Modelagem 03

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2023-05-18

### Análise de modelagem 01

#sisvan\_estab <- read\_rds("../data/sisvan\_estab.rds")  
#sisvan\_estab$files\_way %>% unique()  
#sisvan\_estab$ano %>% unique()  
  
read\_rds("../data/vulnerabilidade.rds") %>% filter(id\_municipio == "3500105")

## # A tibble: 54 × 91  
## ano sigla\_uf id\_municipio raca\_cor sexo localizacao ivs  
## <int> <chr> <chr> <chr> <chr> <chr> <dbl>  
## 1 2000 SP 3500105 branco total total 0.23   
## 2 2000 SP 3500105 branco total urbano 0.226  
## 3 2000 SP 3500105 total total total 0.275  
## 4 2000 SP 3500105 total total urbano 0.279  
## 5 2000 SP 3500105 negro total total 0.41   
## 6 2000 SP 3500105 negro total urbano 0.401  
## 7 2000 SP 3500105 branco homem total NA   
## 8 2000 SP 3500105 branco homem rural NA   
## 9 2000 SP 3500105 branco homem urbano NA   
## 10 2000 SP 3500105 total homem total NA   
## # ℹ 44 more rows  
## # ℹ 84 more variables: ivs\_infraestrutura\_urbana <dbl>,  
## # ivs\_capital\_humano <dbl>, ivs\_renda\_trabalho <dbl>, idhm <dbl>,  
## # idhm\_l <dbl>, idhm\_e <dbl>, idhm\_r <dbl>, idhm\_subescolaridade <dbl>,  
## # idhm\_subfrequencia <dbl>, prosperidade\_social <chr>,  
## # proporcao\_vulnerabilidade\_socioeconomica <dbl>,  
## # propocao\_energia\_eletrica <dbl>, proporcao\_domicilio\_densidade <dbl>, …

vulnerabilidade <- read\_rds("../data/vulnerabilidade.rds") %>%   
 select(ano, id\_municipio,  
 proporcao\_vulnerabilidade\_socioeconomica,  
 renda\_per\_capita,  
 renda\_per\_capita\_vulneravel,  
 proporcao\_vulneravel\_dependente\_idoso,  
 populacao\_vulneravel\_15\_24,  
 indice\_gini)  
  
glimpse(vulnerabilidade)

## Rows: 42,177  
## Columns: 8  
## $ ano <int> 2000, 2000, 2000, 2000, 2000,…  
## $ id\_municipio <chr> "3500105", "3500204", "350030…  
## $ proporcao\_vulnerabilidade\_socioeconomica <dbl> NA, NA, NA, NA, NA, NA, NA, N…  
## $ renda\_per\_capita <dbl> 741.66, 447.08, 712.07, 613.0…  
## $ renda\_per\_capita\_vulneravel <dbl> 167.02, 163.06, 157.11, 145.4…  
## $ proporcao\_vulneravel\_dependente\_idoso <dbl> 2.41, 1.59, 1.97, 1.79, 1.25,…  
## $ populacao\_vulneravel\_15\_24 <int> 702, 154, 1008, 1612, 263, 23…  
## $ indice\_gini <dbl> 0.53, 0.40, 0.57, 0.54, 0.52,…

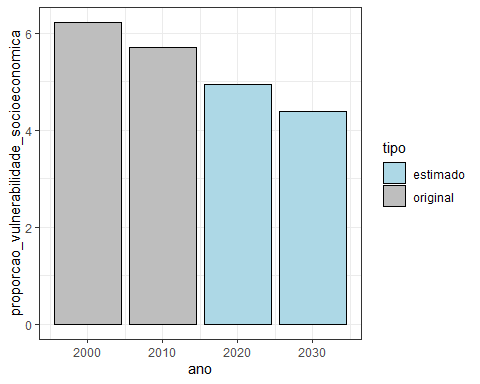
vulnerabilidade %>% filter(id\_municipio == "3500105")

