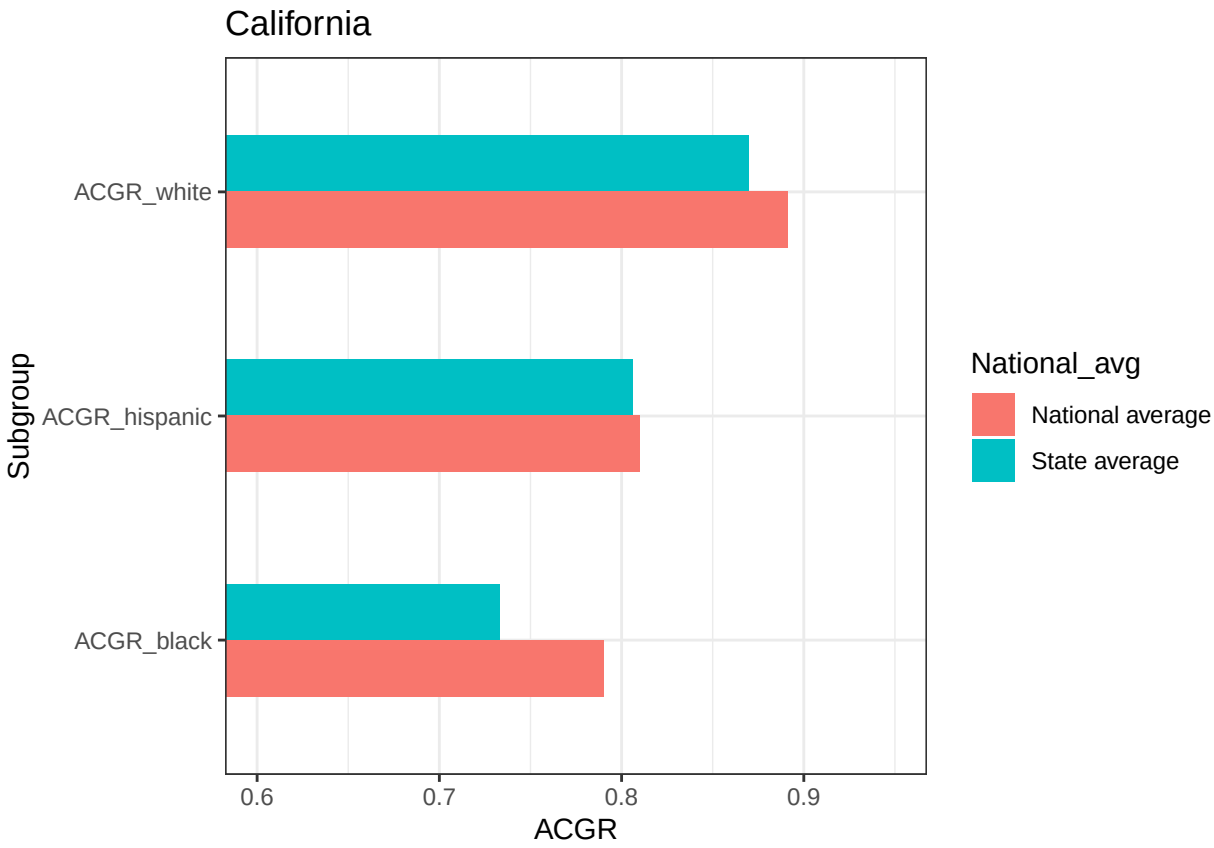
```
##
## $Arizona
```


Arizona
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

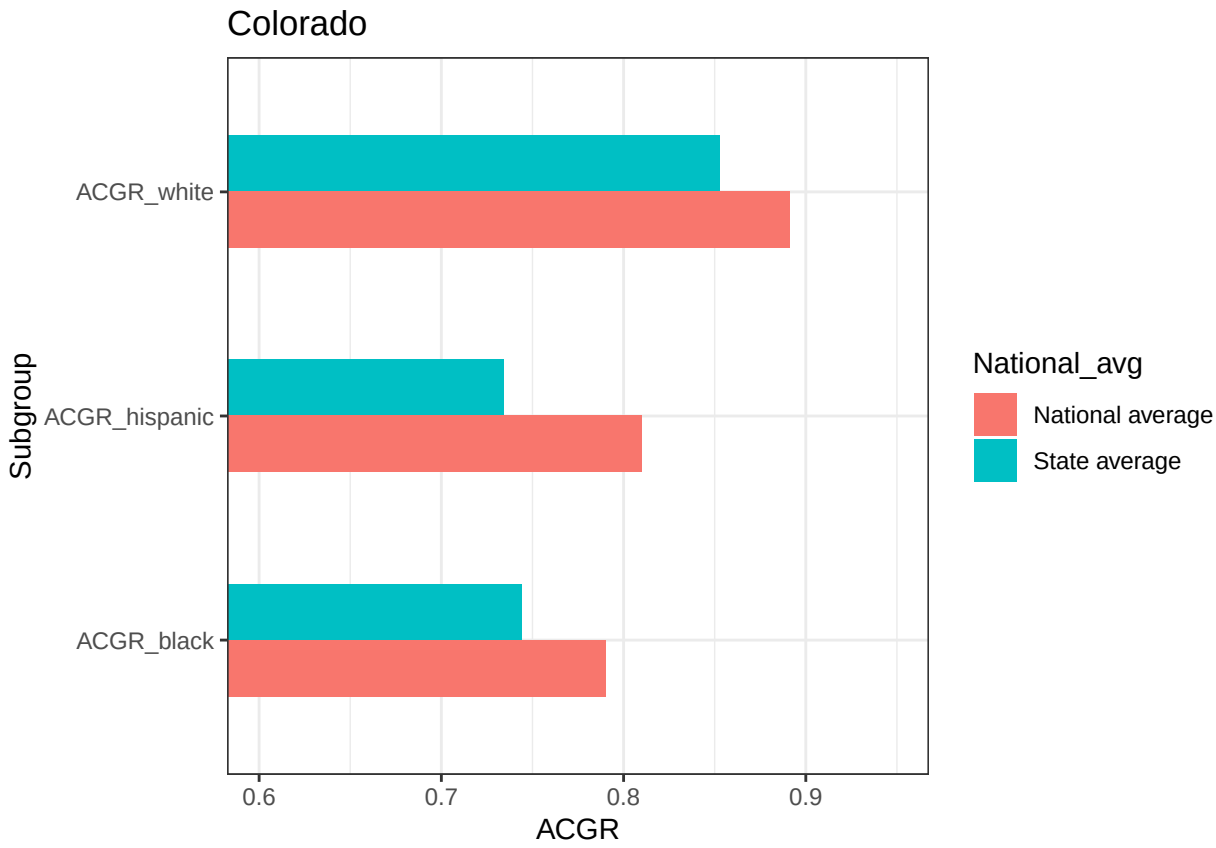
```
##
## $Arkansas
```


Arkansas
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

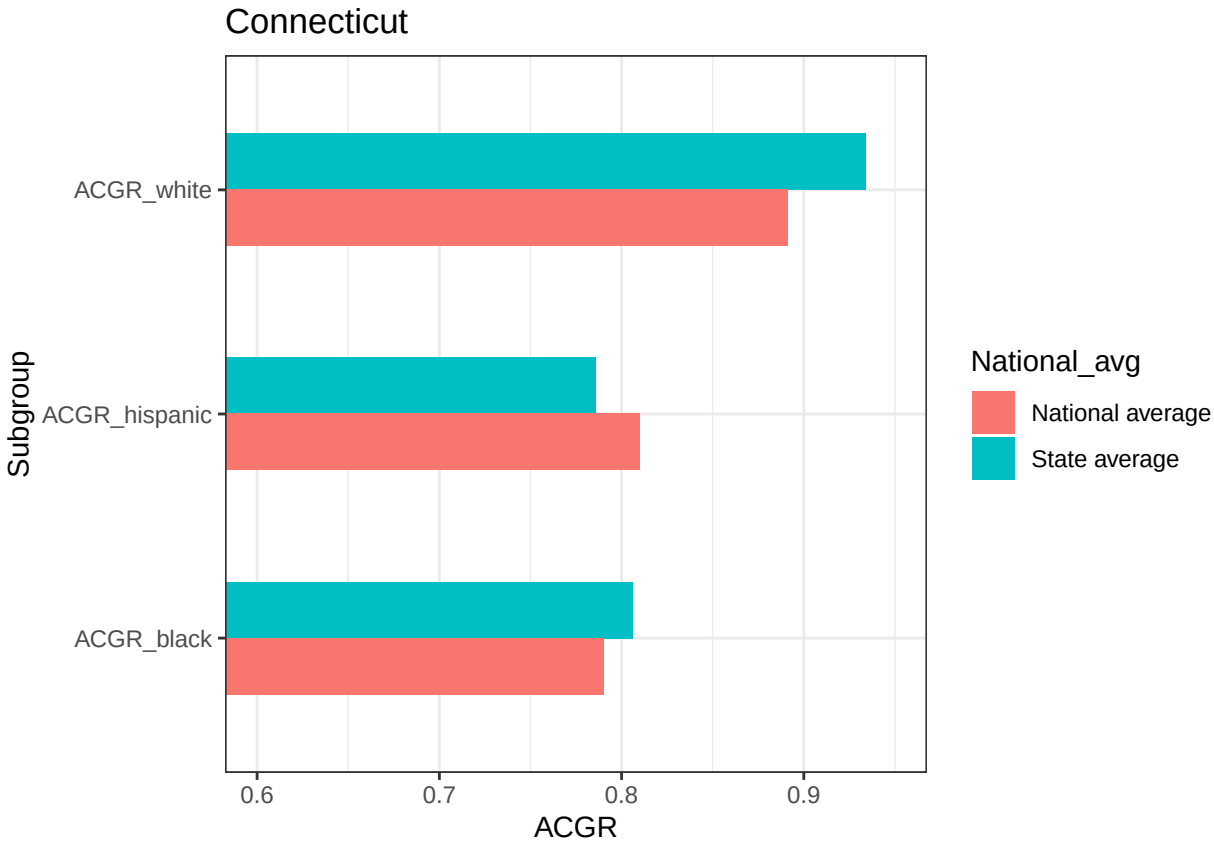
```
##
## $California
```


California
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

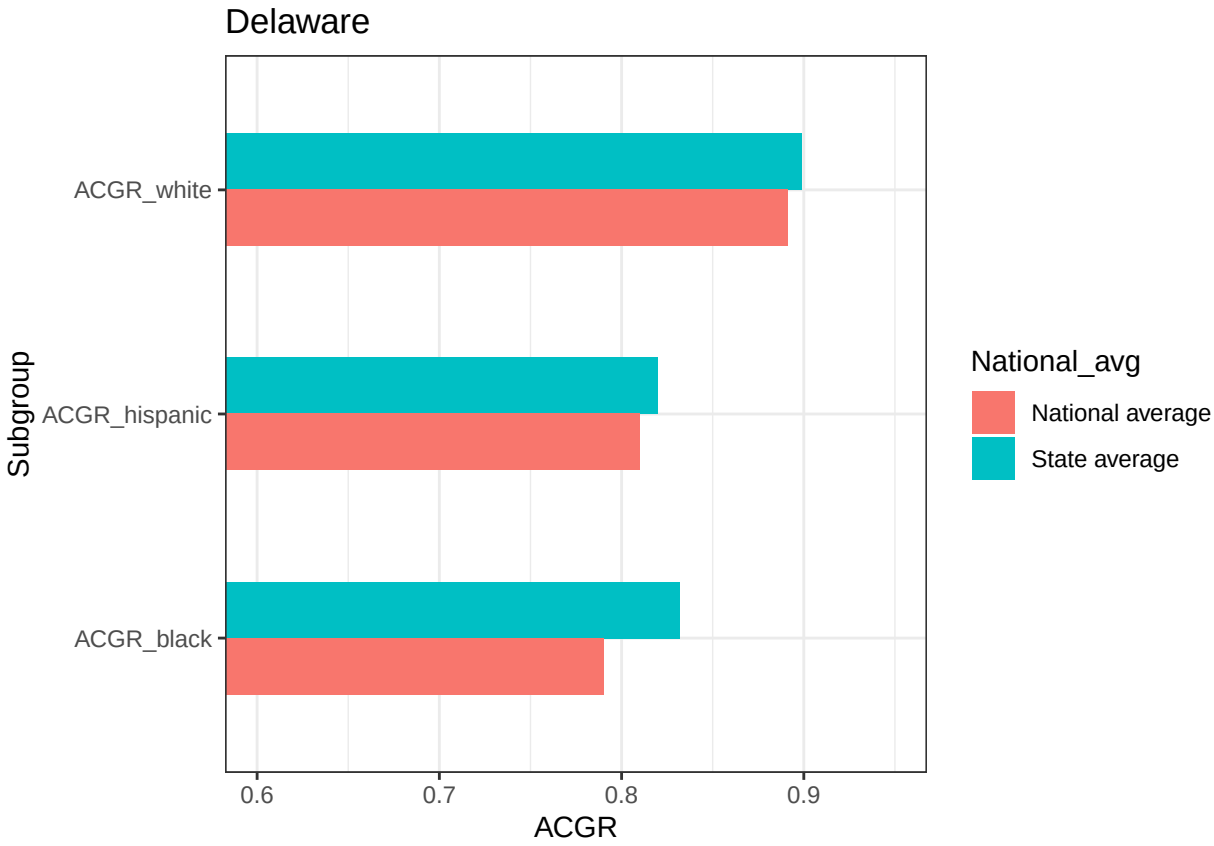
```
##
## $Colorado
```



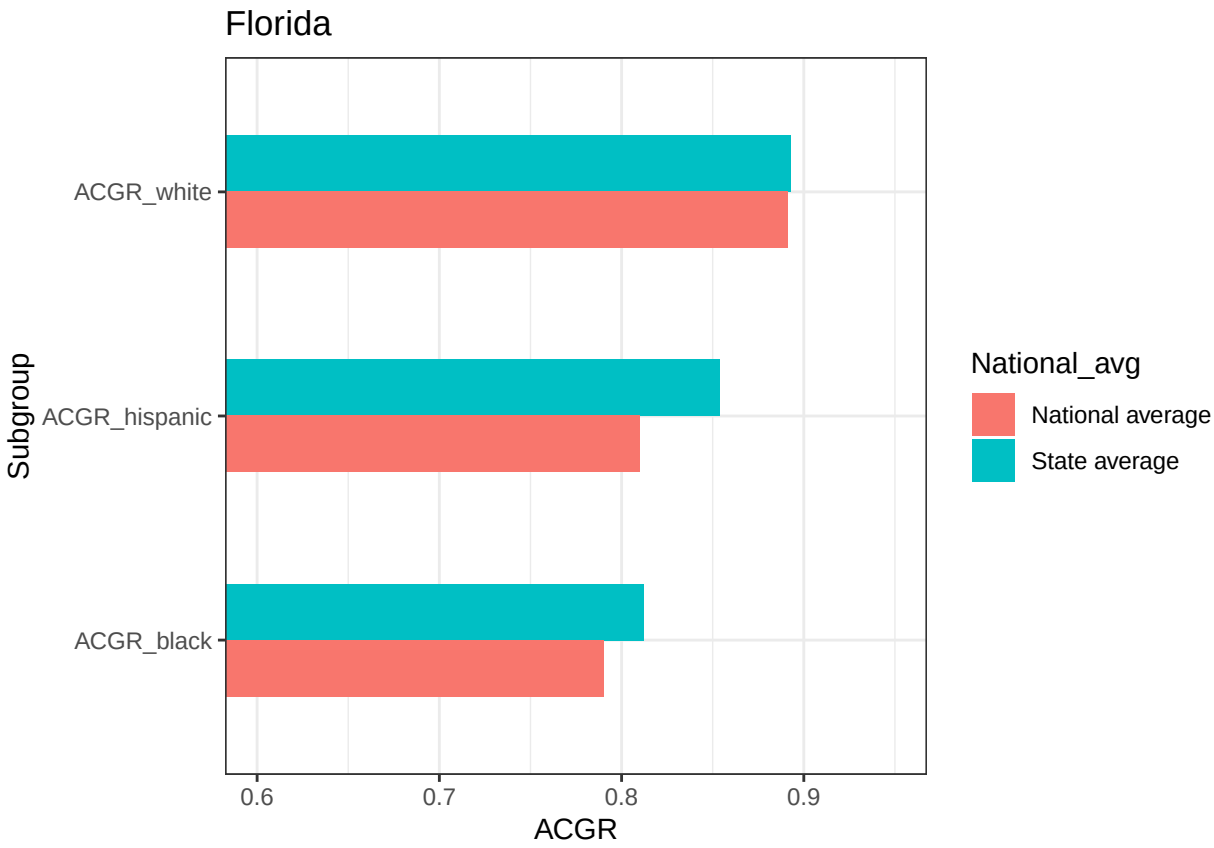

```
##
## $Connecticut
```


Connecticut
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

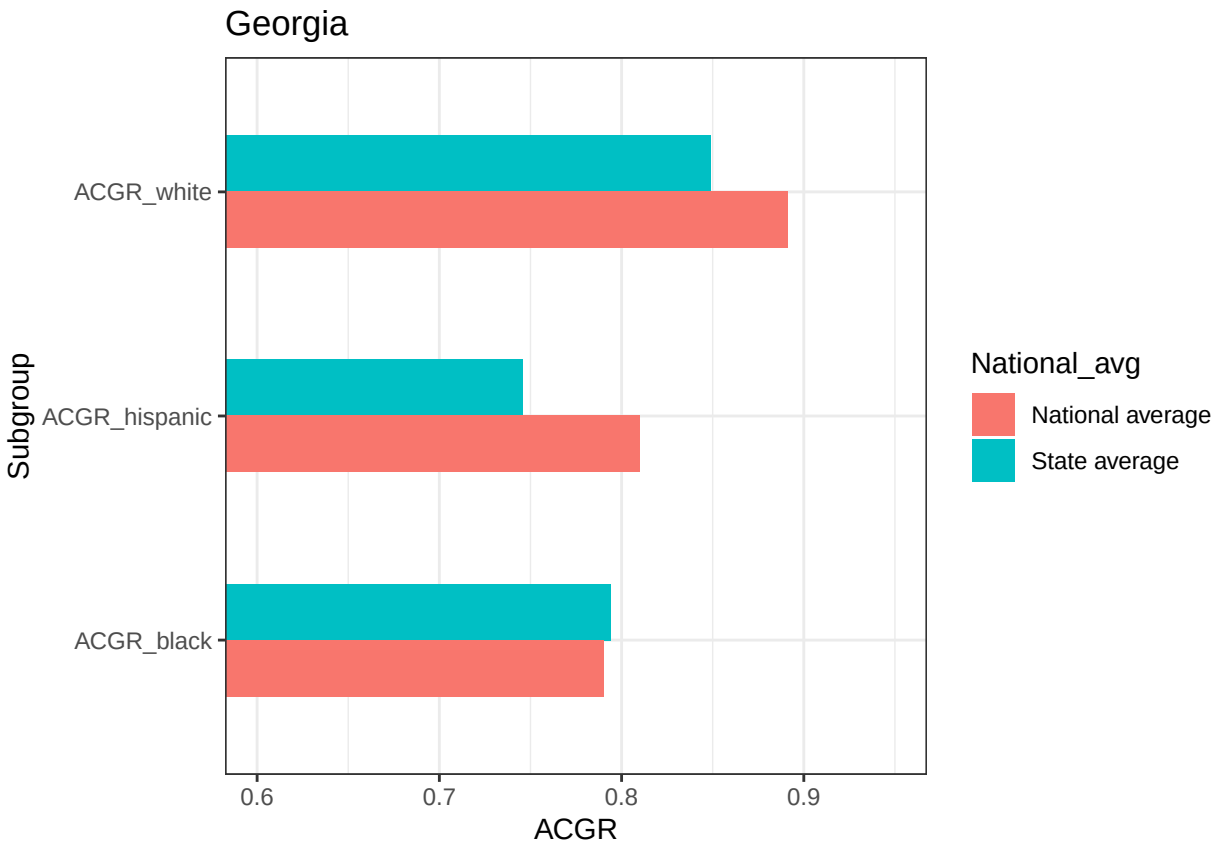
```
##
## $Delaware
```


Delaware
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

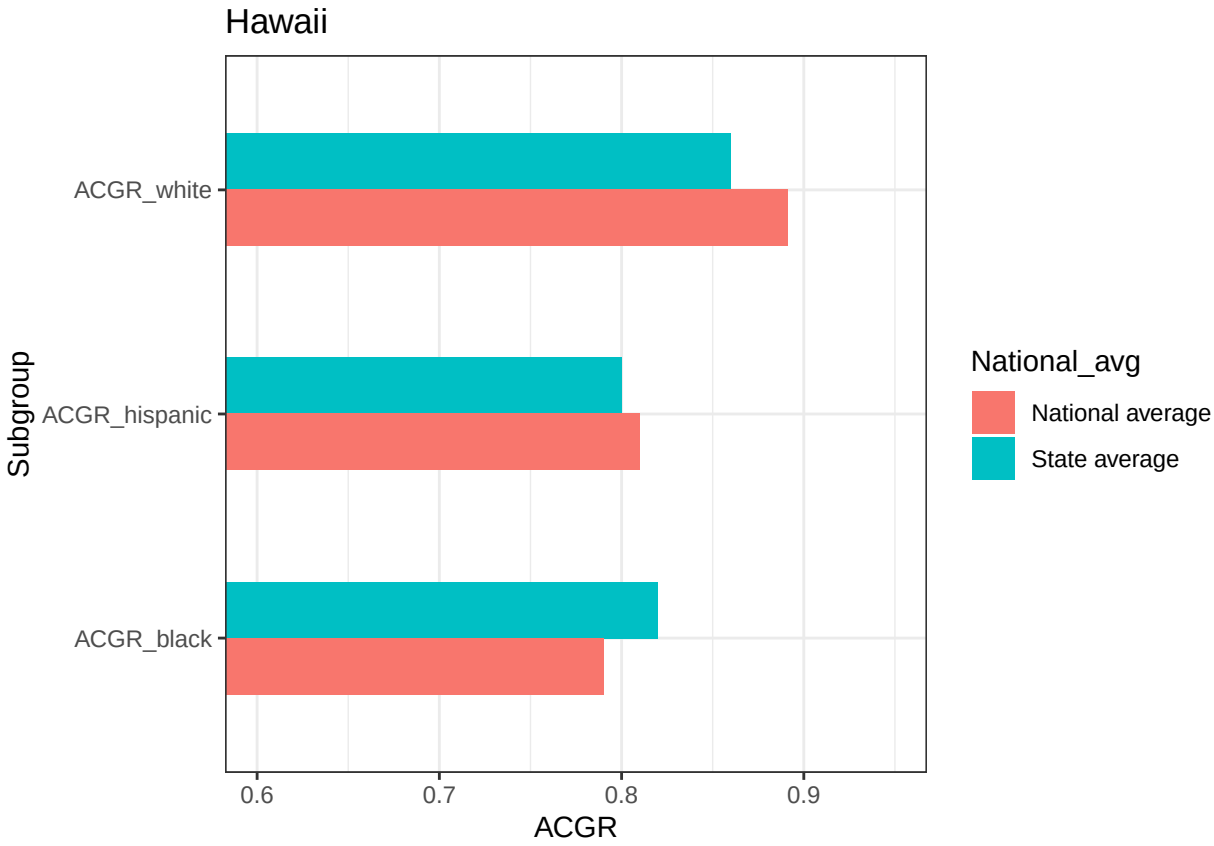
```
##
## $Florida
```


