

Untitled

```
library(tidyverse)

-- Attaching core tidyverse packages ----- tidyverse 2.0.0 --
v dplyr      1.1.2      v readr      2.1.4
v forcats    1.0.0      v stringr    1.5.0
v ggplot2    3.4.2      v tibble     3.2.1
v lubridate  1.9.2      v tidyr      1.3.0
v purrr      1.0.1
-- Conflicts ----- tidyverse_conflicts() --
x dplyr::filter() masks stats::filter()
x dplyr::lag()     masks stats::lag()
i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become
errors

source("2_DataProcessing.R")

#|fig-width: 10
FracTotRate <- RD %>% filter (year(DT_INTER) == 2022) %>%
  group_by(FaixaEtr, DIAG_CAP, DS_CID_CAP) %>%
  summarize(n = n_distinct(N_AIH), .groups = "keep") %>%
  left_join(popSUSBR %>% filter(ano == 2022) %>% group_by(FaixaEtr) %>% summarise(PopSUS =
  mutate(IndFrac = n*100000/PopSUS)

FracTotRate72 <- RD %>% filter (year(DT_INTER) == 2022) %>% filter (DIAG_CAP == "S72")%>%
  group_by(FaixaEtr, DS_CID, DIAG_CAP) %>% summarize(n = n_distinct(N_AIH), .groups = "kee
  left_join(popSUSBR %>% filter(ano == 2022) %>% group_by(FaixaEtr) %>% summarise(PopSUS =
  mutate(IndFrac = n*100000/PopSUS)

#Hospitalizations by Fracture Type and Age Group (2017) (PORTUGUES)
FracLabel <- (FracTotRate %>% arrange (desc(n)))[c(1,5,7),]
p <- ggplot (FracTotRate, aes(x = FaixaEtr, y=n, group = DIAG_CAP,
```

```

        color = case_when(DIAG_CAP== "S72" ~ "green",
                          DIAG_CAP== "S52" ~ "blue",
                          DIAG_CAP== "S82" ~ "red",
                          FALSE ~ "black")

    )) +
  geom_line(aes(size = replace_na(case_when(DIAG_CAP== "S72" ~ 1.2,
                                             DIAG_CAP== "S52" ~ 1.2,
                                             DIAG_CAP== "S82" ~ 1.2,
                                             FALSE ~ 1),1))) +
  geom_text(aes(label = DS_CID_CAP), data = FracLabel, nudge_y = 700, nudge_x = c(-1,0,2),
            labs(title = "Hospitalizações por tipo de Fratura e Faixa Etária (2022)", x = "Faixa Etária",
                 theme_bw() +
                 theme(axis.text.x = element_text(angle = 20, hjust = 1))) +
            scale_colour_discrete(guide = FALSE) +
            scale_size_continuous(guide = FALSE, limits = c(1,10))

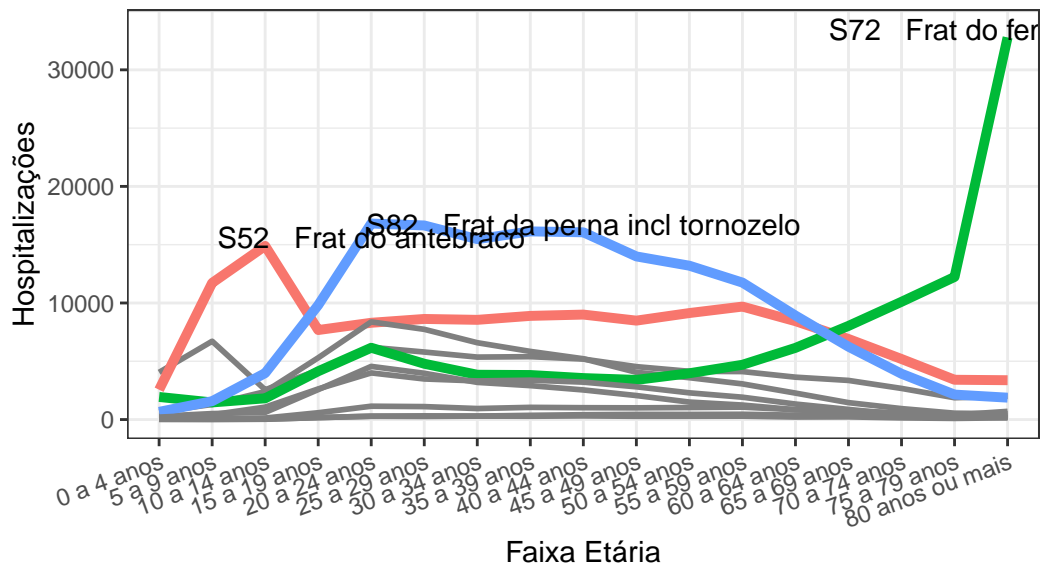
```