## # A tibble: 54 × 8  
## ano id\_municipio proporcao\_vulnerabilidade\_socioeconomica renda\_per\_capita  
## <int> <chr> <dbl> <dbl>  
## 1 2000 3500105 NA 742.  
## 2 2000 3500105 NA 770.  
## 3 2000 3500105 6.21 696.  
## 4 2000 3500105 NA 720.  
## 5 2000 3500105 NA 333.  
## 6 2000 3500105 NA 337.  
## 7 2000 3500105 NA 752.  
## 8 2000 3500105 NA 487.  
## 9 2000 3500105 NA 778.  
## 10 2000 3500105 NA 699.  
## # ℹ 44 more rows  
## # ℹ 4 more variables: renda\_per\_capita\_vulneravel <dbl>,  
## # proporcao\_vulneravel\_dependente\_idoso <dbl>,  
## # populacao\_vulneravel\_15\_24 <int>, indice\_gini <dbl>

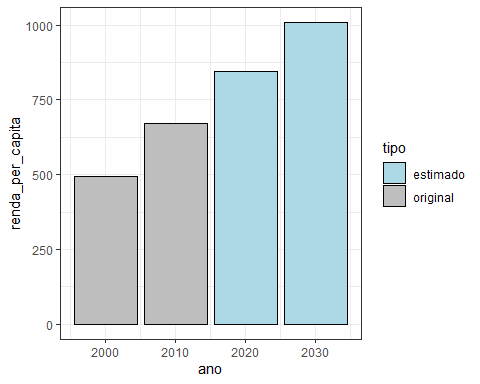
df\_nome <- read\_rds("../data/df\_nome.rds")  
  
vulne <- left\_join(vulnerabilidade,df\_nome %>%   
 select(id\_municipio, nome) ,"id\_municipio") %>%   
 mutate(municipio = nome) %>%   
 select(-nome)

vulne\_est <- vulne %>%   
 group\_by(ano, municipio) %>%  
 summarise(  
 proporcao\_vulnerabilidade\_socioeconomica = median(proporcao\_vulnerabilidade\_socioeconomica, na.rm=TRUE),  
 renda\_per\_capita = median(renda\_per\_capita, na.rm=TRUE),  
 renda\_per\_capita\_vulneravel = median(renda\_per\_capita\_vulneravel, na.rm=TRUE),  
 proporcao\_vulneravel\_dependente\_idoso = median(proporcao\_vulneravel\_dependente\_idoso, na.rm=TRUE),  
 populacao\_vulneravel\_15\_24 = sum(populacao\_vulneravel\_15\_24, na.rm=TRUE),  
 indice\_gini = median(indice\_gini, na.rm=TRUE)  
 ) %>%   
 pivot\_wider(names\_from = ano, values\_from = c(  
 proporcao\_vulnerabilidade\_socioeconomica,  
 renda\_per\_capita,  
 renda\_per\_capita\_vulneravel,  
 proporcao\_vulneravel\_dependente\_idoso,  
 populacao\_vulneravel\_15\_24,  
 indice\_gini)  
 ) %>%   
 mutate(  
 proporcao\_vulnerabilidade\_socioeconomica\_2020= my\_mean(proporcao\_vulnerabilidade\_socioeconomica\_2000,proporcao\_vulnerabilidade\_socioeconomica\_2010,2020,"est"),  
 renda\_per\_capita\_2020= my\_mean(renda\_per\_capita\_2000,renda\_per\_capita\_2010,2020,"est"),  
 renda\_per\_capita\_vulneravel\_2020= my\_mean(renda\_per\_capita\_vulneravel\_2000,renda\_per\_capita\_vulneravel\_2010,2020,"est"),  
 proporcao\_vulneravel\_dependente\_idoso\_2020= my\_mean(proporcao\_vulneravel\_dependente\_idoso\_2000,proporcao\_vulneravel\_dependente\_idoso\_2010,2020,"est"),  
 populacao\_vulneravel\_15\_24\_2020= my\_mean(populacao\_vulneravel\_15\_24\_2000,populacao\_vulneravel\_15\_24\_2010,2020,"est"),  
 indice\_gini\_2020 = my\_mean(indice\_gini\_2000,indice\_gini\_2010,2020,"est"),  
   