Florida
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

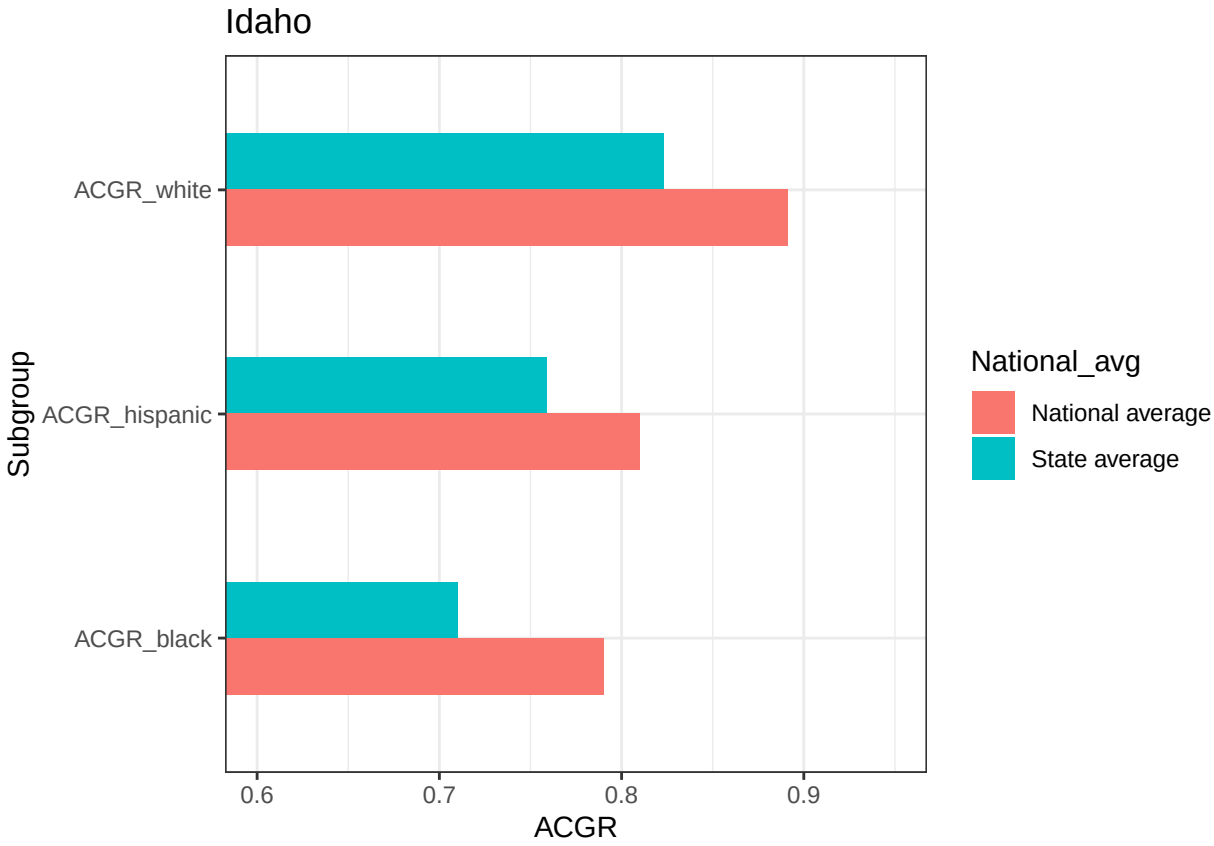
```
##
## $Georgia
```


Georgia
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

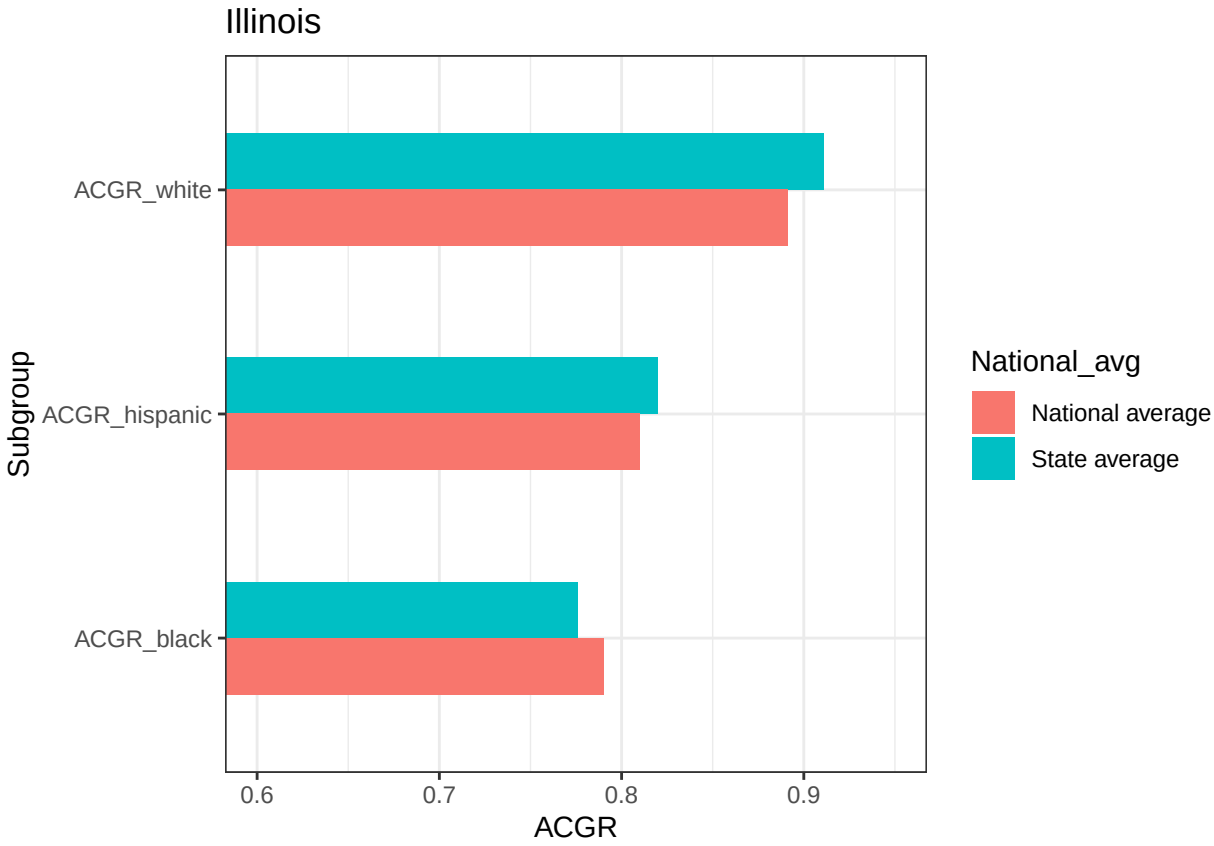
```
##
## $Hawaii
```


Hawaii
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

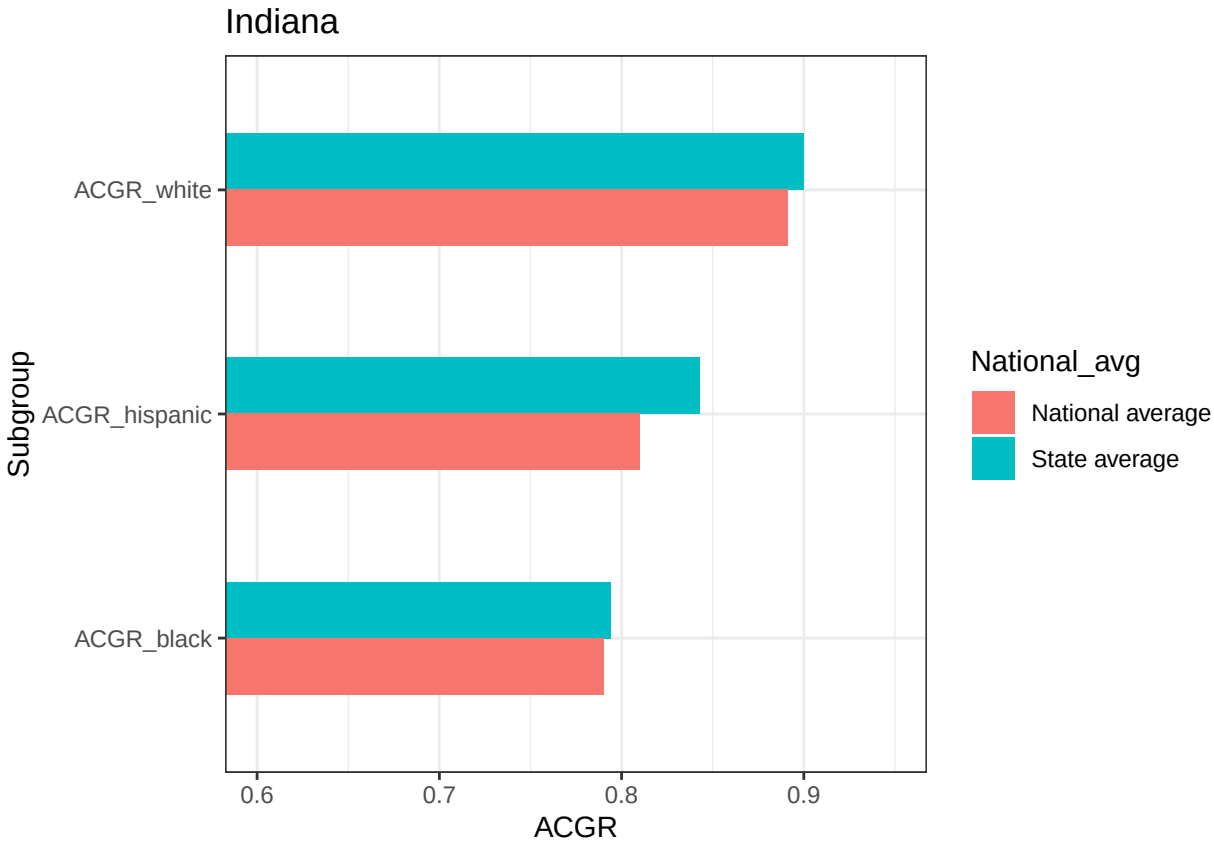
```
##
## $Idaho
```


Idaho
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

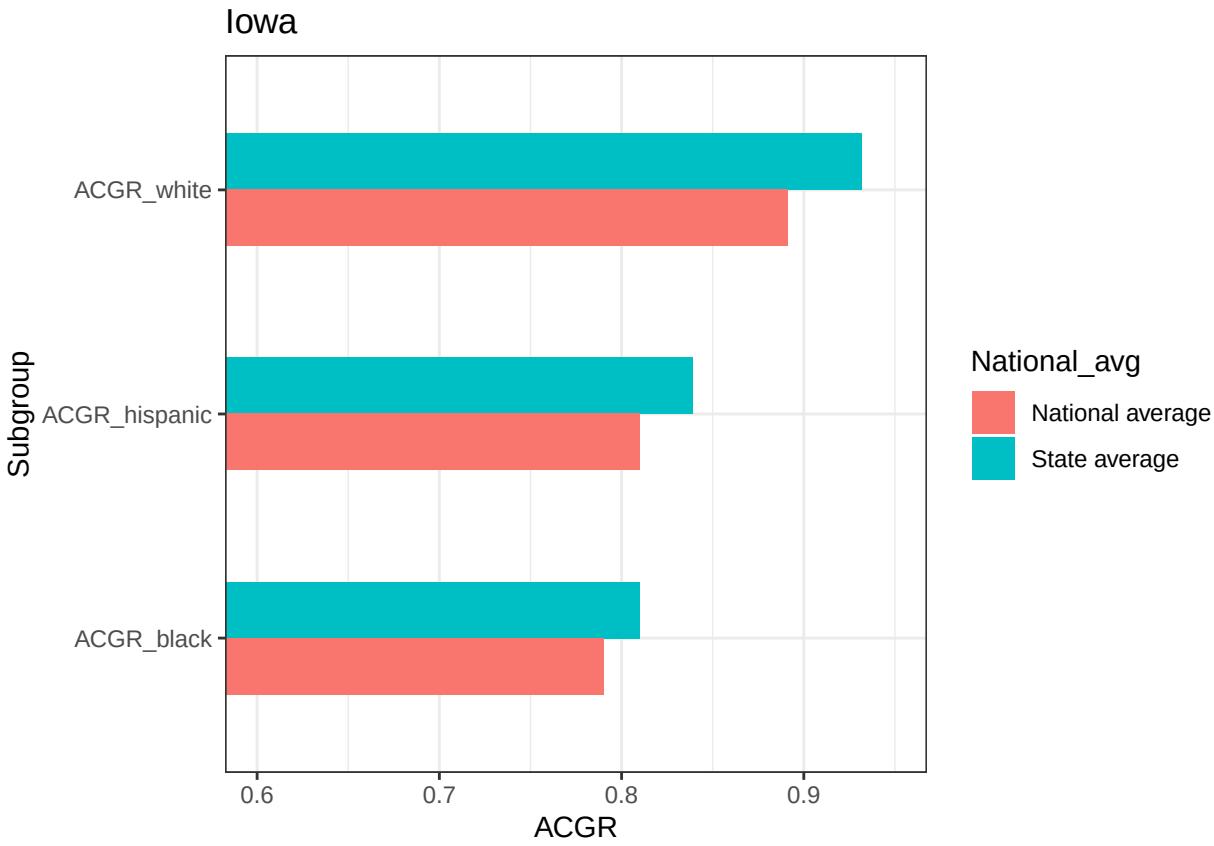
```
##
## $Illinois
```


Illinois
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

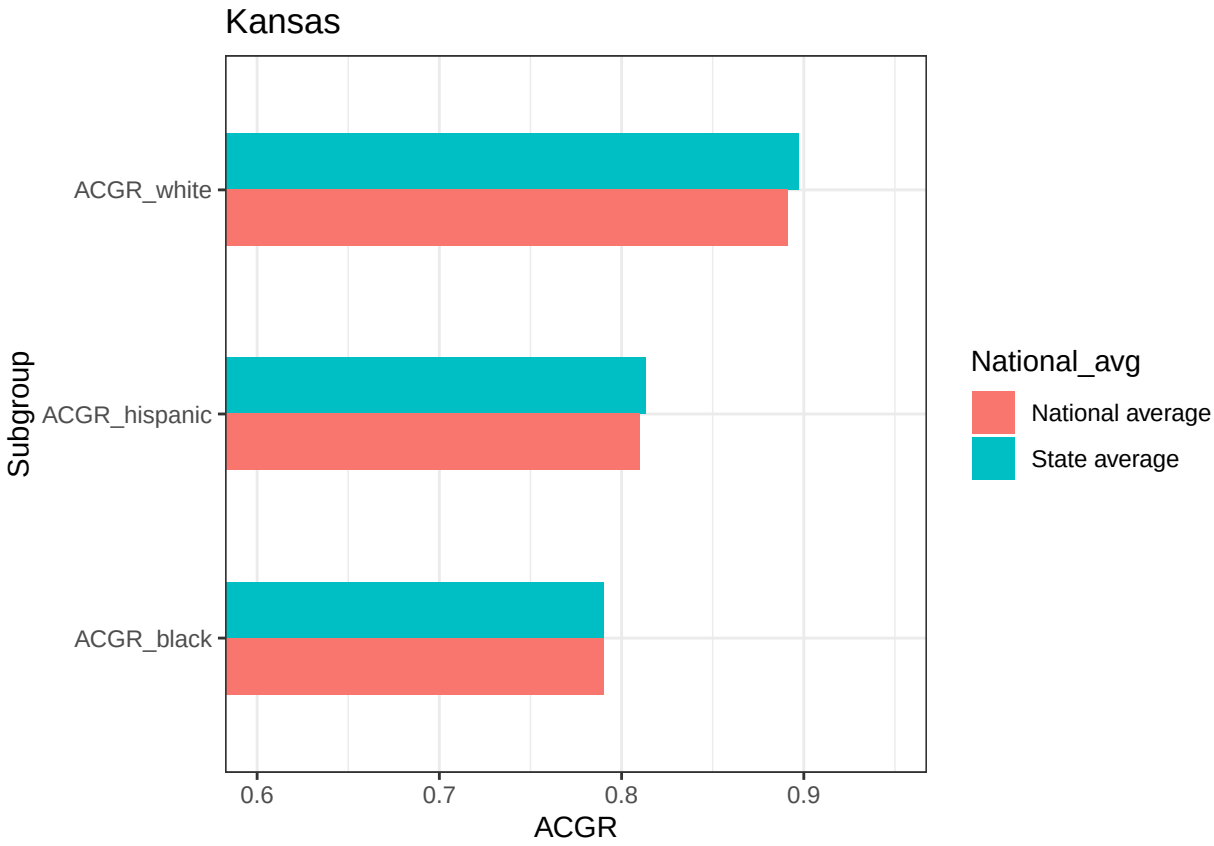
```
##
## $Indiana
```


Indiana
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

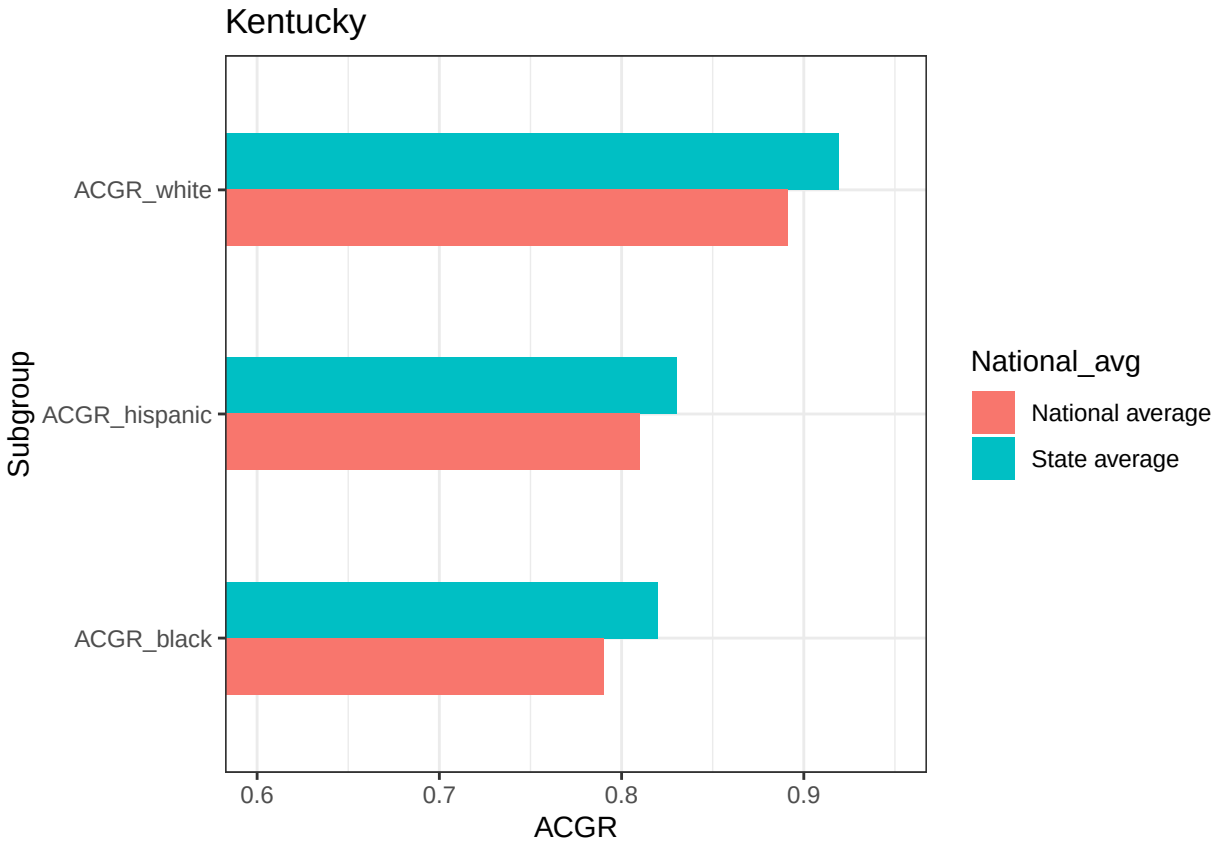
```
##
## $Iowa
```


Iowa