 proporcao\_vulnerabilidade\_socioeconomica\_2030= my\_mean(proporcao\_vulnerabilidade\_socioeconomica\_2000,proporcao\_vulnerabilidade\_socioeconomica\_2010,2030,"est"),  
 renda\_per\_capita\_2030= my\_mean(renda\_per\_capita\_2000,renda\_per\_capita\_2010,2030,"est"),  
 renda\_per\_capita\_vulneravel\_2030= my\_mean(renda\_per\_capita\_vulneravel\_2000,renda\_per\_capita\_vulneravel\_2010,2030,"est"),  
 proporcao\_vulneravel\_dependente\_idoso\_2030= my\_mean(proporcao\_vulneravel\_dependente\_idoso\_2000,proporcao\_vulneravel\_dependente\_idoso\_2010,2030,"est"),  
 populacao\_vulneravel\_15\_24\_2030= my\_mean(populacao\_vulneravel\_15\_24\_2000,populacao\_vulneravel\_15\_24\_2010,2030,"est"),  
 indice\_gini\_2030 = my\_mean(indice\_gini\_2000,indice\_gini\_2010,2030,"est")  
 ) %>%   
 pivot\_longer(cols = proporcao\_vulnerabilidade\_socioeconomica\_2000:indice\_gini\_2030,names\_to = "variavel",values\_to = "valor") %>%   
 mutate(ano = str\_remove\_all(variavel,"[A-z]|15|24"),  
 variavel = str\_remove\_all(variavel,"\_2000|\_2010|\_2020|\_2030")) %>%   
 pivot\_wider(names\_from = variavel, values\_from = valor) %>%   
 mutate(ano = as.numeric(ano))

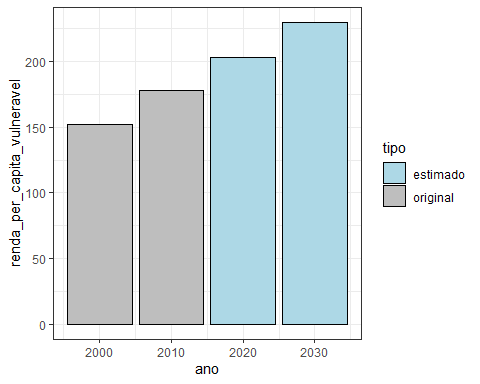
vulne\_est %>%   
 group\_by(ano) %>%   
 summarise(  
 proporcao\_vulnerabilidade\_socioeconomica = median(proporcao\_vulnerabilidade\_socioeconomica, na.rm=TRUE),  
 renda\_per\_capita = median(renda\_per\_capita, na.rm=TRUE),  
 renda\_per\_capita\_vulneravel = median(renda\_per\_capita\_vulneravel, na.rm=TRUE),  
 proporcao\_vulneravel\_dependente\_idoso = median(proporcao\_vulneravel\_dependente\_idoso, na.rm=TRUE),  
 populacao\_vulneravel\_15\_24 = sum(populacao\_vulneravel\_15\_24, na.rm=TRUE),  
 indice\_gini = median(indice\_gini, na.rm=TRUE)  
 ) %>%  
 mutate(tipo = as.factor(ifelse(ano<=2010,"original","estimado"))) %>%   
 ggplot(aes(x=ano, y=proporcao\_vulnerabilidade\_socioeconomica,fill=tipo)) +  
 geom\_col(color="black") +  
 scale\_fill\_manual(values=c("lightblue","gray")) +  
 theme\_bw()



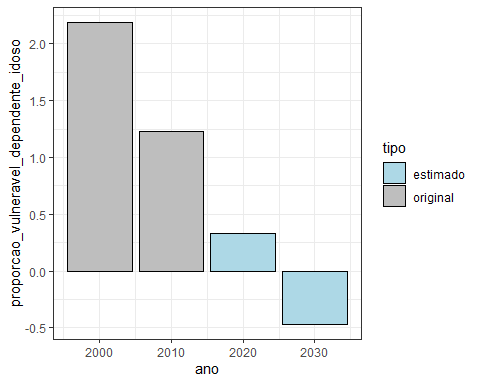
vulne\_est %>%   
 group\_by(ano) %>%  
 summarise(  
 proporcao\_vulnerabilidade\_socioeconomica = median(proporcao\_vulnerabilidade\_socioeconomica, na.rm=TRUE),  
 renda\_per\_capita = median(renda\_per\_capita, na.rm=TRUE),  
 renda\_per\_capita\_vulneravel = median(renda\_per\_capita\_vulneravel, na.rm=TRUE),  
 proporcao\_vulneravel\_dependente\_idoso = median(proporcao\_vulneravel\_dependente\_idoso, na.rm=TRUE),  
 populacao\_vulneravel\_15\_24 = sum(populacao\_vulneravel\_15\_24, na.rm=TRUE),  
 indice\_gini = median(indice\_gini, na.rm=TRUE)  
 ) %>%  
 mutate(tipo = as.factor(ifelse(ano<=2010,"original","estimado"))) %>%  
 ggplot(aes(x=ano, y=renda\_per\_capita, fill=tipo)) +  
 geom\_col(color="black") +  
 scale\_fill\_manual(values=c("lightblue","gray")) +  
 theme\_bw()



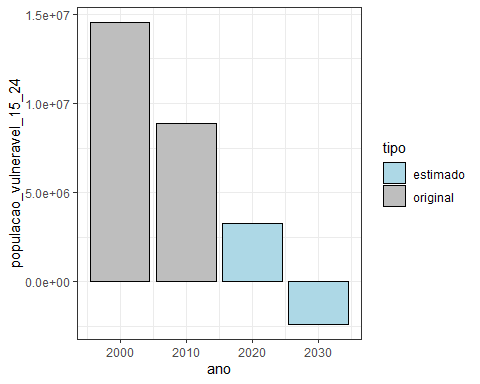
vulne\_est %>%   
 group\_by(ano) %>%  
 summarise(  
 proporcao\_vulnerabilidade\_socioeconomica = median(proporcao\_vulnerabilidade\_socioeconomica, na.rm=TRUE),  
 renda\_per\_capita = median(renda\_per\_capita, na.rm=TRUE),  
 renda\_per\_capita\_vulneravel = median(renda\_per\_capita\_vulneravel, na.rm=TRUE),  
 proporcao\_vulneravel\_dependente\_idoso = median(proporcao\_vulneravel\_dependente\_idoso, na.rm=TRUE),  
 populacao\_vulneravel\_15\_24 = sum(populacao\_vulneravel\_15\_24, na.rm=TRUE),  
 indice\_gini = median(indice\_gini, na.rm=TRUE)  
 ) %>%  
 mutate(tipo = as.factor(ifelse(ano<=2010,"original","estimado"))) %>%   
 ggplot(aes(x=ano, y=renda\_per\_capita\_vulneravel, fill=tipo)) +  
 geom\_col(color="black") +  
 scale\_fill\_manual(values=c("lightblue","gray")) +  
 theme\_bw()