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

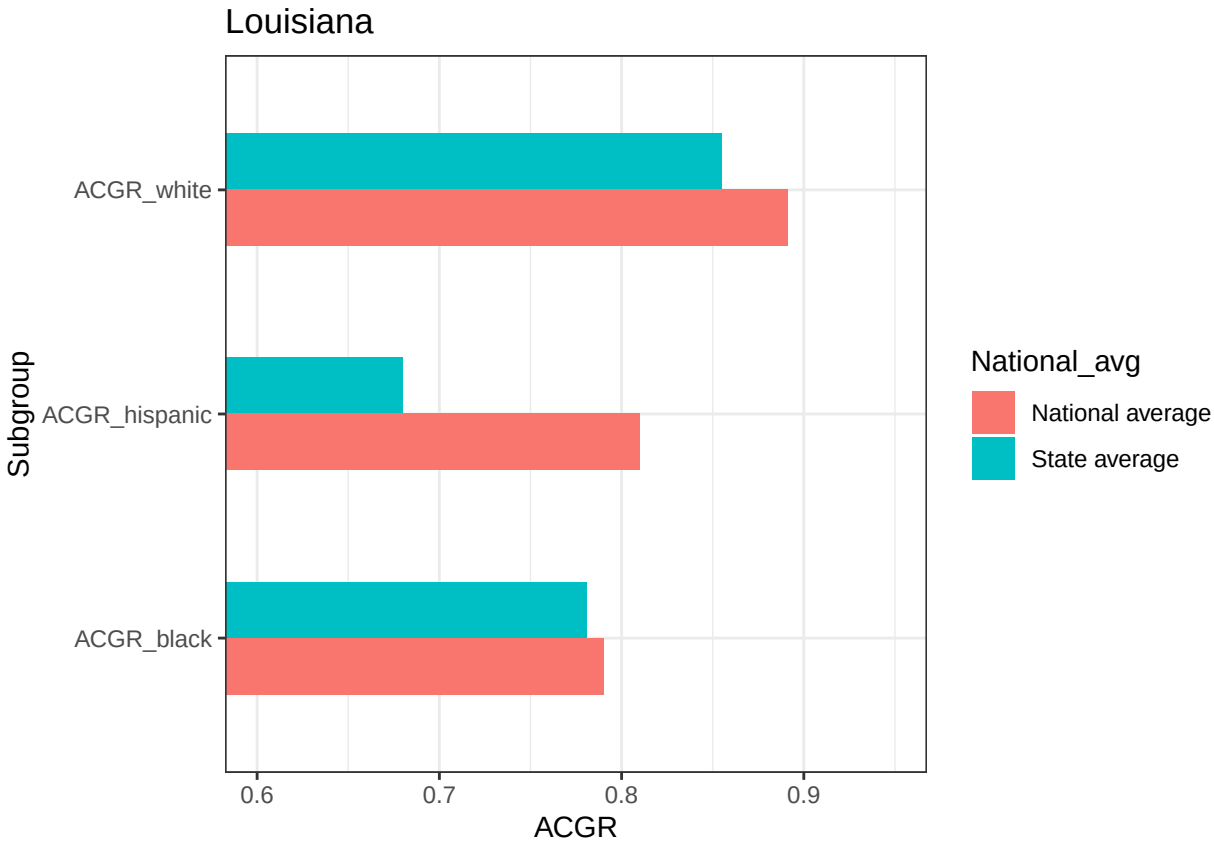
```
##
## $Kansas
```


Kansas
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

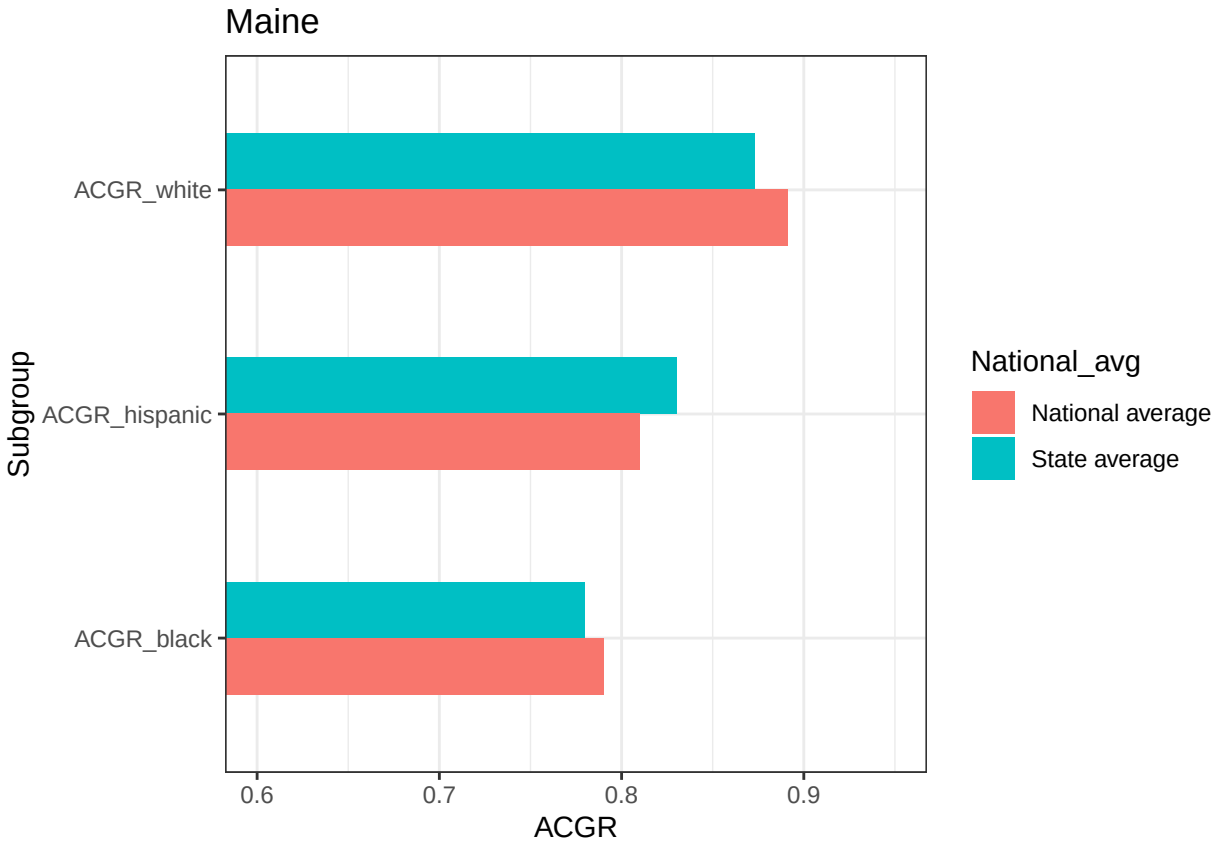
```
##
## $Kentucky
```


Kentucky
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

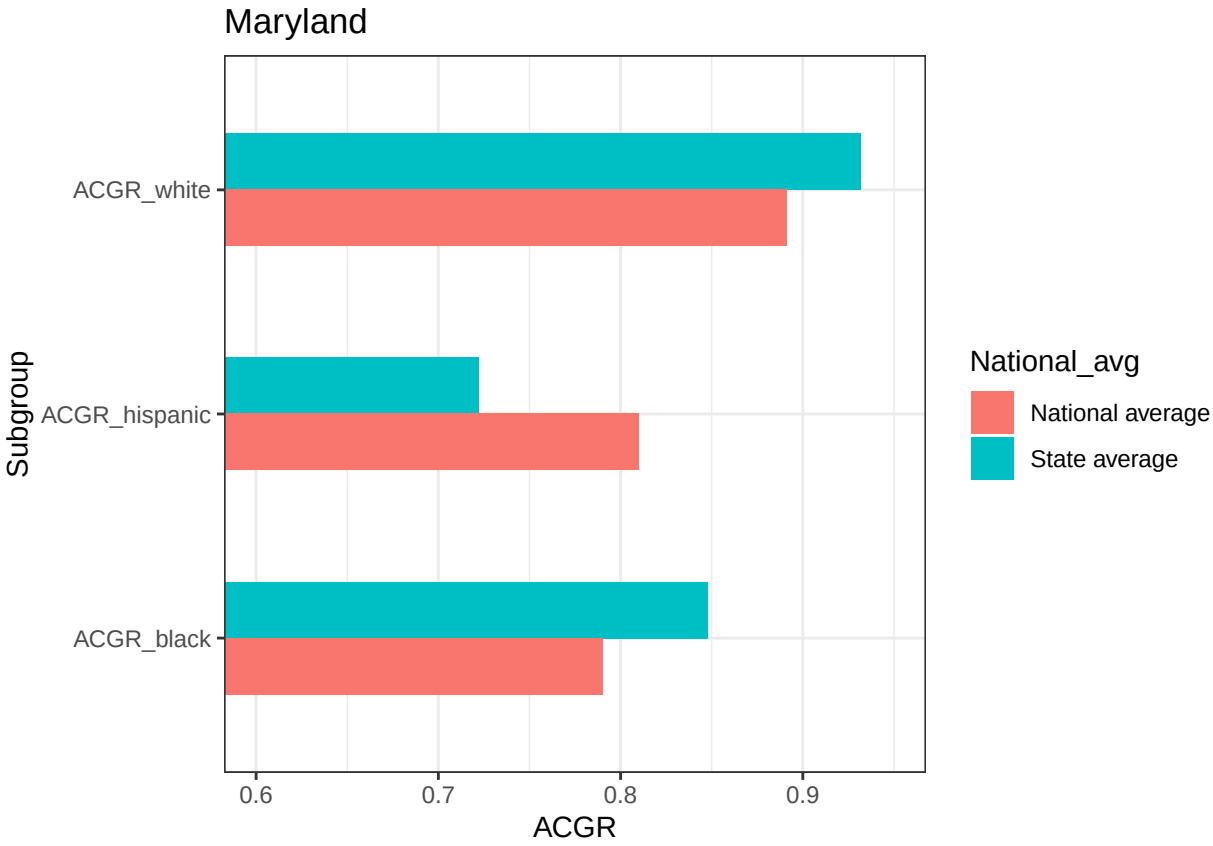
```
##
## $Louisiana
```


Louisiana
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

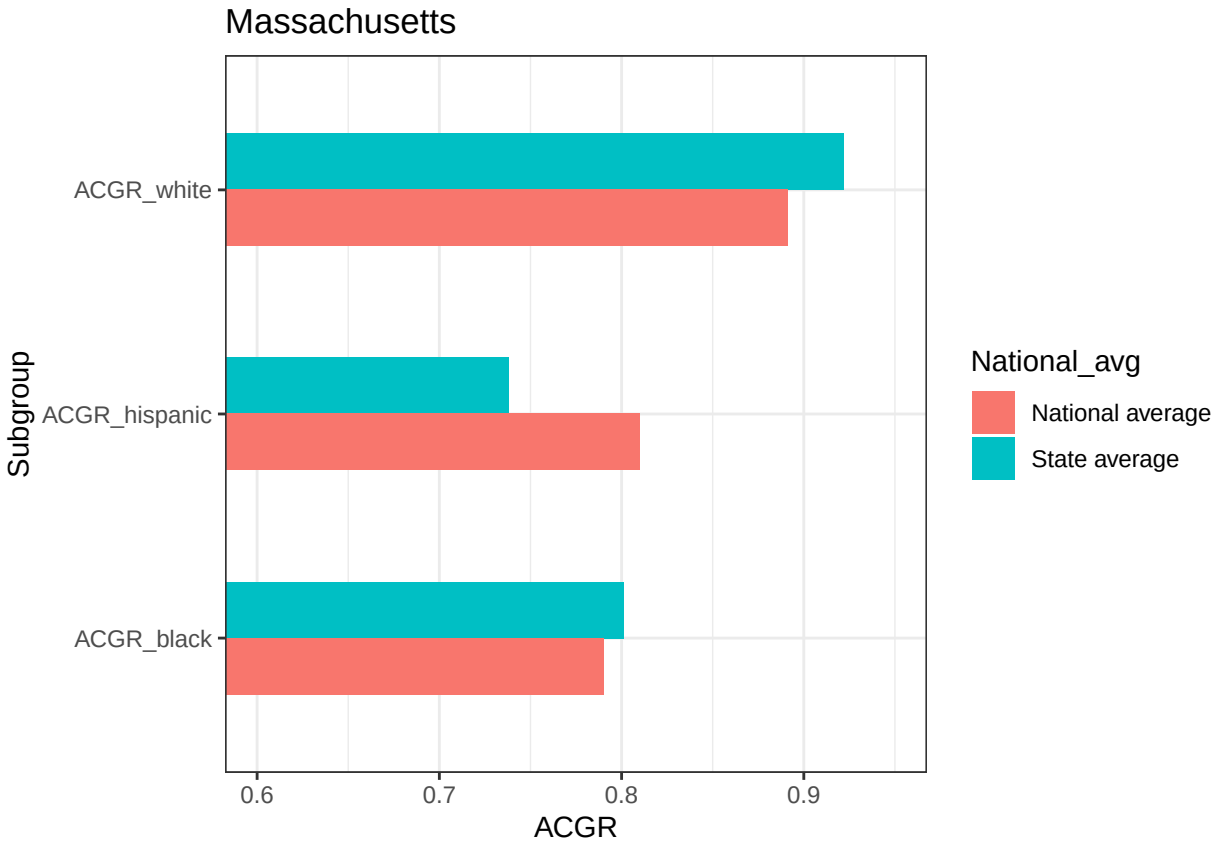
```
##
## $Maine
```


Maine
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

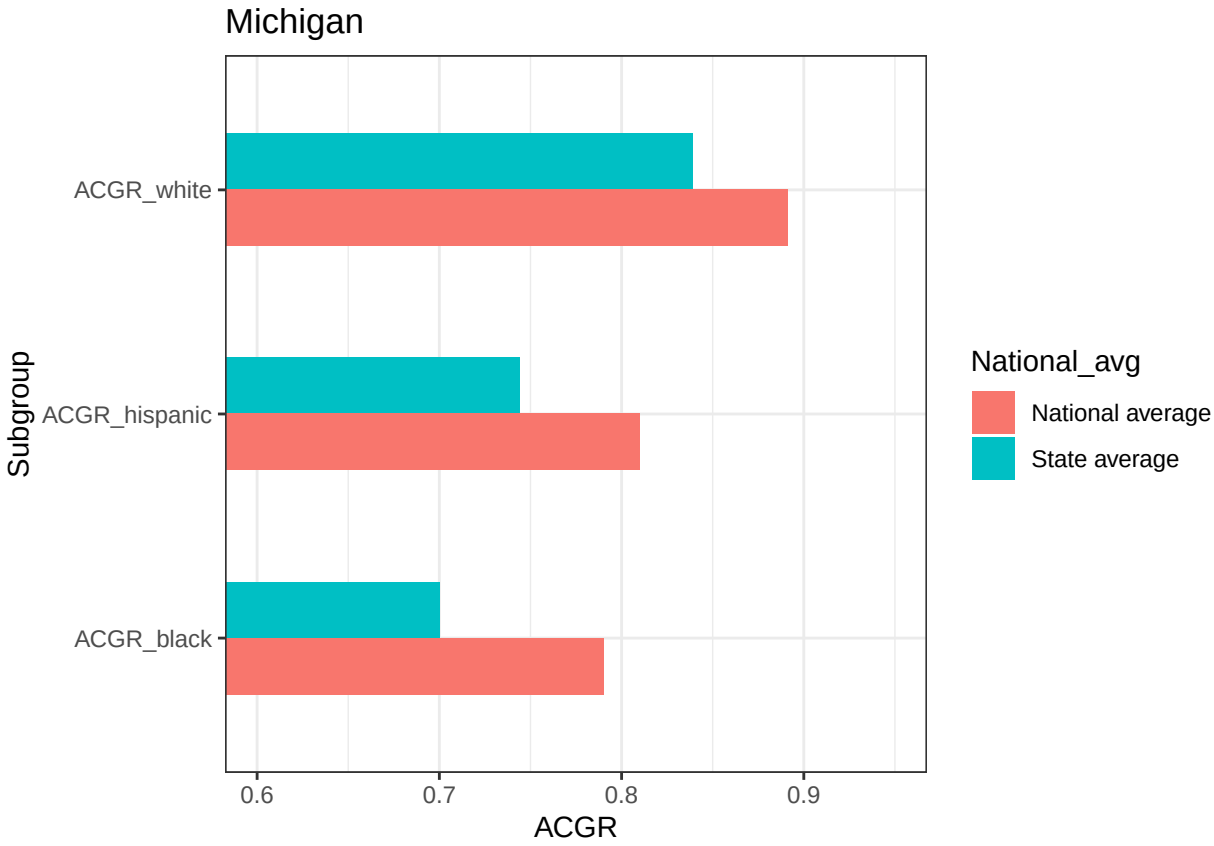
```
##
## $Maryland
```



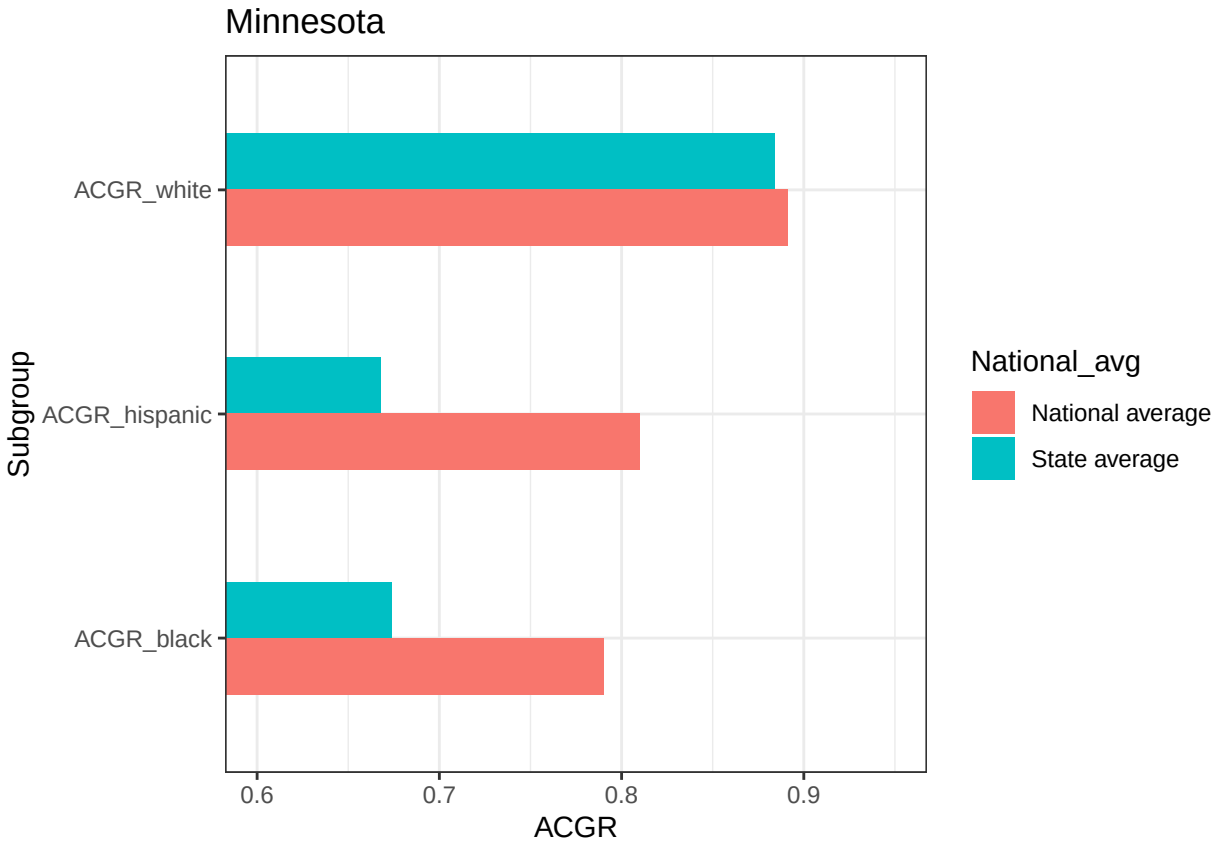

```
##
## $Massachusetts
```


Massachusetts
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

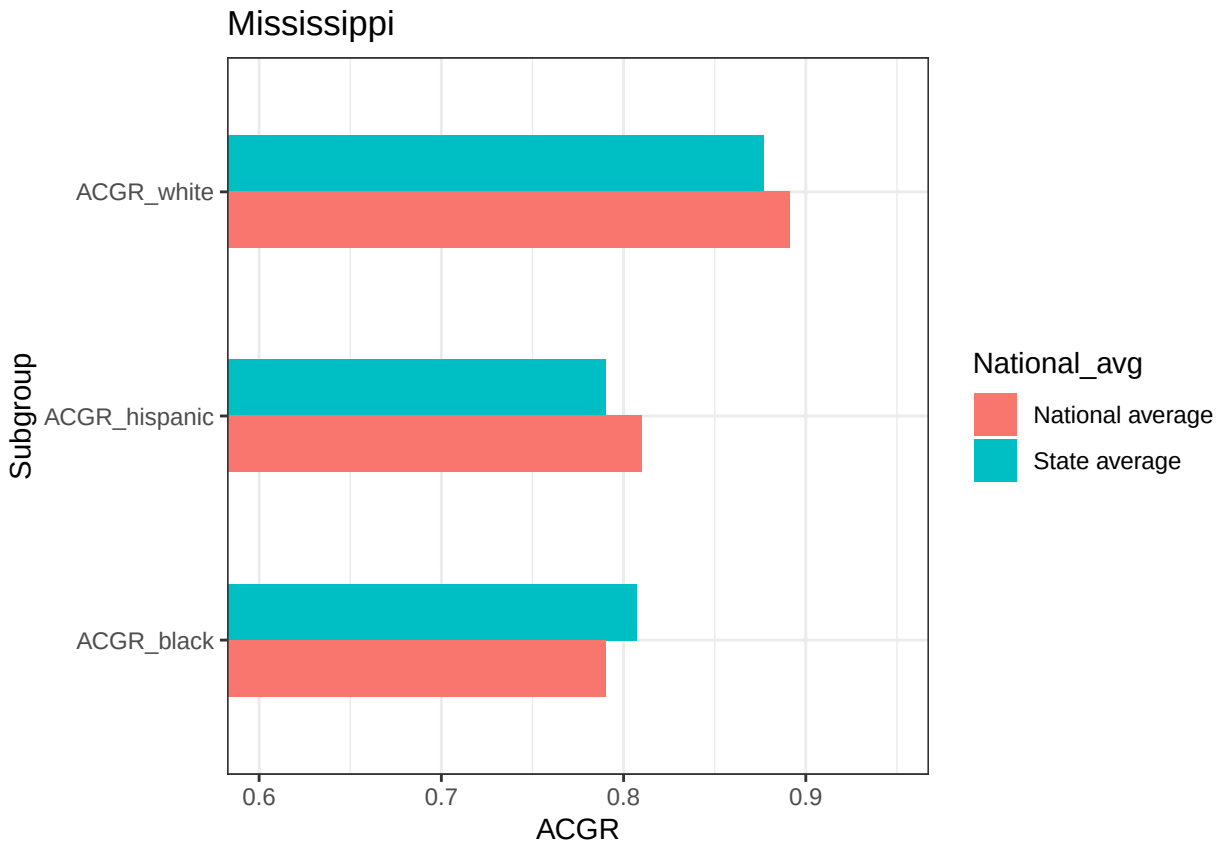