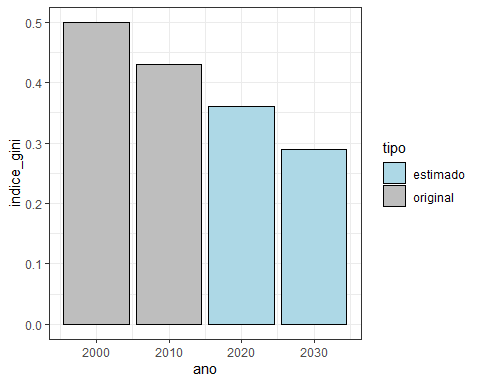
vulne\_est %>%   
 group\_by(ano) %>%  
 summarise(  
 proporcao\_vulnerabilidade\_socioeconomica = median(proporcao\_vulnerabilidade\_socioeconomica, na.rm=TRUE),  
 renda\_per\_capita = median(renda\_per\_capita, na.rm=TRUE),  
 renda\_per\_capita\_vulneravel = median(renda\_per\_capita\_vulneravel, na.rm=TRUE),  
 proporcao\_vulneravel\_dependente\_idoso = median(proporcao\_vulneravel\_dependente\_idoso, na.rm=TRUE),  
 populacao\_vulneravel\_15\_24 = sum(populacao\_vulneravel\_15\_24, na.rm=TRUE),  
 indice\_gini = median(indice\_gini, na.rm=TRUE)  
 ) %>%  
 mutate(tipo = as.factor(ifelse(ano<=2010,"original","estimado"))) %>%  
 ggplot(aes(x=ano, y=proporcao\_vulneravel\_dependente\_idoso, fill=tipo)) +  
 geom\_col(color="black") +  
 scale\_fill\_manual(values=c("lightblue","gray")) +  
 theme\_bw()



vulne\_est %>%   
 group\_by(ano) %>%  
 summarise(  
 proporcao\_vulnerabilidade\_socioeconomica = median(proporcao\_vulnerabilidade\_socioeconomica, na.rm=TRUE),  
 renda\_per\_capita = median(renda\_per\_capita, na.rm=TRUE),  
 renda\_per\_capita\_vulneravel = median(renda\_per\_capita\_vulneravel, na.rm=TRUE),  
 proporcao\_vulneravel\_dependente\_idoso = median(proporcao\_vulneravel\_dependente\_idoso, na.rm=TRUE),  
 populacao\_vulneravel\_15\_24 = sum(populacao\_vulneravel\_15\_24, na.rm=TRUE),  
 indice\_gini = median(indice\_gini, na.rm=TRUE)  
 ) %>%  
 mutate(tipo = as.factor(ifelse(ano<=2010,"original","estimado"))) %>%  
 ggplot(aes(x=ano, y=populacao\_vulneravel\_15\_24, fill=tipo)) +  
 geom\_col(color="black") +  
 scale\_fill\_manual(values=c("lightblue","gray")) +  
 theme\_bw()



vulne\_est %>%   
 group\_by(ano) %>%  
 summarise(  
 proporcao\_vulnerabilidade\_socioeconomica = median(proporcao\_vulnerabilidade\_socioeconomica, na.rm=TRUE),  
 renda\_per\_capita = median(renda\_per\_capita, na.rm=TRUE),  
 renda\_per\_capita\_vulneravel = median(renda\_per\_capita\_vulneravel, na.rm=TRUE),  
 proporcao\_vulneravel\_dependente\_idoso = median(proporcao\_vulneravel\_dependente\_idoso, na.rm=TRUE),  
 populacao\_vulneravel\_15\_24 = sum(populacao\_vulneravel\_15\_24, na.rm=TRUE),  
 indice\_gini = median(indice\_gini, na.rm=TRUE)  
 ) %>%  
 mutate(tipo = as.factor(ifelse(ano<=2010,"original","estimado"))) %>%  
 ggplot(aes(x=ano, y=indice\_gini, fill=tipo)) +  
 geom\_col(color="black") +  
 scale\_fill\_manual(values=c("lightblue","gray")) +  
 theme\_bw()