```
##
## $Michigan
```


Michigan
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

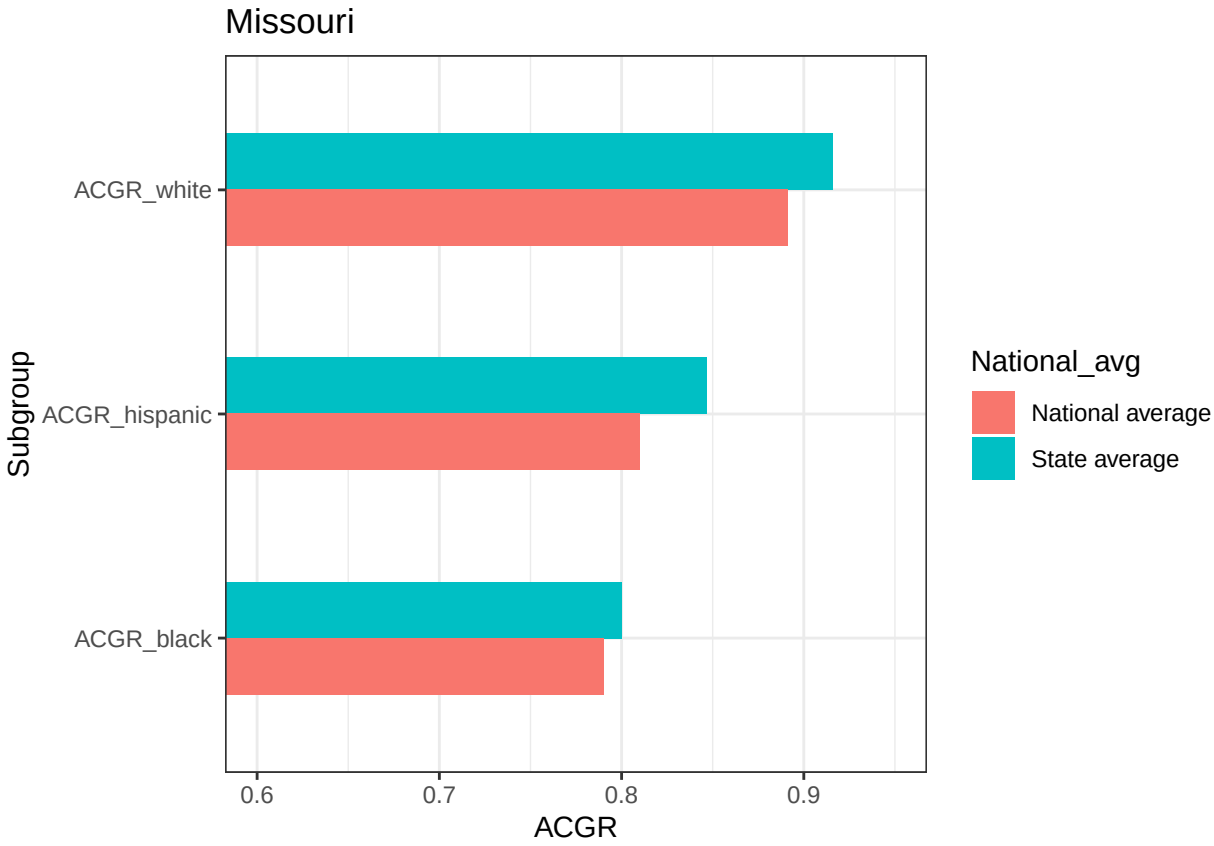
```
##
## $Minnesota
```



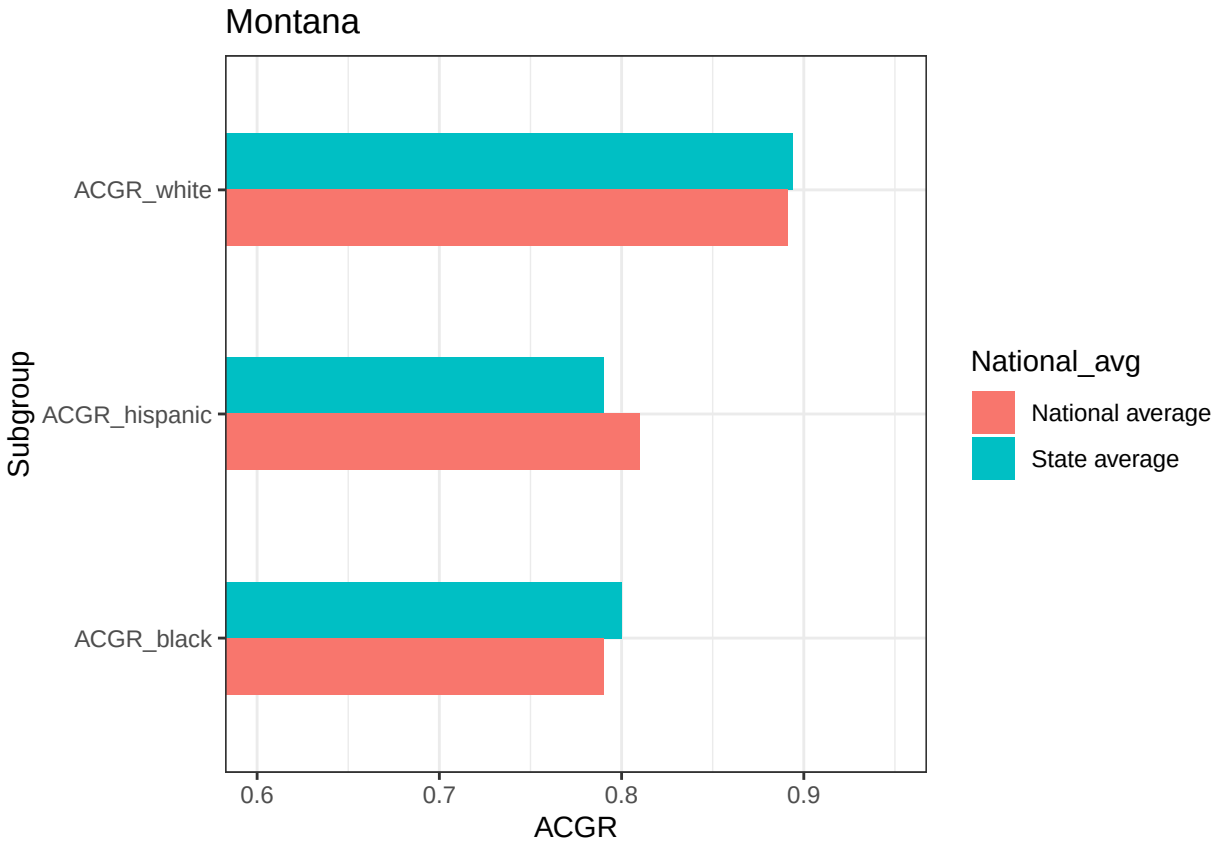

```
##
## $Mississippi
```


Mississippi
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

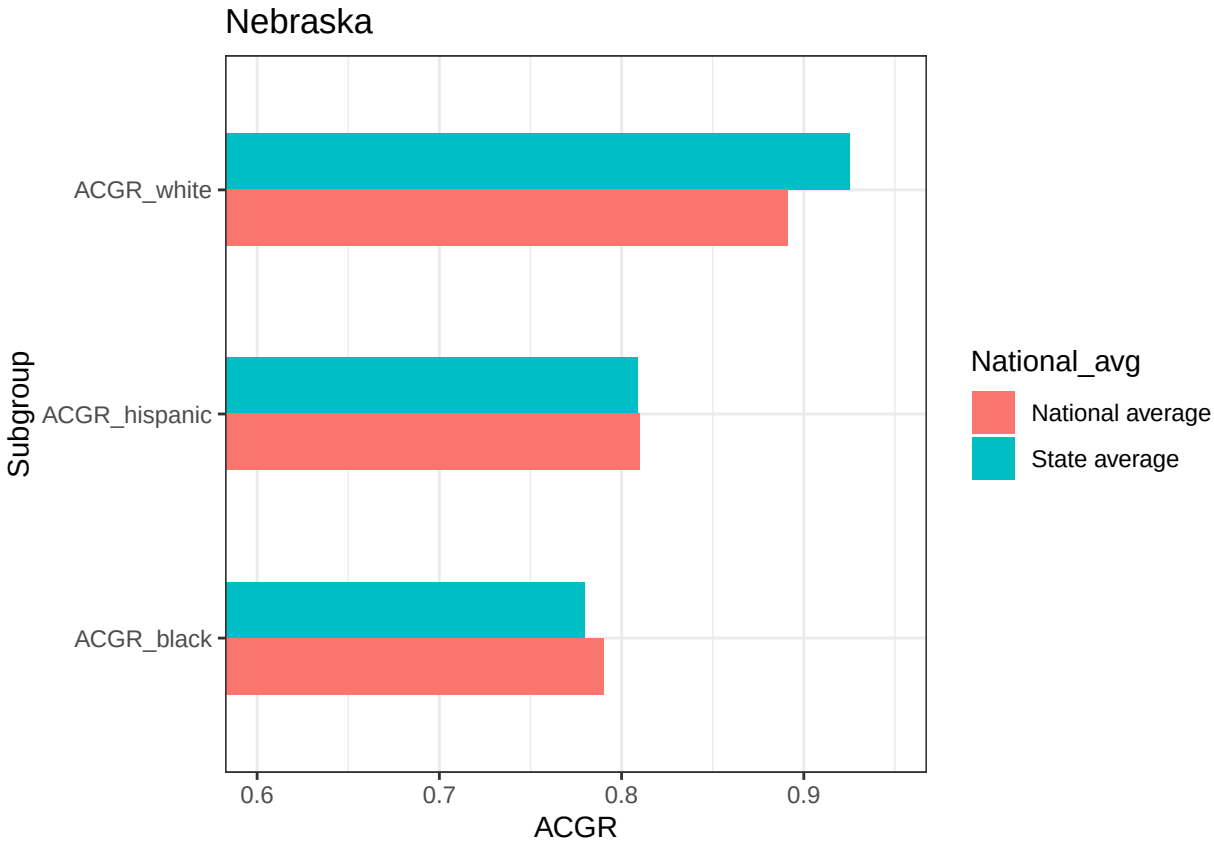
```
##
## $Missouri
```


Missouri
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

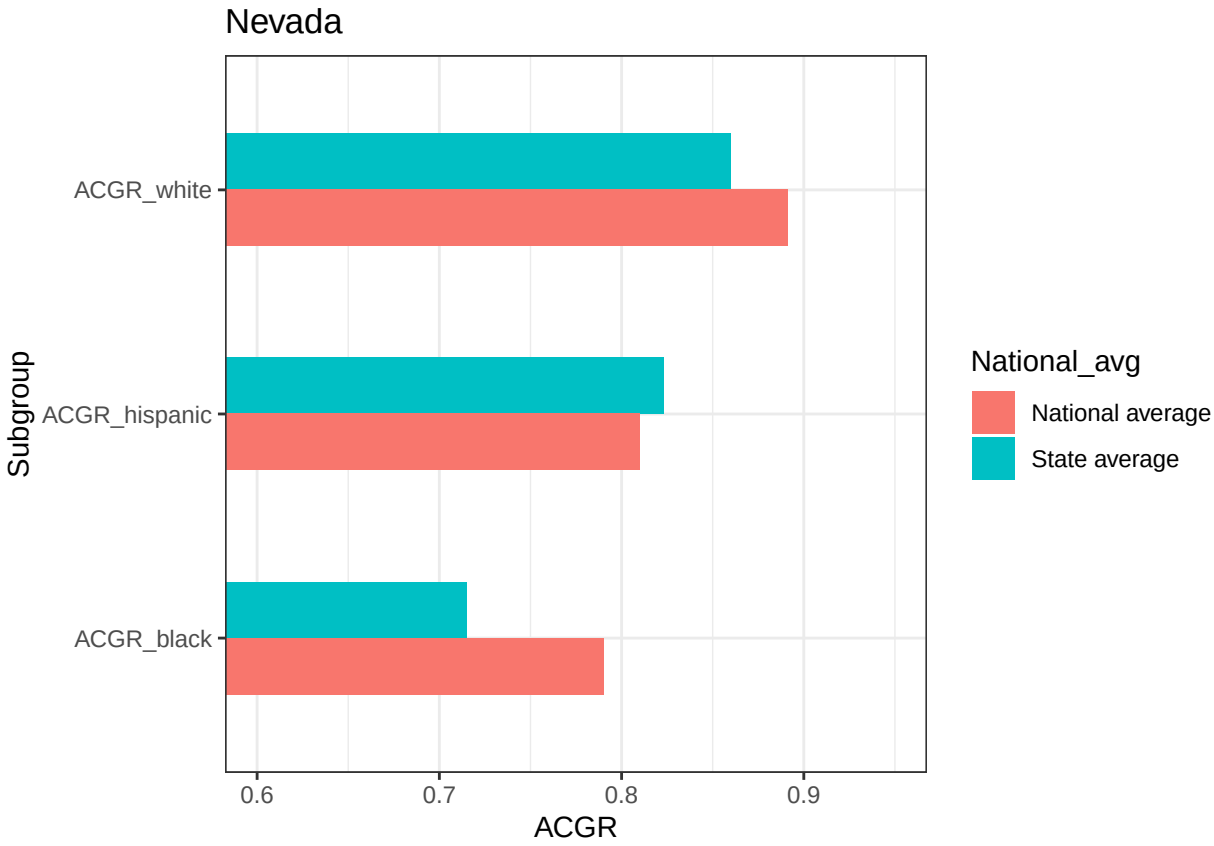
```
##
## $Montana
```


Montana
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

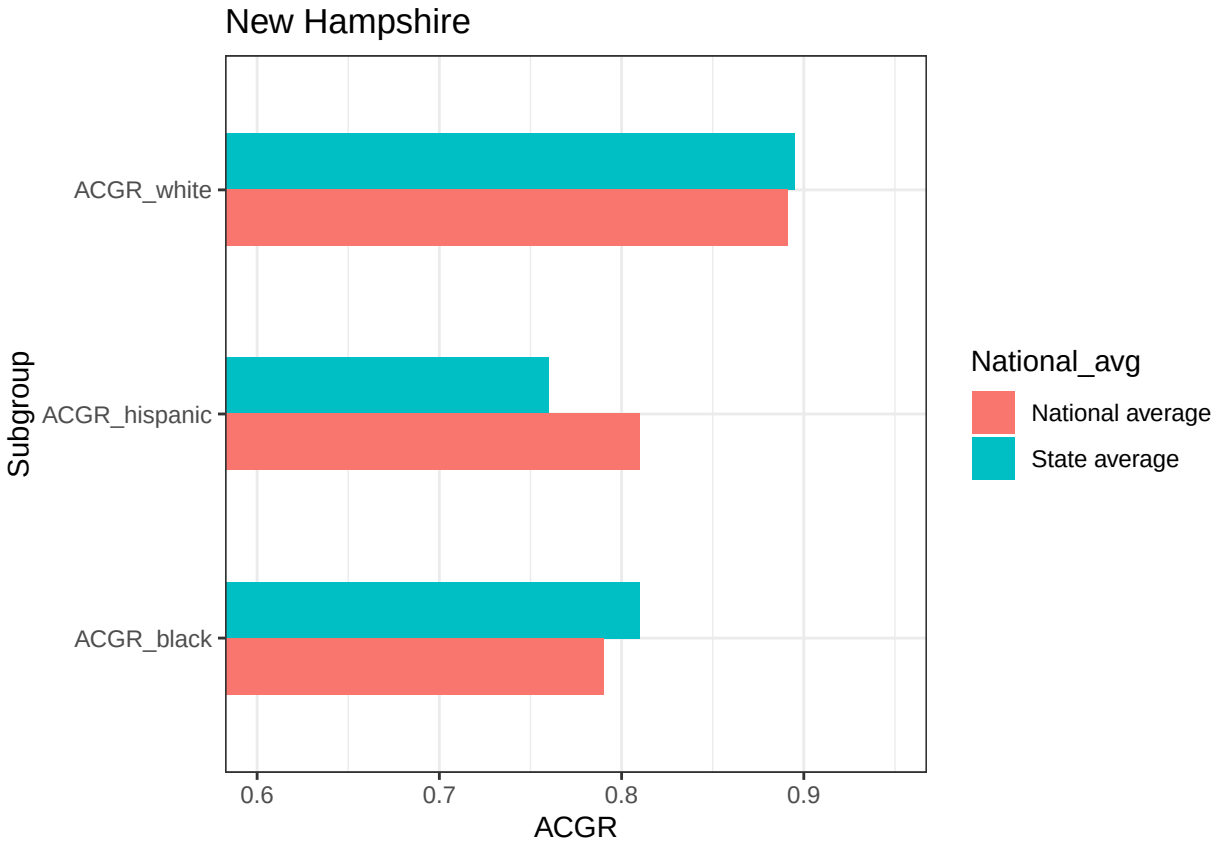
```
##
## $Nebraska
```


Nebraska
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

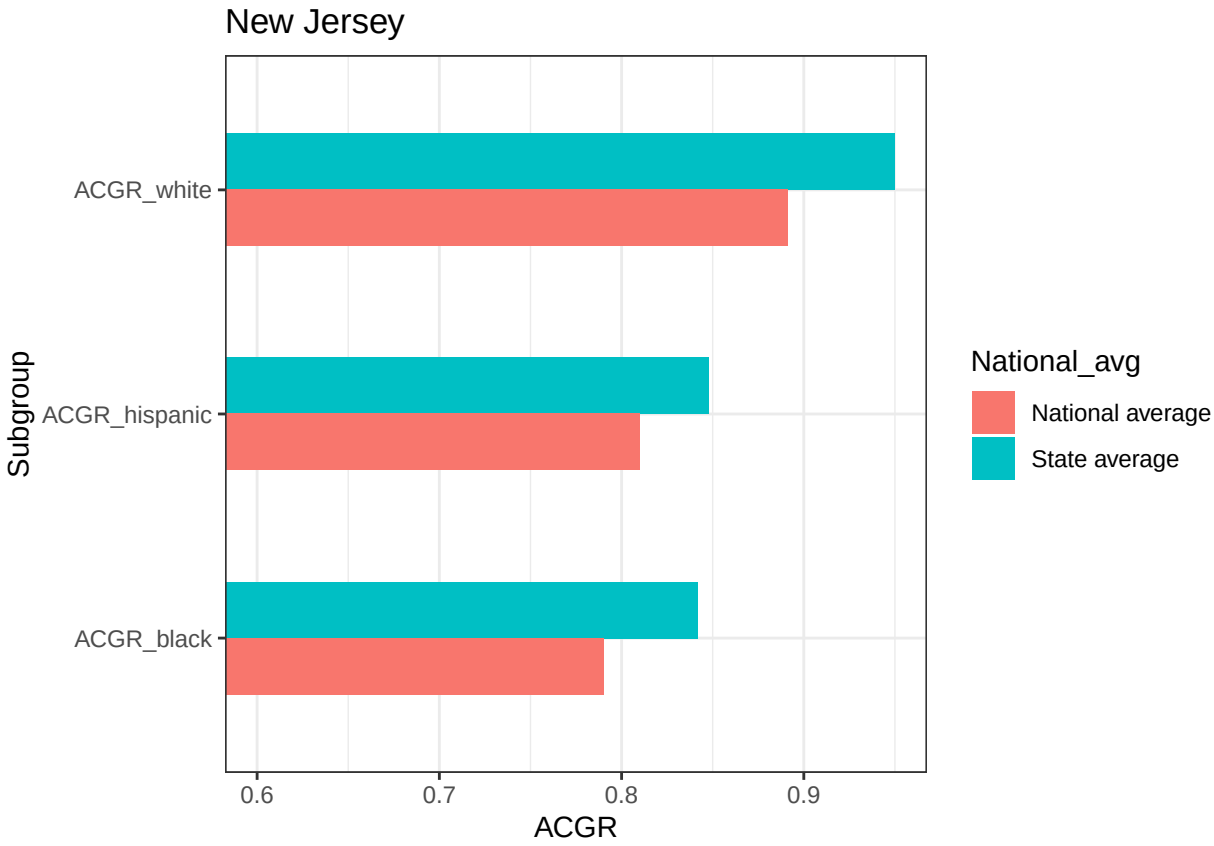
```
##
## $Nevada
```



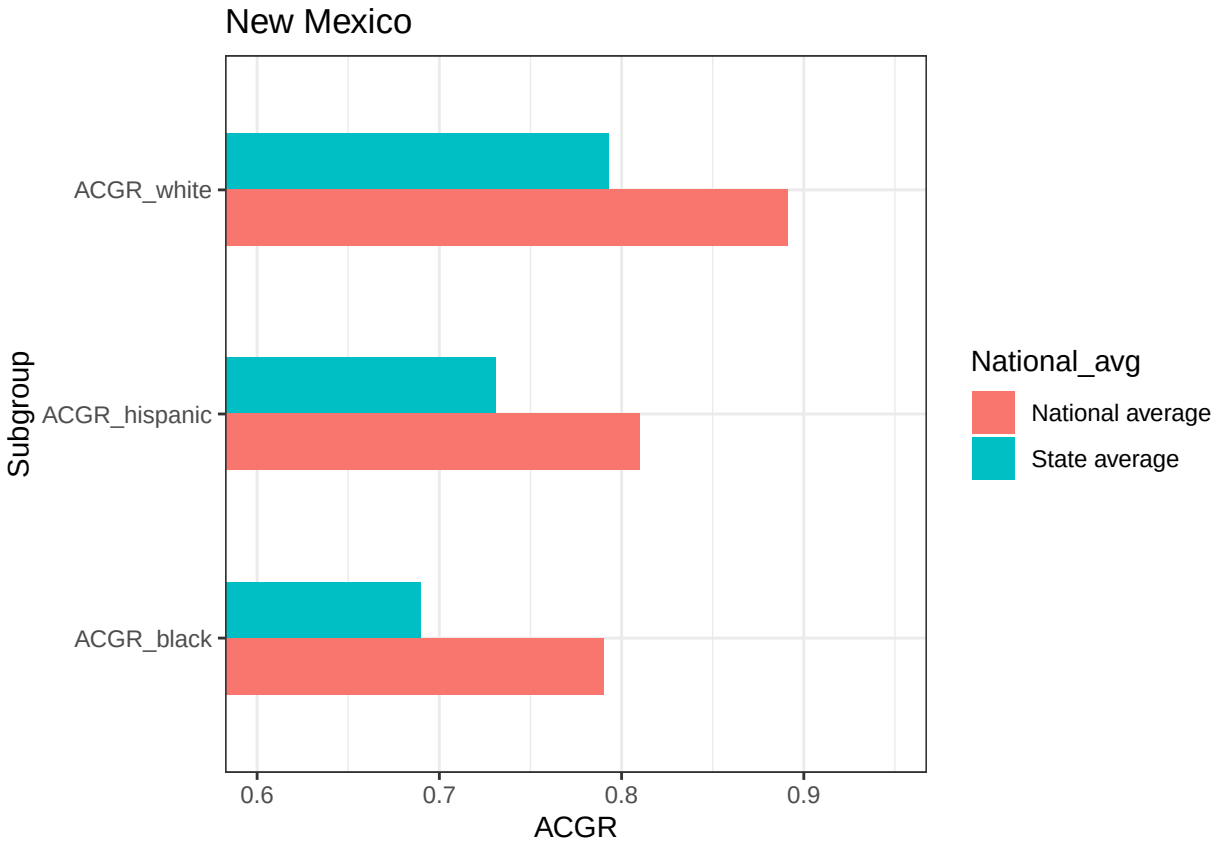

```
##
## $`New Hampshire`
```


New Hampshire
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

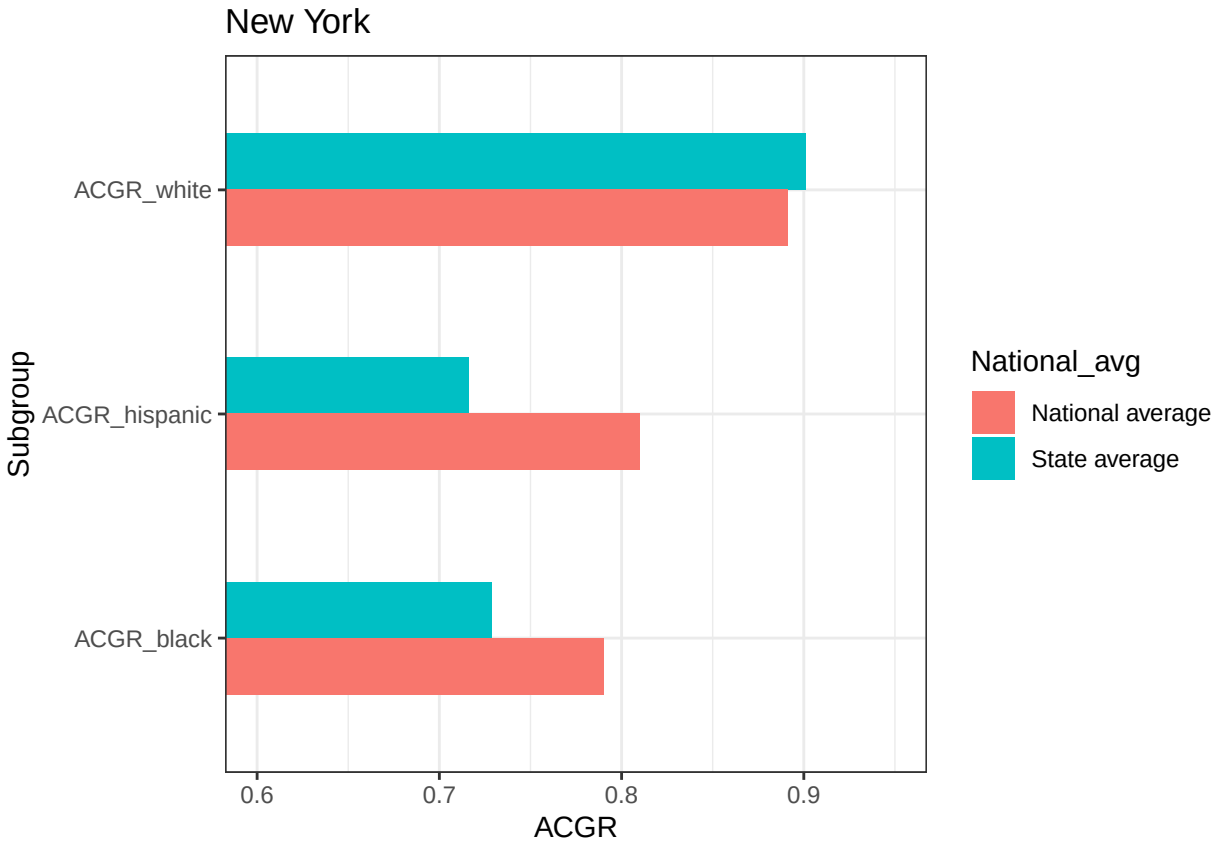
```
##
## $`New Jersey`
```


New Jersey
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

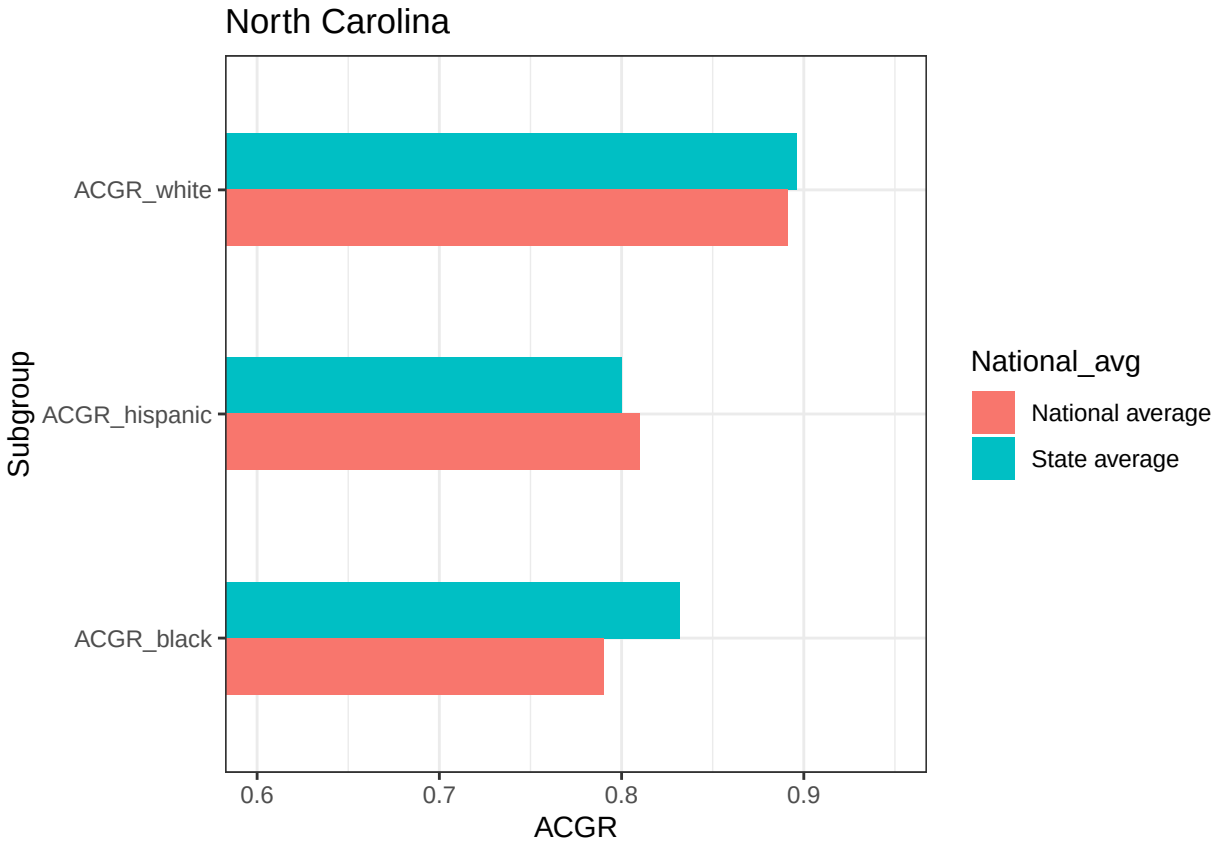
```
##
## $`New Mexico`
```


New Mexico
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

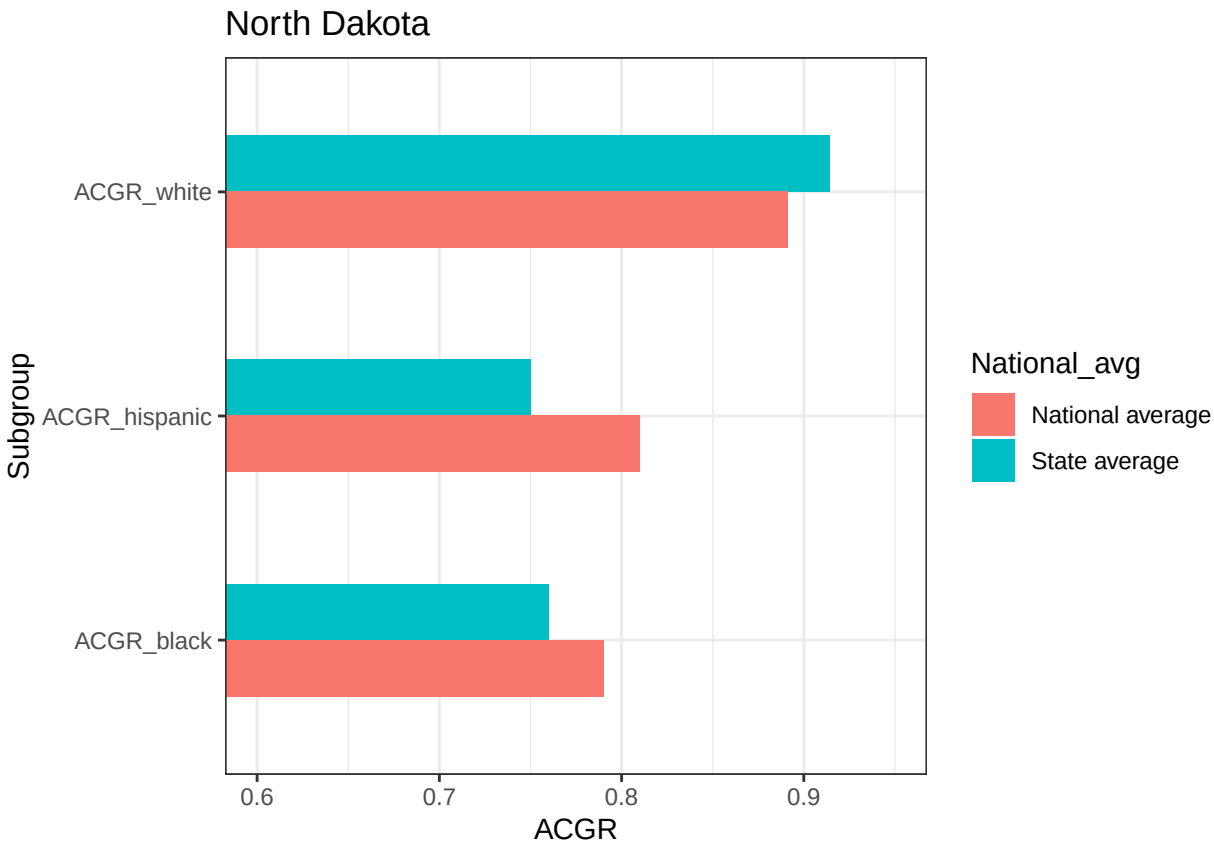
```
##
## $`New York`
```



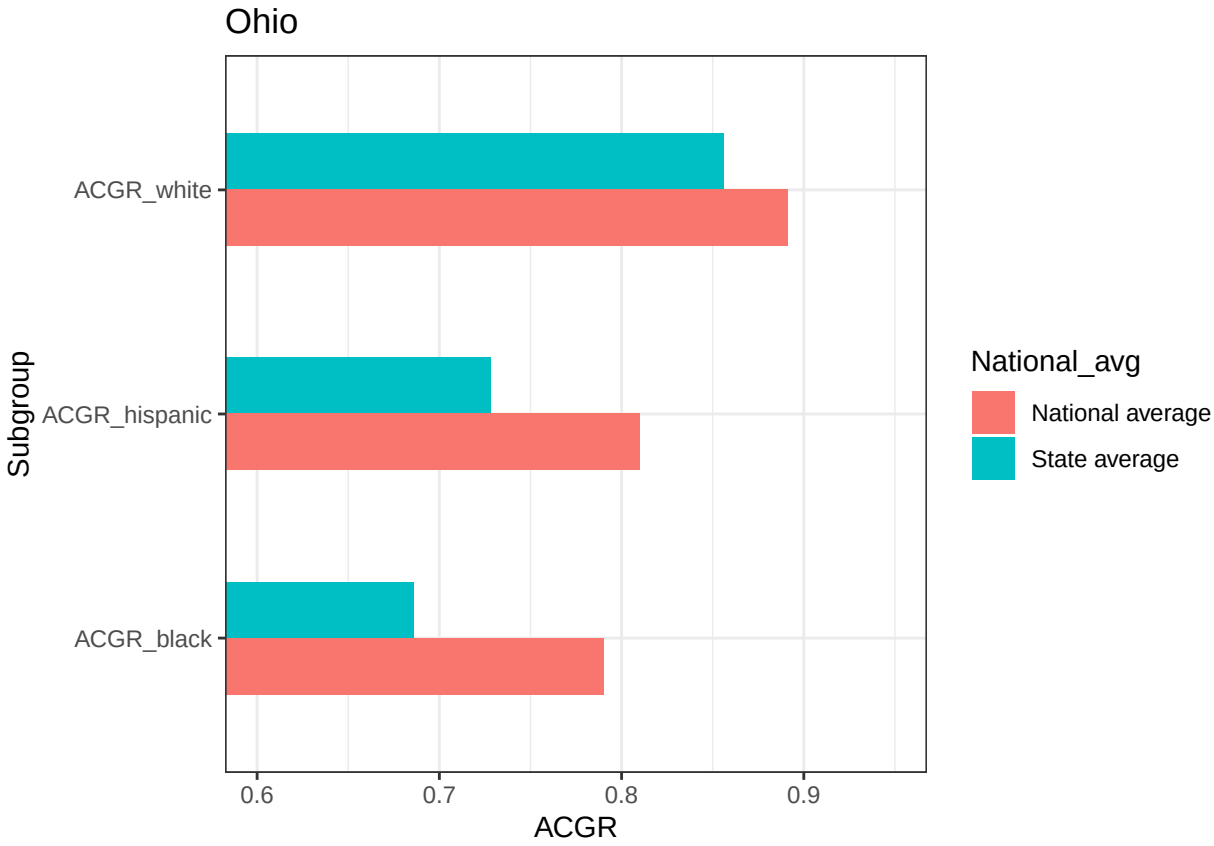

```
##
## $`North Carolina`
```



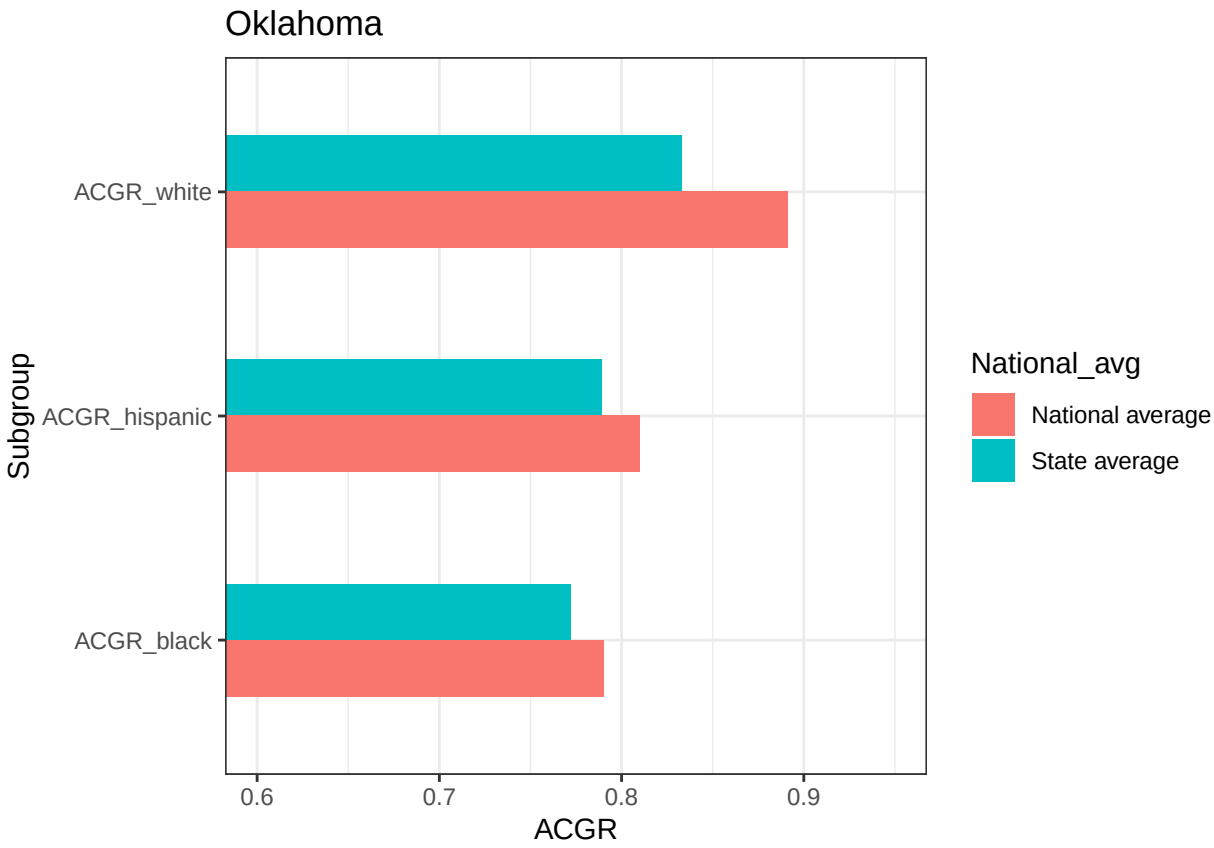

```
##
## $`North Dakota`
```


North Dakota
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

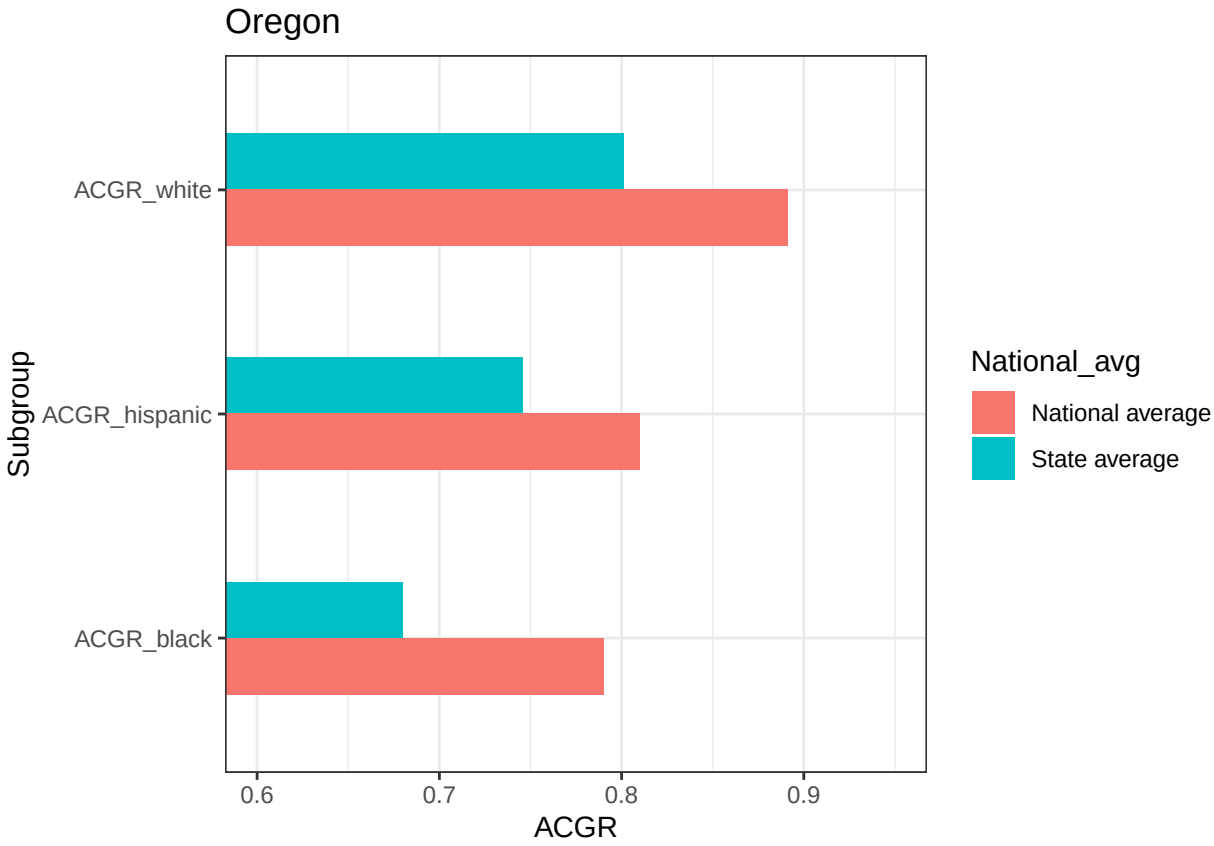
```
##
## $Ohio
```


Ohio
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