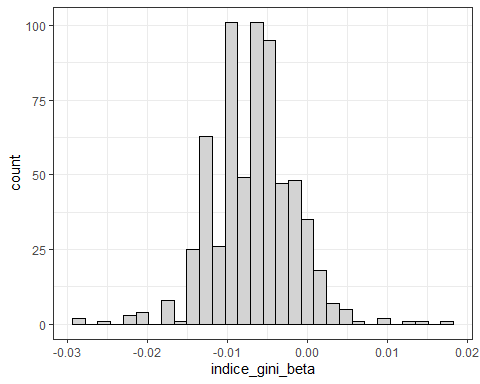
 ### Mapeando

vulne\_beta <- vulne %>%   
 group\_by(ano, municipio, id\_municipio) %>%  
 summarise(  
 proporcao\_vulnerabilidade\_socioeconomica = median(proporcao\_vulnerabilidade\_socioeconomica, na.rm=TRUE),  
 renda\_per\_capita = median(renda\_per\_capita, na.rm=TRUE),  
 renda\_per\_capita\_vulneravel = median(renda\_per\_capita\_vulneravel, na.rm=TRUE),  
 proporcao\_vulneravel\_dependente\_idoso = median(proporcao\_vulneravel\_dependente\_idoso, na.rm=TRUE),  
 populacao\_vulneravel\_15\_24 = sum(populacao\_vulneravel\_15\_24, na.rm=TRUE),  
 indice\_gini = median(indice\_gini, na.rm=TRUE)  
 ) %>% group\_by(municipio) %>% filter(ano <= 2010) %>%   
 mutate(proporcao\_vulnerabilidade\_socioeconomica\_beta = my\_regs(ano,proporcao\_vulnerabilidade\_socioeconomica),  
 renda\_per\_capita\_beta = my\_regs(ano,renda\_per\_capita),  
 renda\_per\_capita\_vulneravel\_beta = my\_regs(ano,renda\_per\_capita\_vulneravel),  
 proporcao\_vulneravel\_dependente\_idoso\_beta = my\_regs(ano,proporcao\_vulneravel\_dependente\_idoso),  
 populacao\_vulneravel\_15\_24\_beta = my\_regs(ano,populacao\_vulneravel\_15\_24),  
 indice\_gini\_beta = my\_regs(ano,indice\_gini)) %>%   
 filter(ano == 2010) %>% select(-ano)  
  
glimpse(vulne\_beta)

## Rows: 645  
## Columns: 14  
## Groups: municipio [645]  
## $ municipio <chr> "Adamantina", "Adolfo", …  
## $ id\_municipio <chr> "3500105", "3500204", "3…  
## $ proporcao\_vulnerabilidade\_socioeconomica <dbl> 5.49, 6.78, 11.85, 10.57…  
## $ renda\_per\_capita <dbl> 960.390, 661.650, 636.07…  
## $ renda\_per\_capita\_vulneravel <dbl> 183.88, 173.90, 172.69, …  
## $ proporcao\_vulneravel\_dependente\_idoso <dbl> 0.78, 1.25, 0.71, 1.83, …  
## $ populacao\_vulneravel\_15\_24 <int> 3396, 719, 9539, 9390, 1…  
## $ indice\_gini <dbl> 0.500, 0.390, 0.450, 0.4…  
## $ proporcao\_vulnerabilidade\_socioeconomica\_beta <dbl> -7.200000e-02, -7.700000…  
## $ renda\_per\_capita\_beta <dbl> 26.4290, 22.2080, 3.1350…  
## $ renda\_per\_capita\_vulneravel\_beta <dbl> 2.6730, 0.7730, 1.5580, …  
## $ proporcao\_vulneravel\_dependente\_idoso\_beta <dbl> -0.163, -0.024, -0.091, …  
## $ populacao\_vulneravel\_15\_24\_beta <dbl> -854.0, -63.3, -311.2, -…  
## $ indice\_gini\_beta <dbl> -2.000000e-03, 0.000000e…