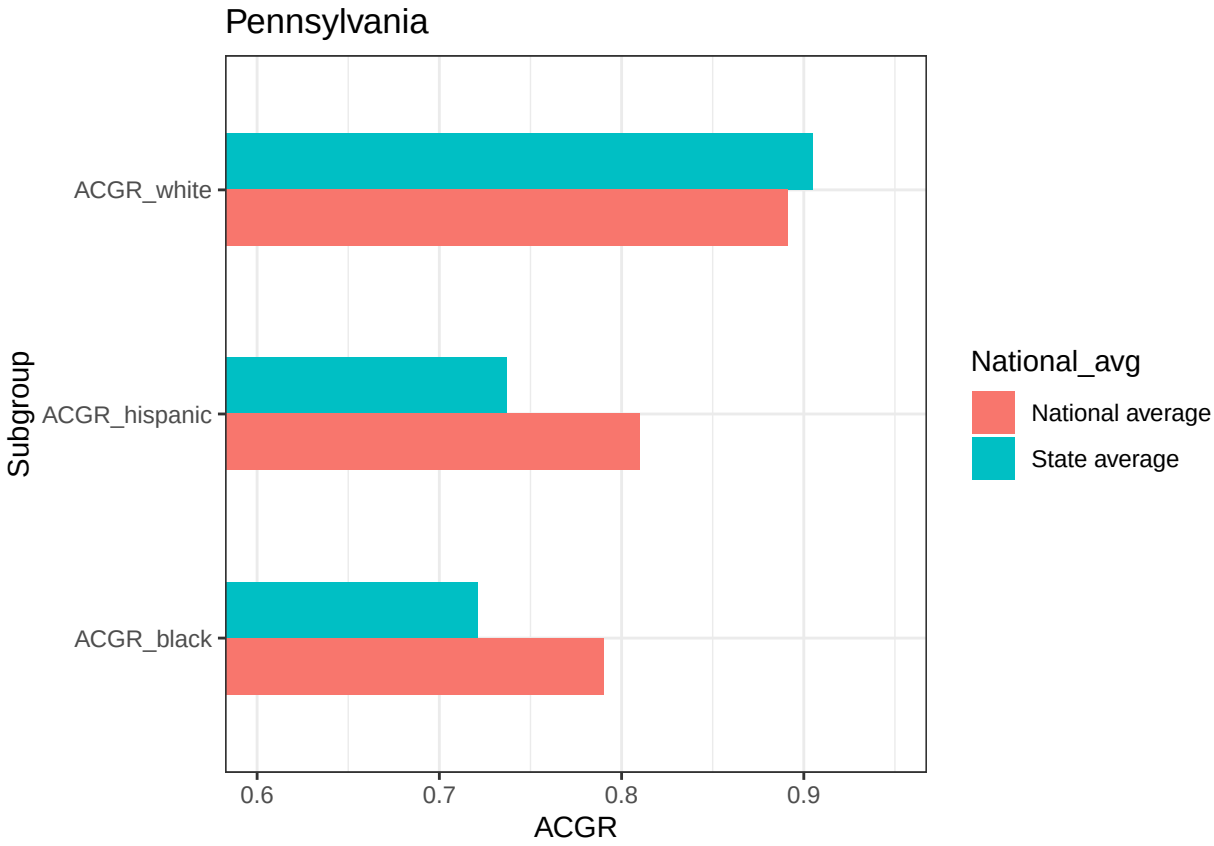
```
##
## $Oklahoma
```


Oklahoma
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

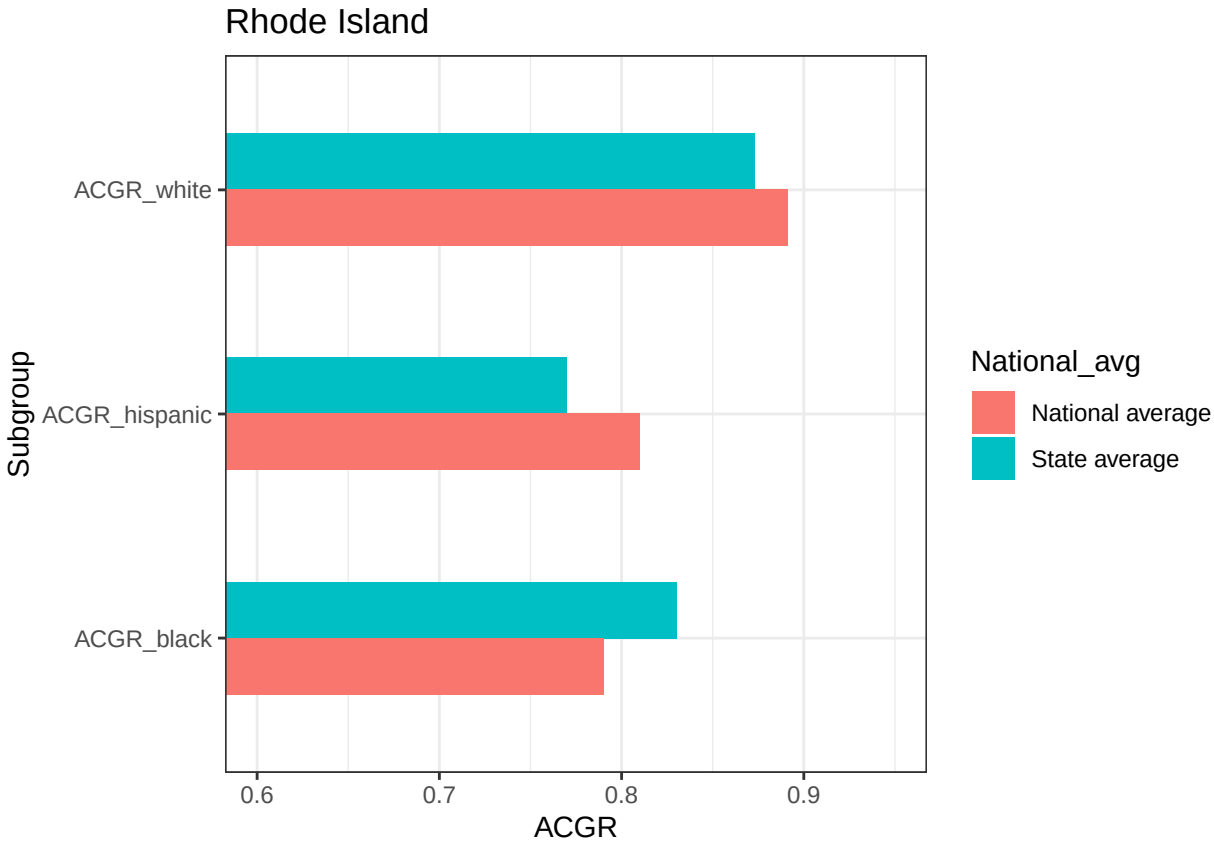
```
##
## $Oregon
```



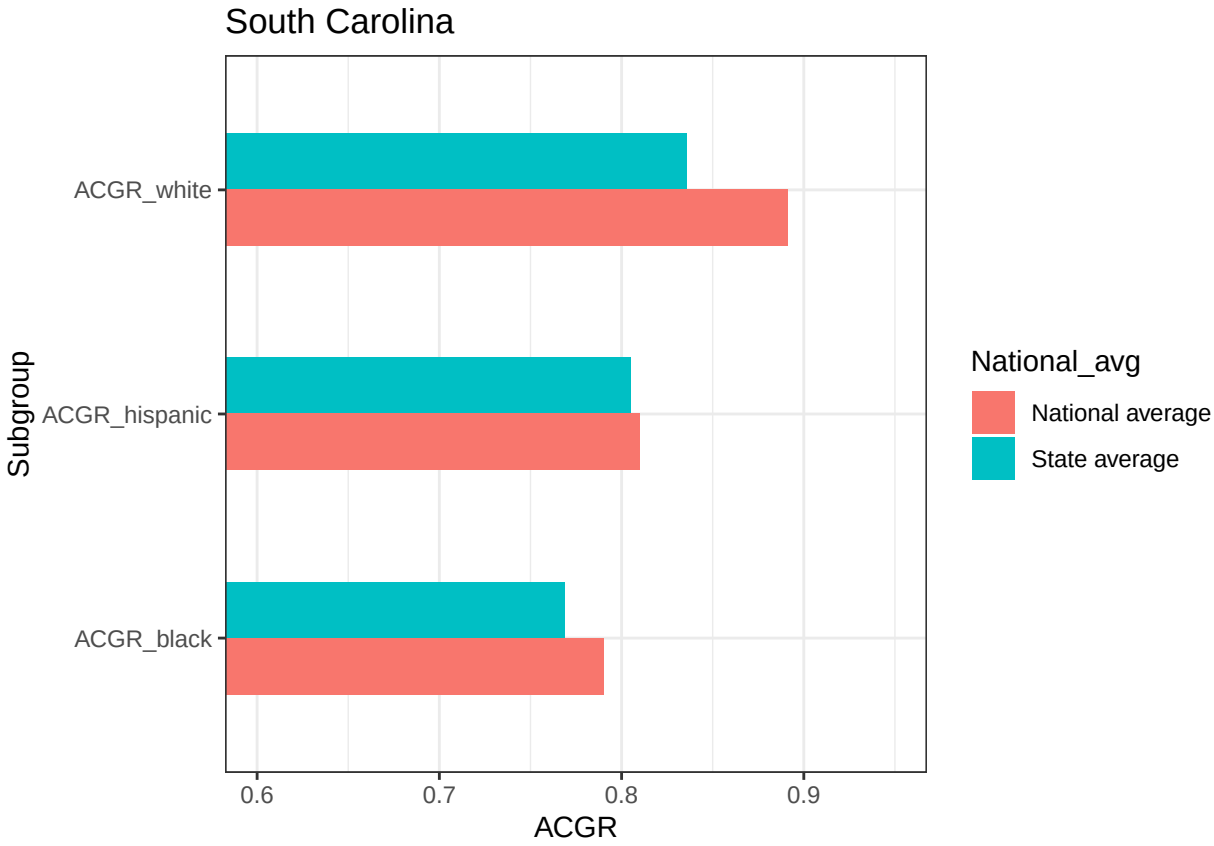

```
##
## $Pennsylvania
```



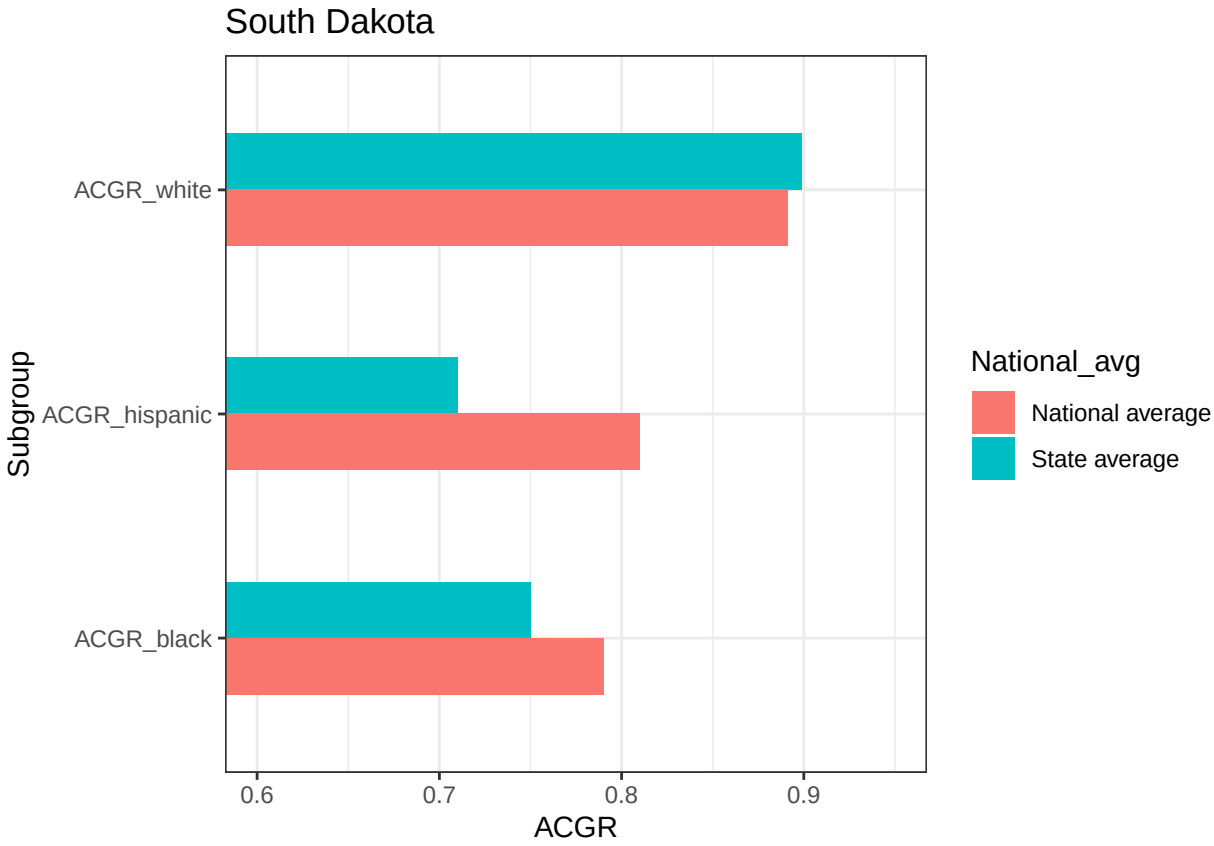

```
##
## $`Rhode Island`
```



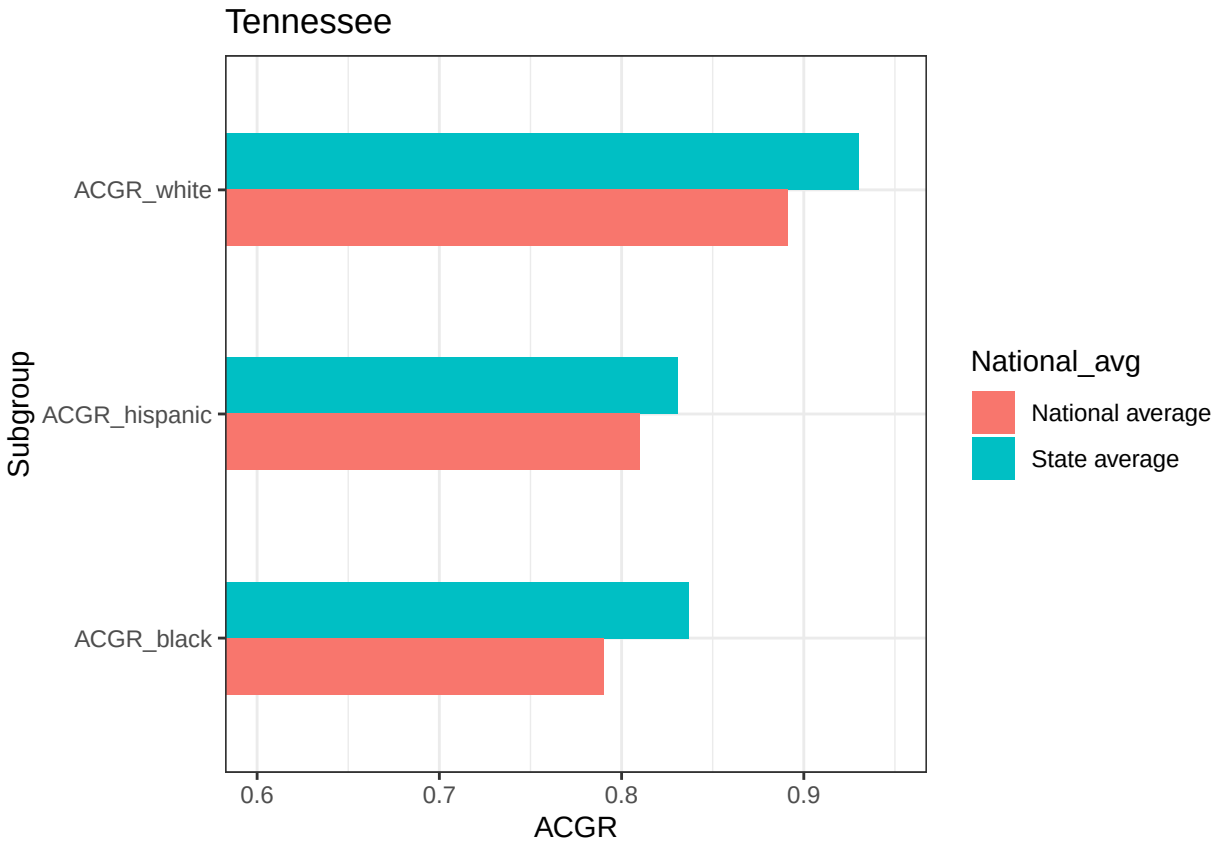

```
##
## $`South Carolina`
```



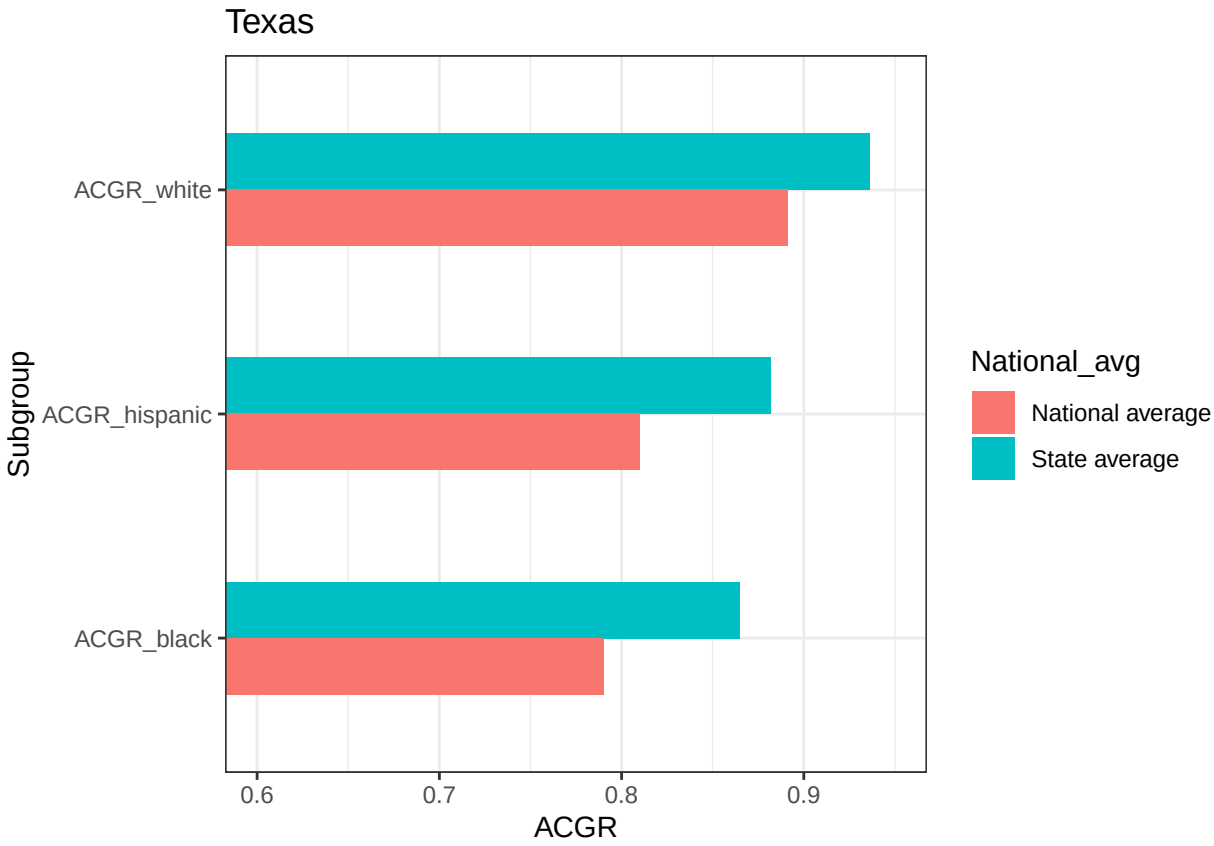

```
##
## $`South Dakota`
```


South Dakota
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

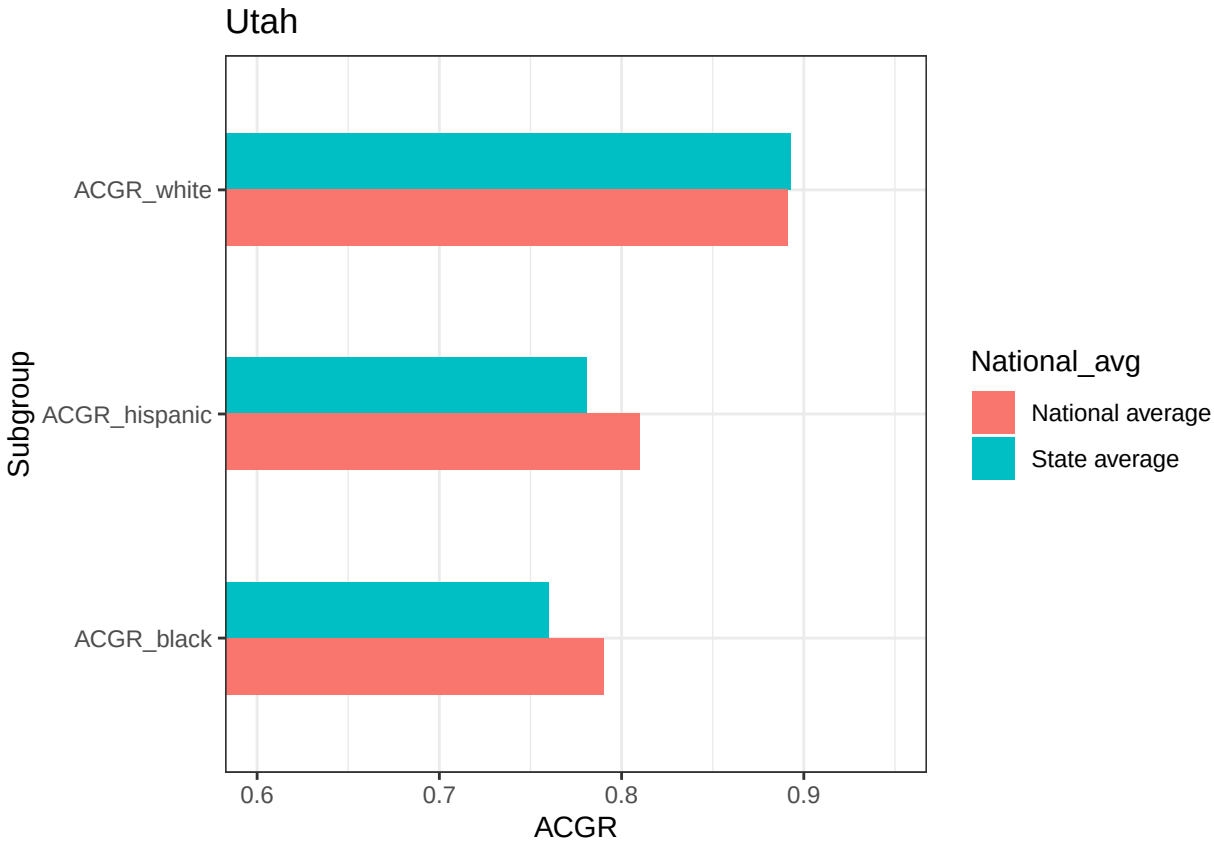
```
##
## $Tennessee
```


Tennessee
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

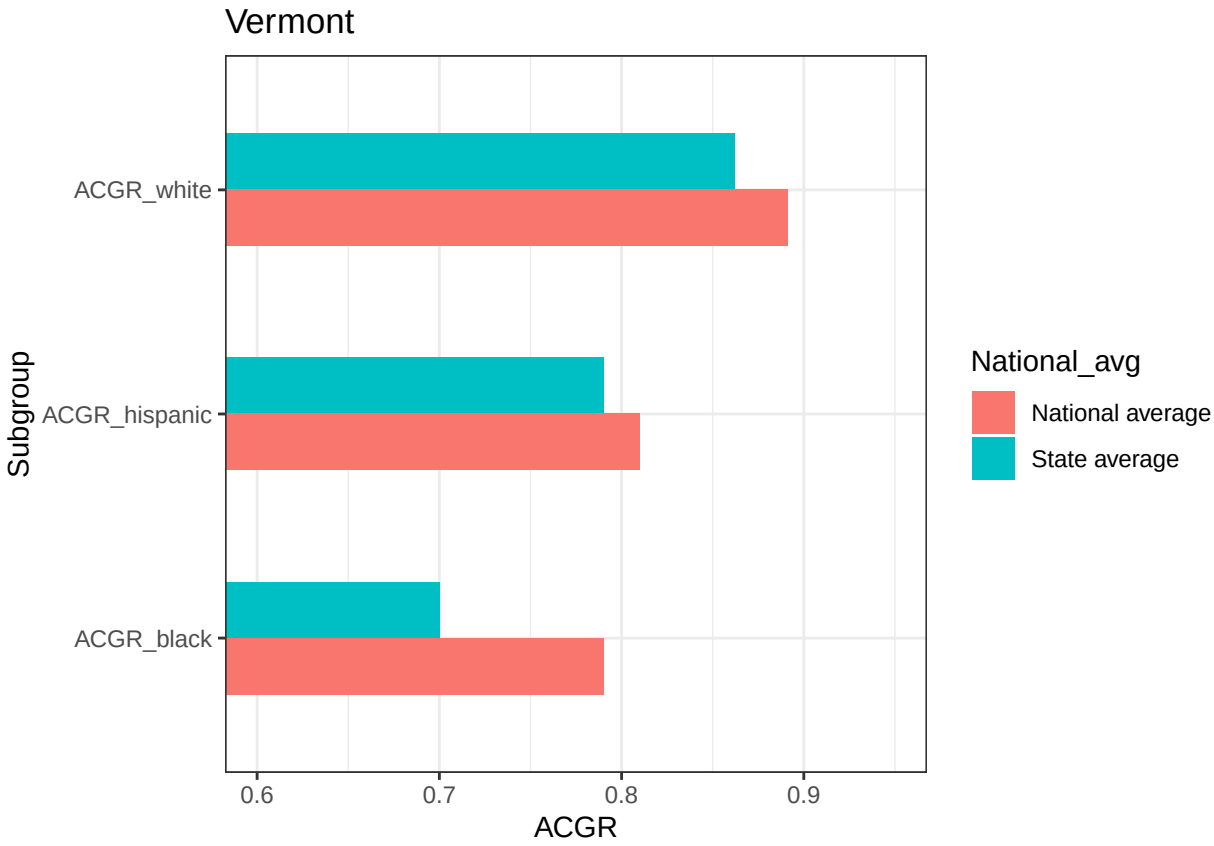
```
##
## $Texas
```


Texas
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

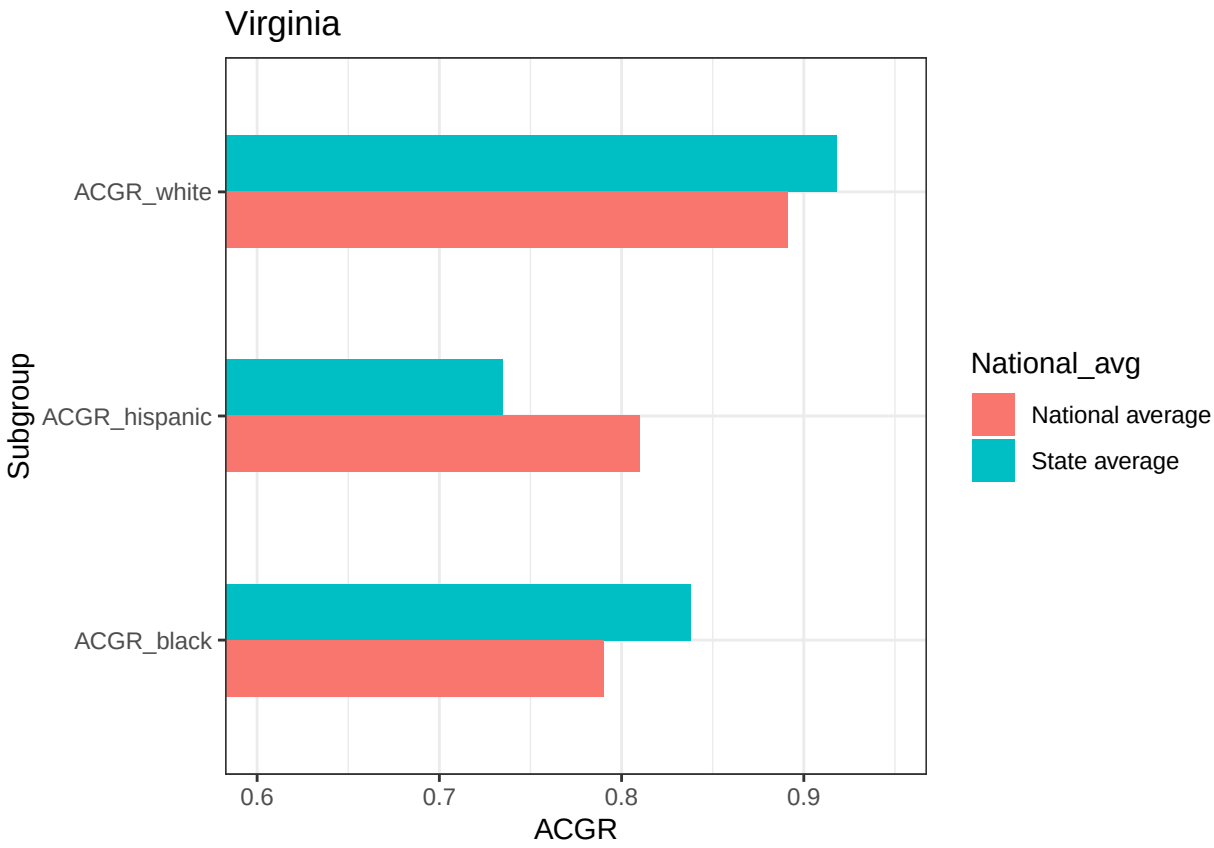
```
##
## $Utah
```


Utah
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

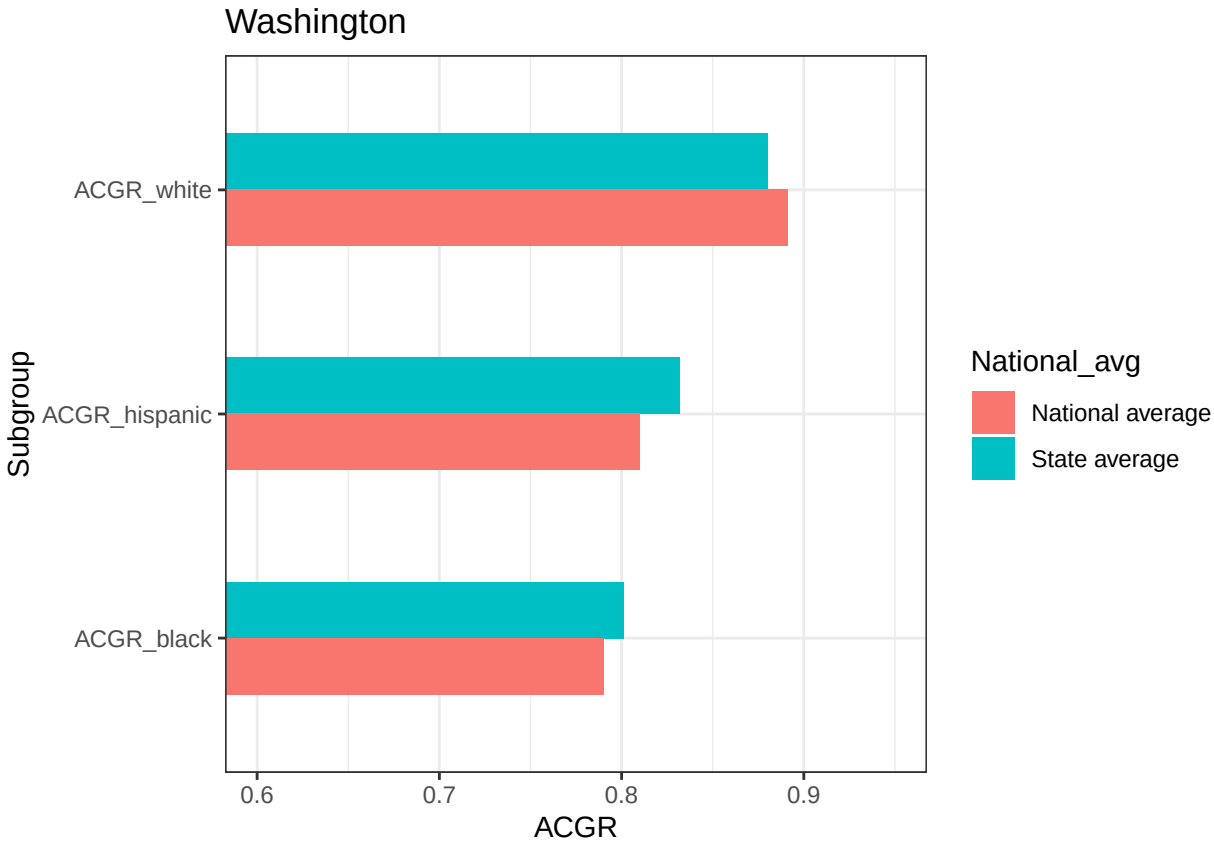
```
##
## $Vermont
```


Vermont
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

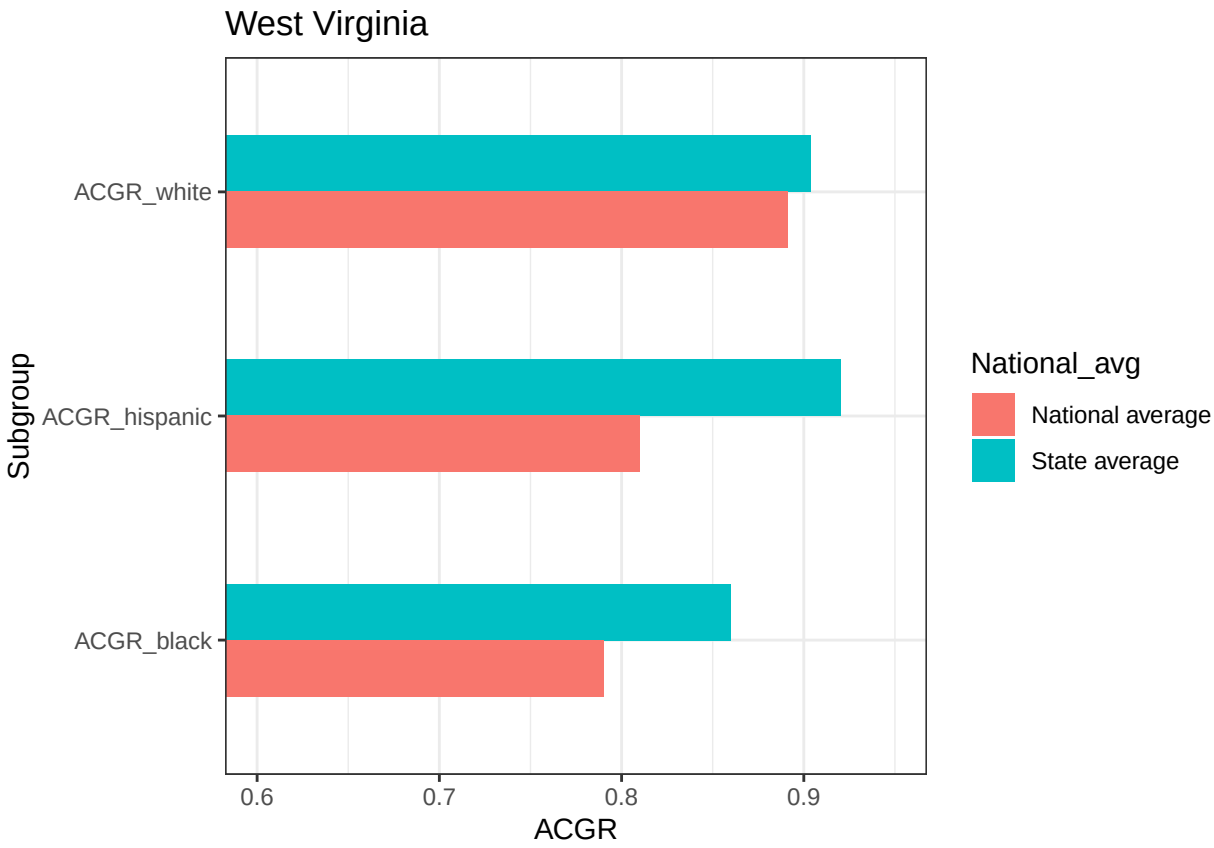
```
##
## $Virginia
```


Virginia
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

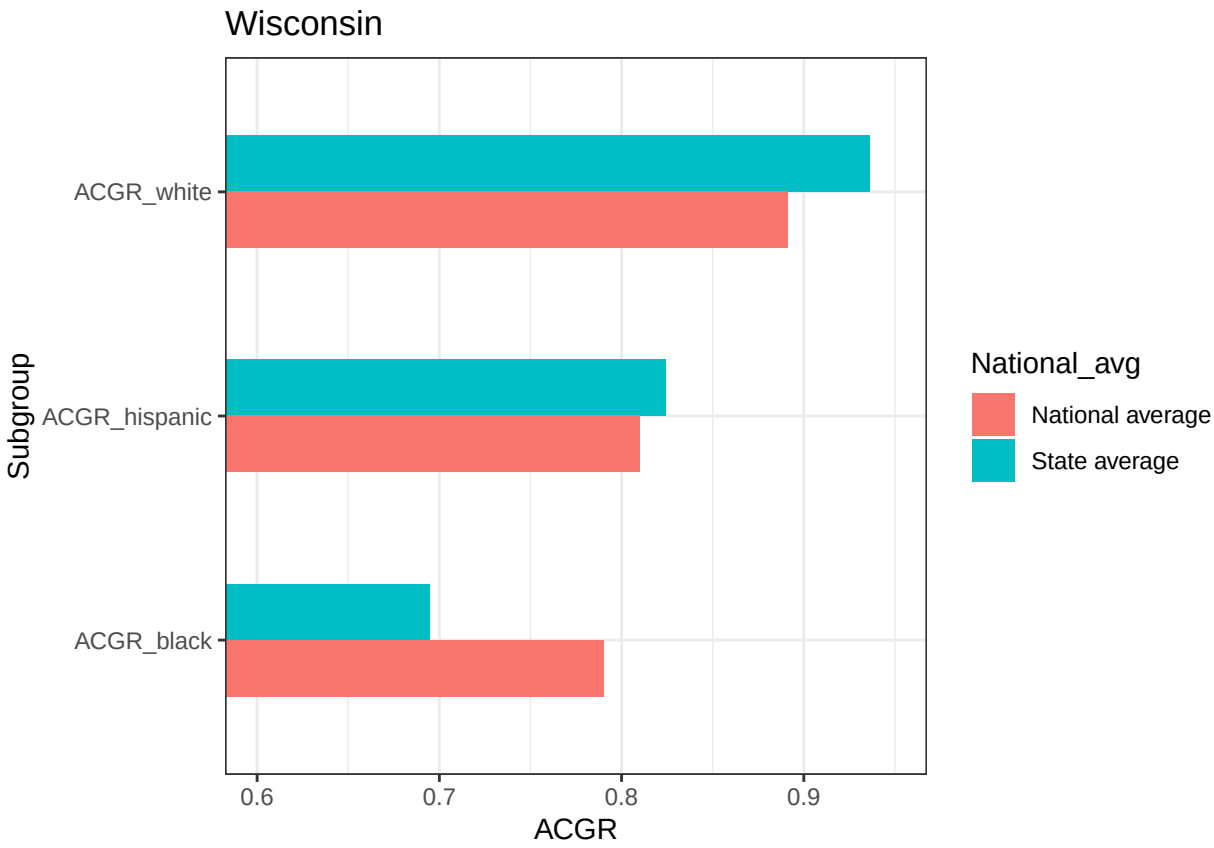
```
##
## $Washington
```



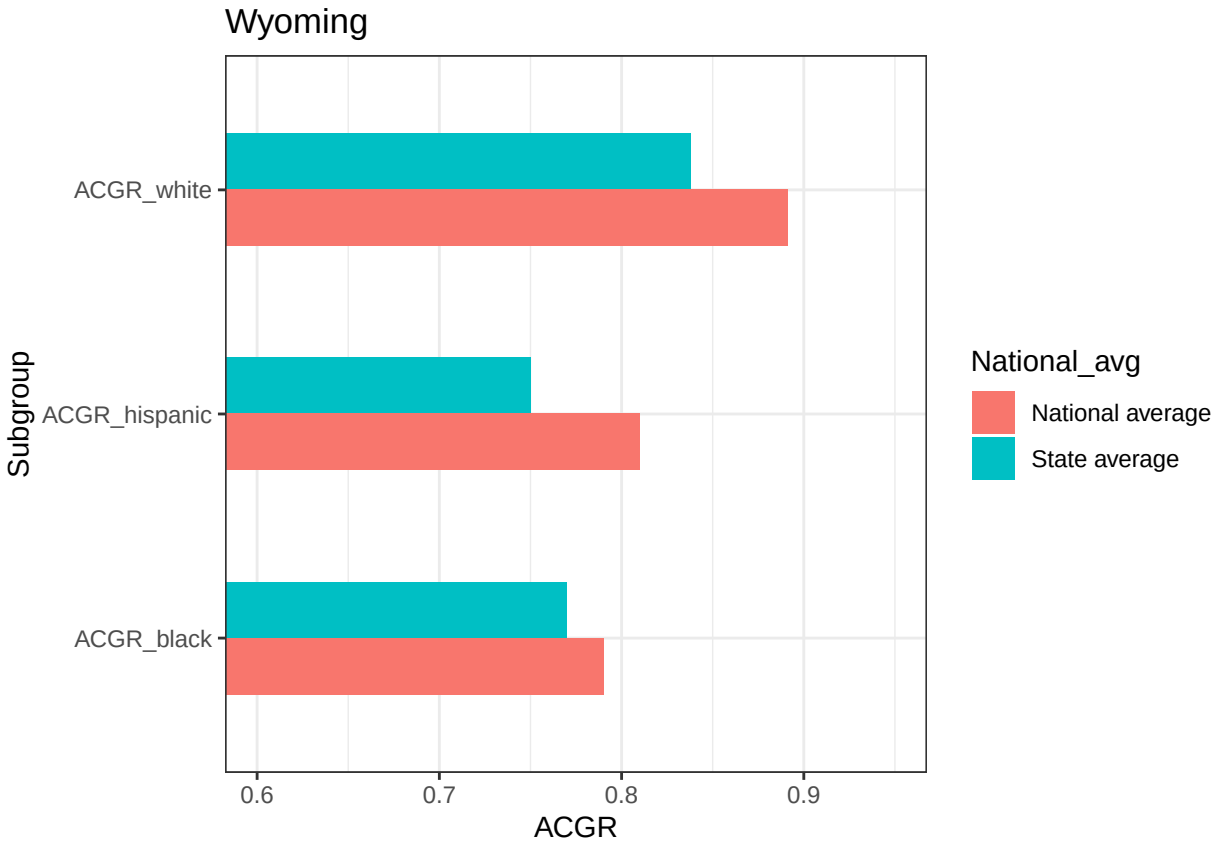

```
##
## $`West Virginia`
```


West Virginia
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

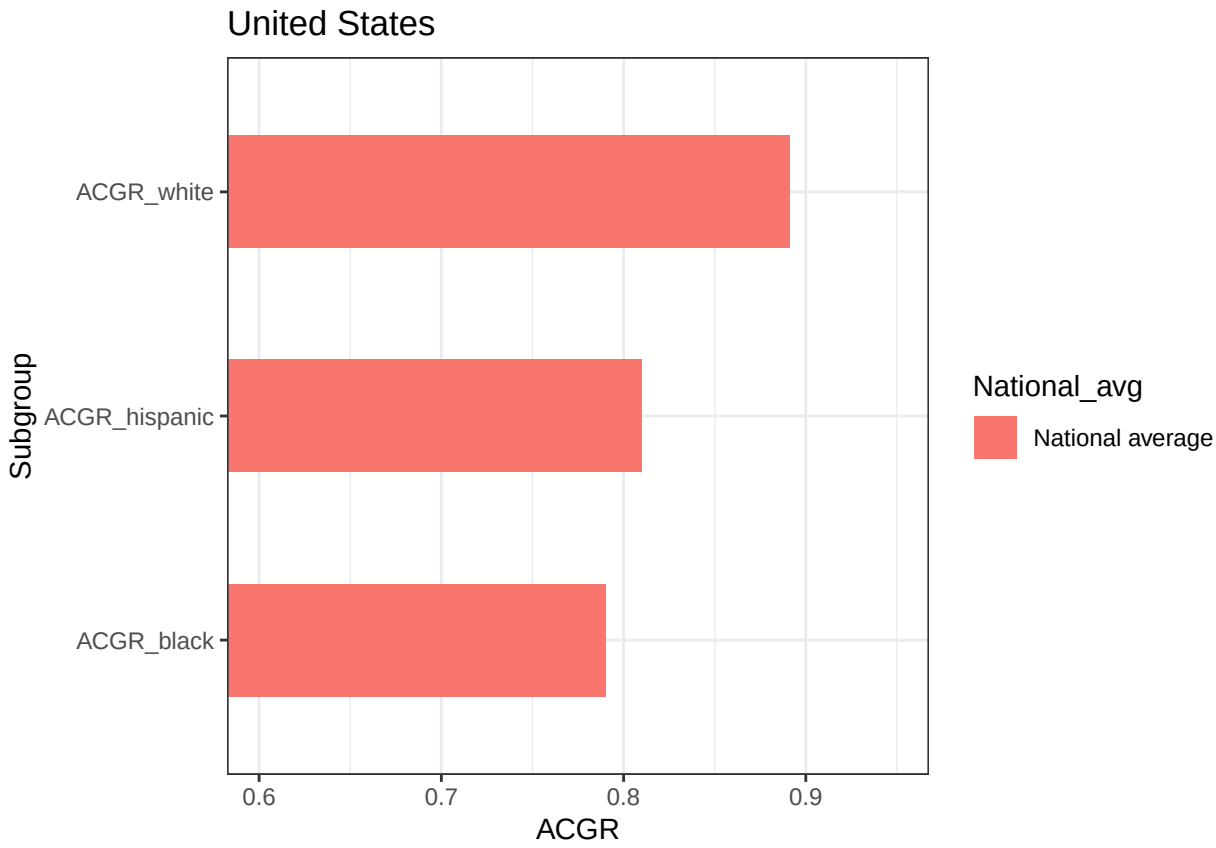
```
##
## $Wisconsin
```


Wisconsin
ACGR_white
ACGR_hispanic
ACGR_black
Subgroup
0.6
0.7
0.8
0.9
ACGR
National_avg
National average
State average