## Mapeando

vulne\_beta %>%  
 ggplot(aes(x=indice\_gini\_beta)) +  
 geom\_histogram(color="black",  
 fill="lightgray") +  
 theme\_bw()



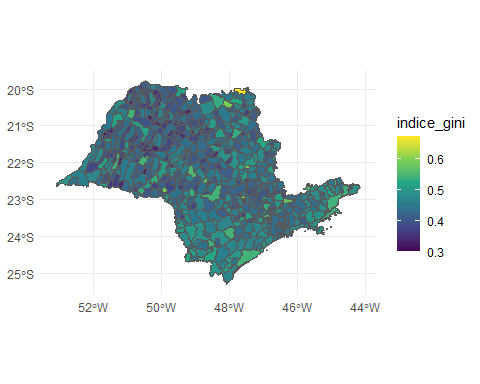
vulne\_beta %>% pull(indice\_gini\_beta) %>% summary()

## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## -0.029000 -0.010000 -0.007000 -0.006712 -0.003000 0.017000

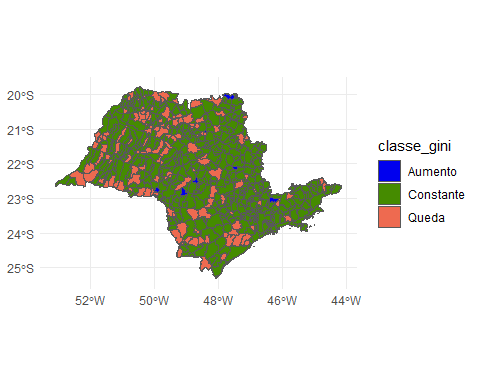
### Juntando as bases de dados

d\_sf\_municipio <- st\_read("../shp/35MUE250GC\_SIR.shp", quiet = TRUE)  
d\_sf\_municipio <- d\_sf\_municipio %>%  
 rename(id\_municipio = CD\_GEOCMU) %>%  
 inner\_join(vulne\_beta %>%  
 relocate(id\_municipio), "id\_municipio") %>%  
 mutate(  
 # classe\_gini = cut(indice\_gini\_beta,7),  
 classe\_gini = ifelse(indice\_gini\_beta > 0.005,  
 "Aumento",ifelse(indice\_gini\_beta > -0.01,  
 "Constante","Queda"))  
 )

ggplot(d\_sf\_municipio) +  
 geom\_sf(aes(fill = indice\_gini))+  
 theme\_minimal() +  
 scale\_fill\_viridis\_c()

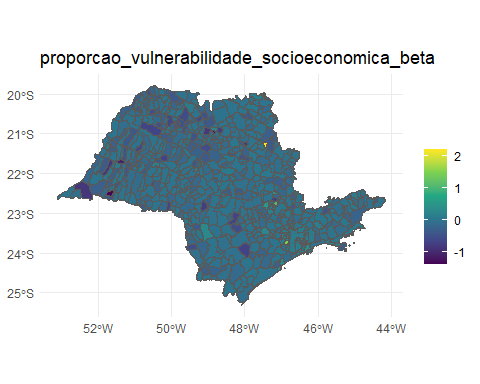


ggplot(d\_sf\_municipio) +  
 geom\_sf(aes(fill = classe\_gini))+  
 theme\_minimal() +  
 scale\_fill\_manual(values = c("blue2","chartreuse4","coral2"))

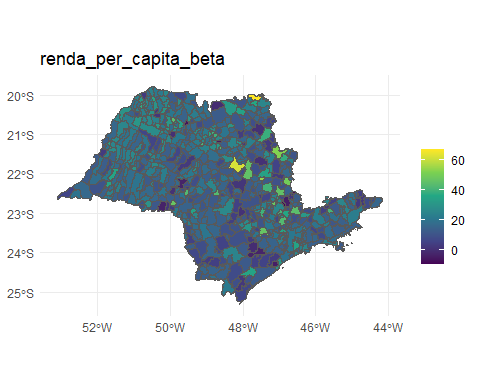


mapas <- list(  
 d\_sf\_municipio,d\_sf\_municipio,d\_sf\_municipio,  
 d\_sf\_municipio,d\_sf\_municipio,d\_sf\_municipio)  
  
titulos <- list(  
 "proporcao\_vulnerabilidade\_socioeconomica\_beta",  
 "renda\_per\_capita\_beta",  
 "renda\_per\_capita\_vulneravel\_beta",  
 "proporcao\_vulneravel\_dependente\_idoso\_beta",  
 "populacao\_vulneravel\_15\_24\_beta",  
 "indice\_gini\_beta")  
  
purrr::map2(mapas, titulos, ~ {  
 ggplot(.x) +  
 geom\_sf(aes\_string(fill = .y)) +  
 theme\_minimal() +  
 ggtitle(.y) + labs(fill="")+  
 scale\_fill\_viridis\_c()  
})

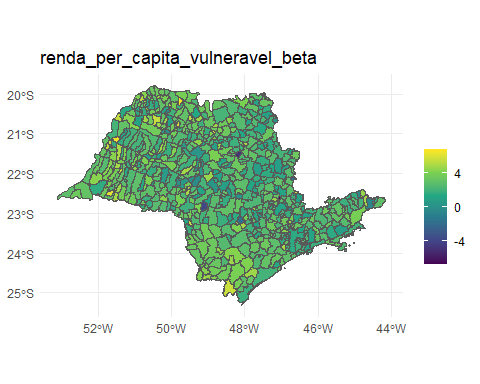
## [[1]]



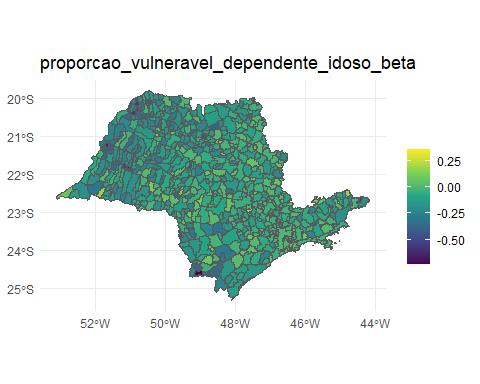
##   
## [[2]]



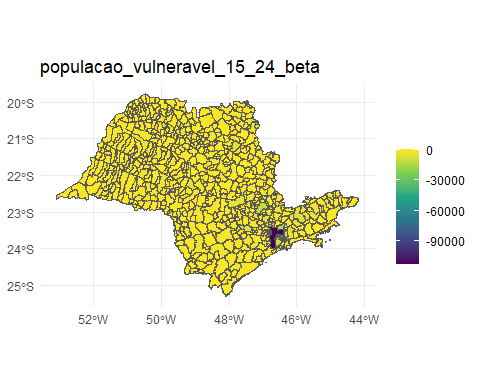
##   
## [[3]]



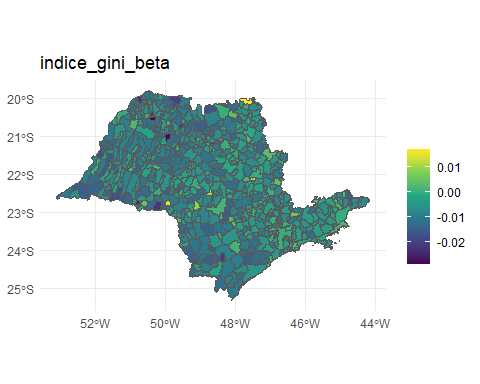
##   
## [[4]]



##   
## [[5]]



##   
## [[6]]



# gridExtra::grid.arrange(grobs = graficos)