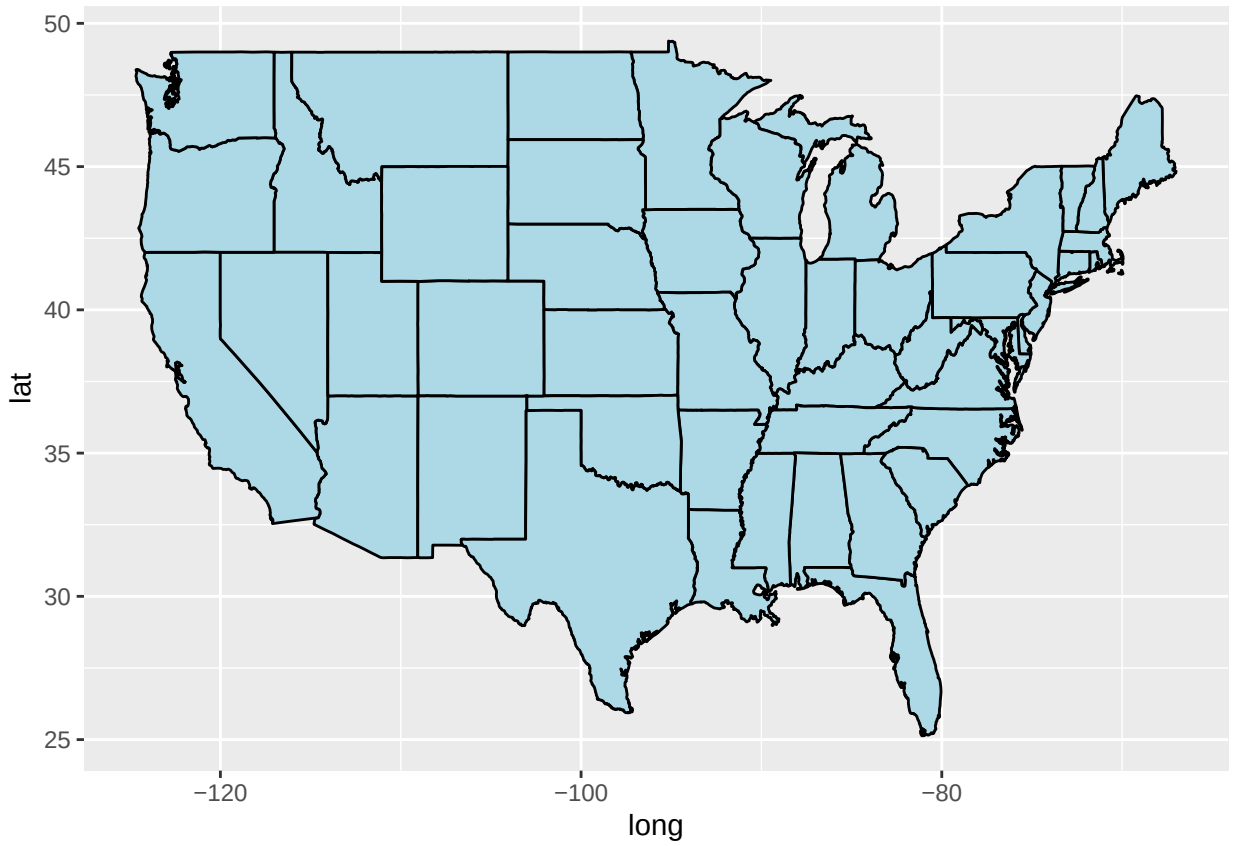
```
##
## $Wyoming
```




```
##
## $`United States`
```

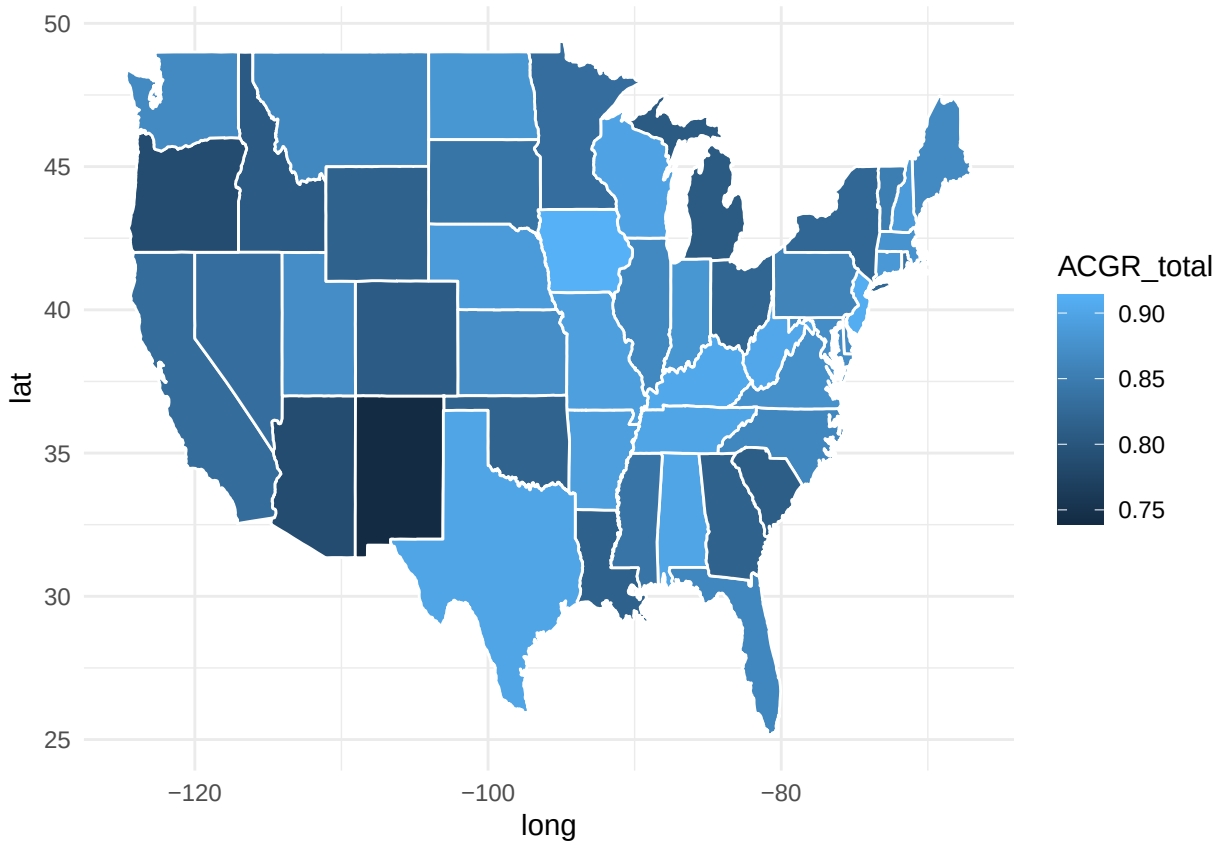



```
ggplot() +
  geom_polygon(data = MainStates, aes(x = long, y = lat, group = group),
    color = "black", fill = "lightblue")
```

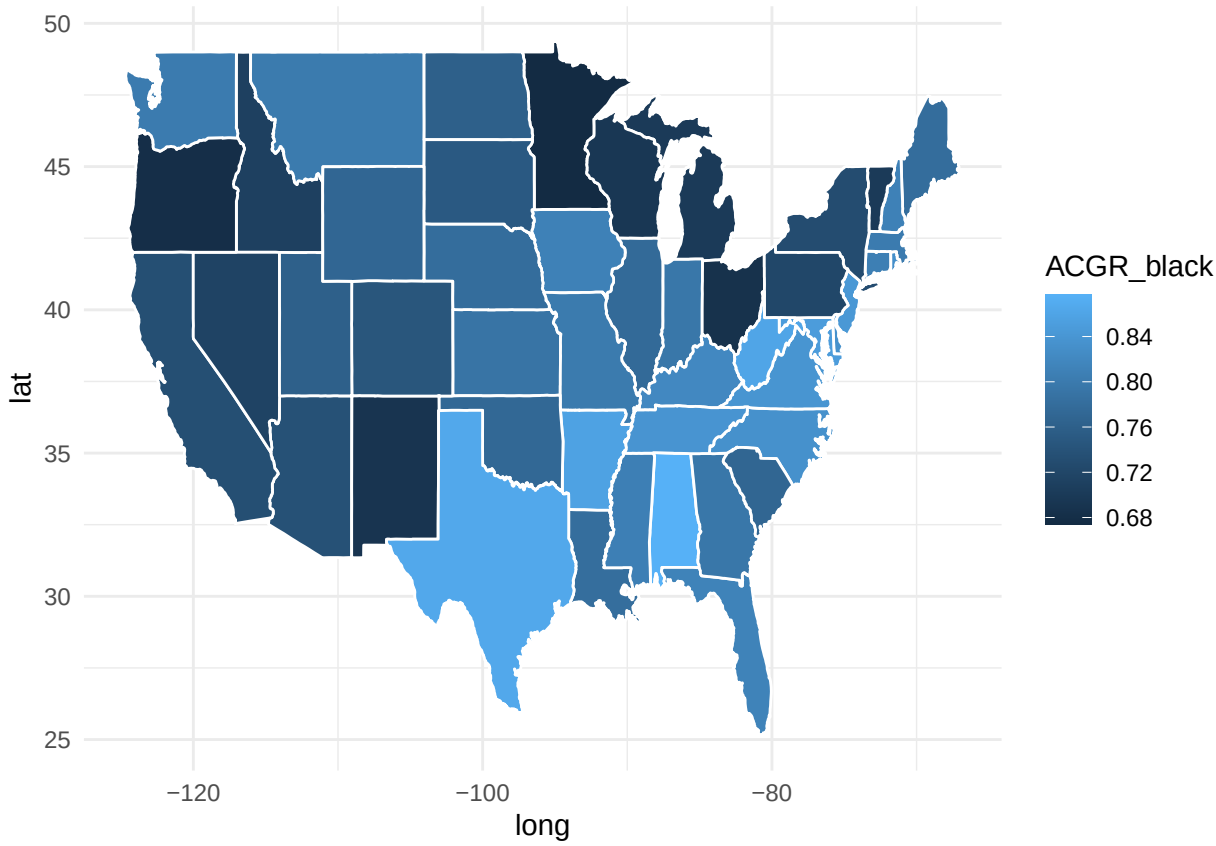



```
MainStates <- MainStates %>%
  rename(statename = region)
```

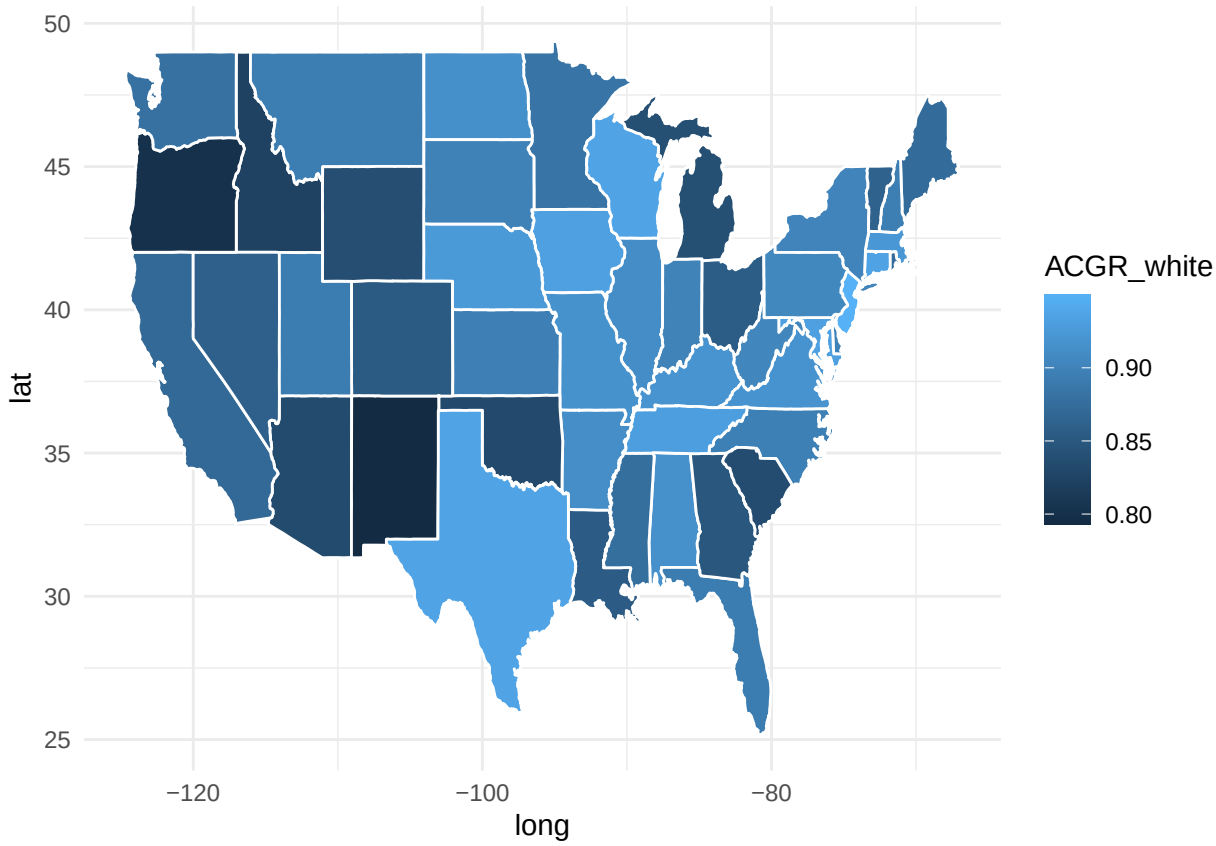
```
MainStates$statename <- toupper(MainStates$statename)
acgr$statename <- toupper(acgr$statename)


MergedStates <- inner_join(MainStates, acgr, by = "statename")

 ggplot() +
  geom_polygon(data = MergedStates,
               aes(x=long, y=lat, group=group,
                   fill=ACGR_total),
               color = "white") + theme_minimal()
```



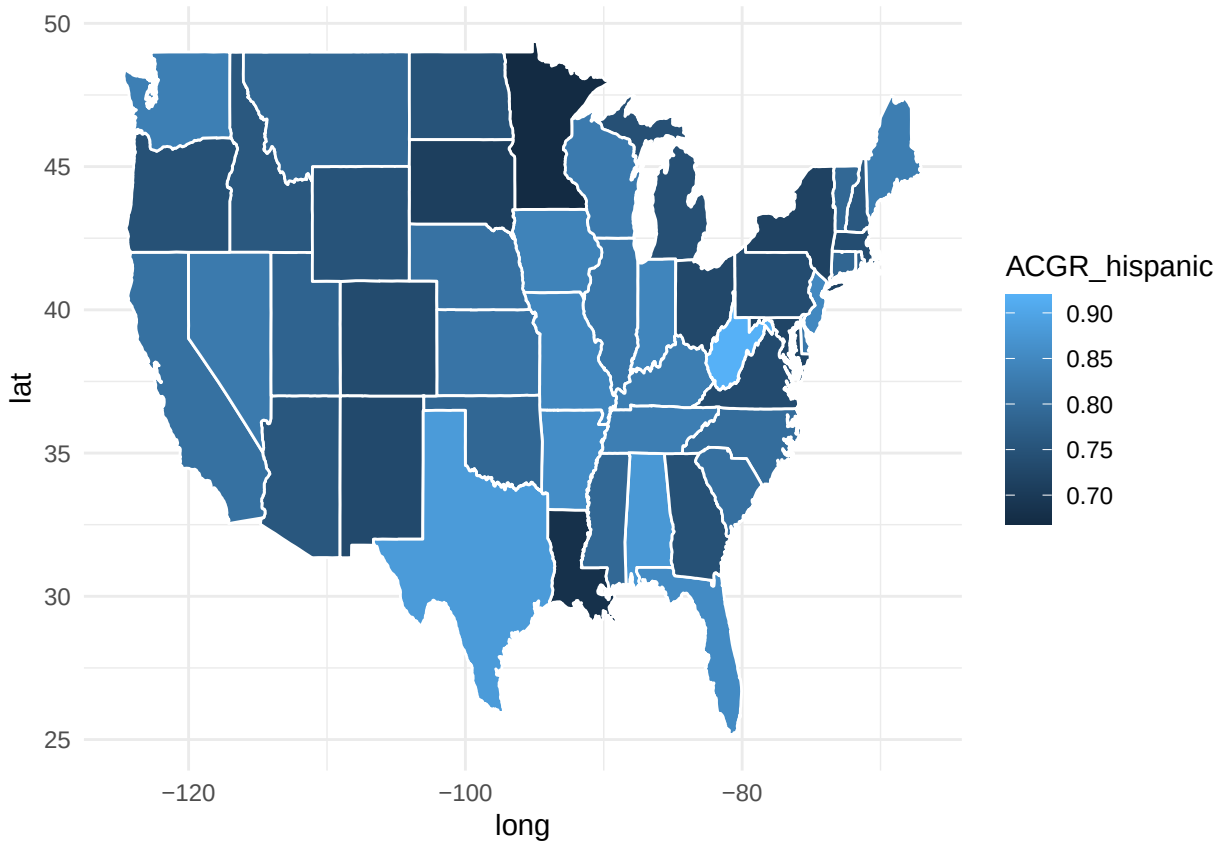

```
ggplot() +
geom_polygon(data = MergedStates,
             aes(x=long, y=lat, group=group,
                 fill=ACGR_black),
             color = "white") + theme_minimal()
```



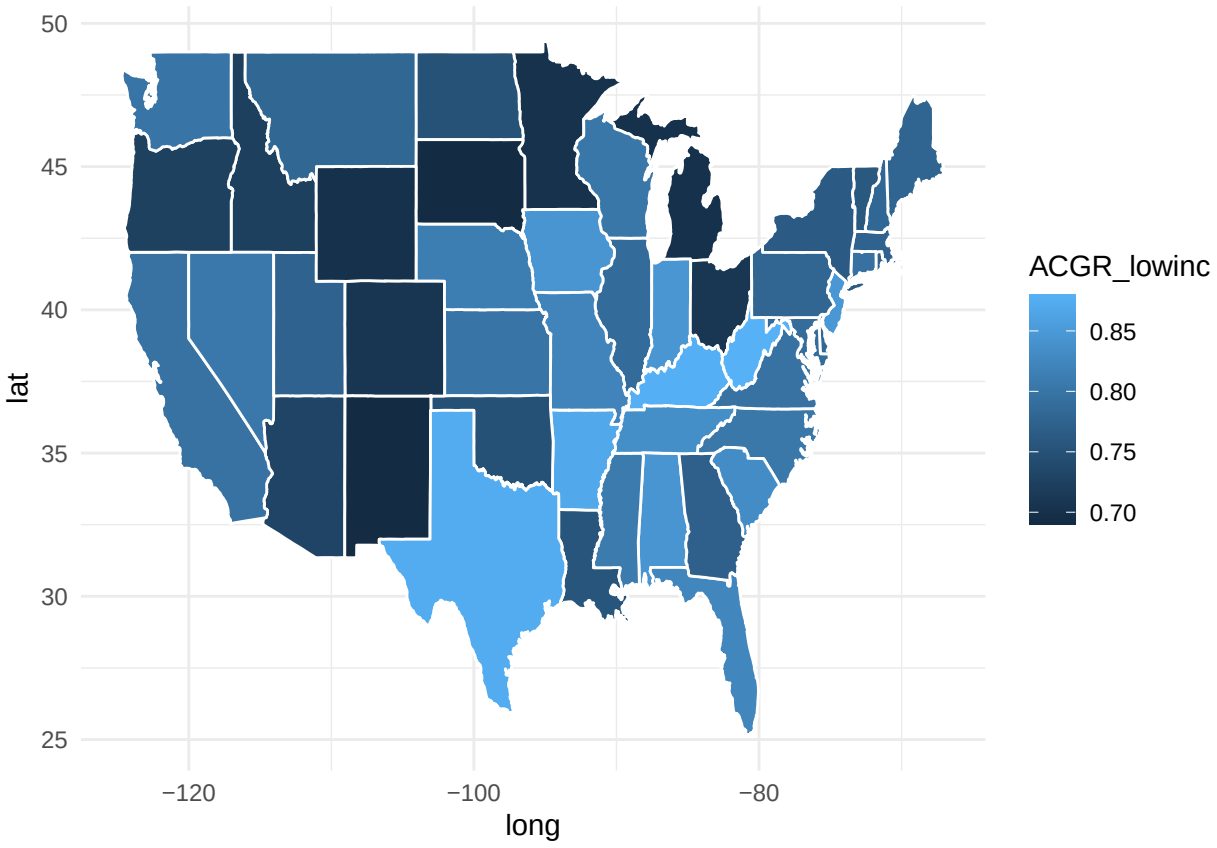

```
  ggplot() +
geom_polygon(data = MergedStates,
             aes(x=long, y=lat, group=group,
                 fill=ACGR_white),
             color = "white") + theme_minimal()
```




```
  ggplot() +
geom_polygon(data = MergedStates,
             aes(x=long, y=lat, group=group,
                 fill=ACGR_hispanic),
             color = "white") + theme_minimal()
```




```
   ggplot() +
geom_polygon(data = MergedStates,
             aes(x=long, y=lat, group=group,
                 fill=ACGR_lowinc),
             color = "white") + theme_minimal()
```


50
45
40
35
30
25
lat
−120
−100
−80
long
ACGR_lowinc
0.85
0.80
0.75
0.70