Warning: Using 'size' aesthetic for lines was deprecated in ggplot2 3.4.0.
 i Please use 'linewidth' instead.

p

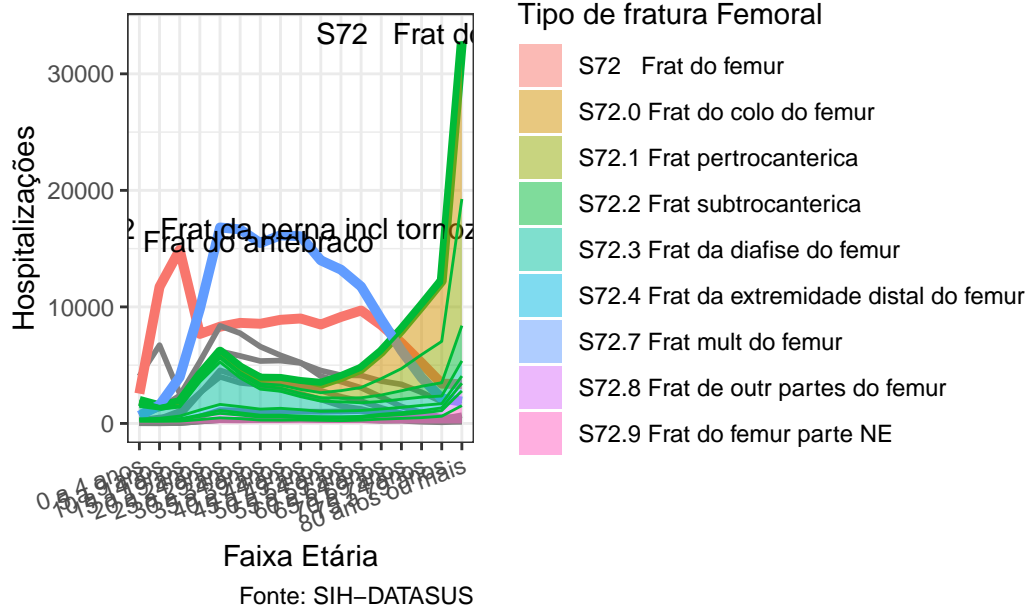
Warning: The 'guide' argument in 'scale_*()' cannot be 'FALSE'. This was deprecated in ggplot2 3.3.4.
 i Please use "none" instead.

Hospitalizações por tipo de Fratura e Faixa Etária (2022)



```
p + geom_area(data = FracTotRate72, aes(x = FaixaEtr, y=n, group = DS_CID, fill = DS_CID),
```

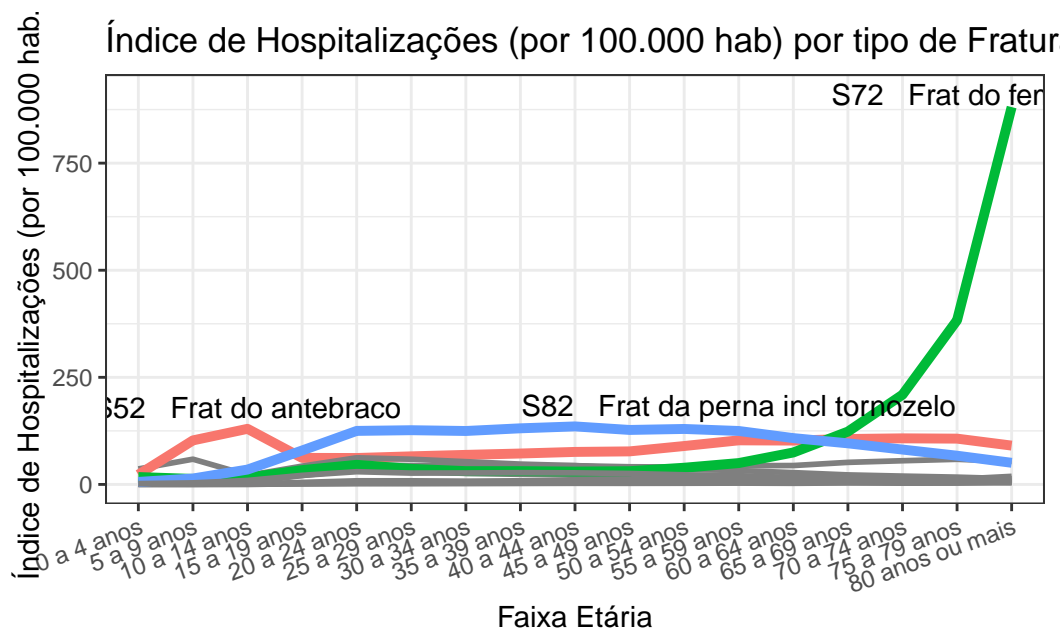
Hospitalizações por tipo de Fratura e Faixa Etária (2022)



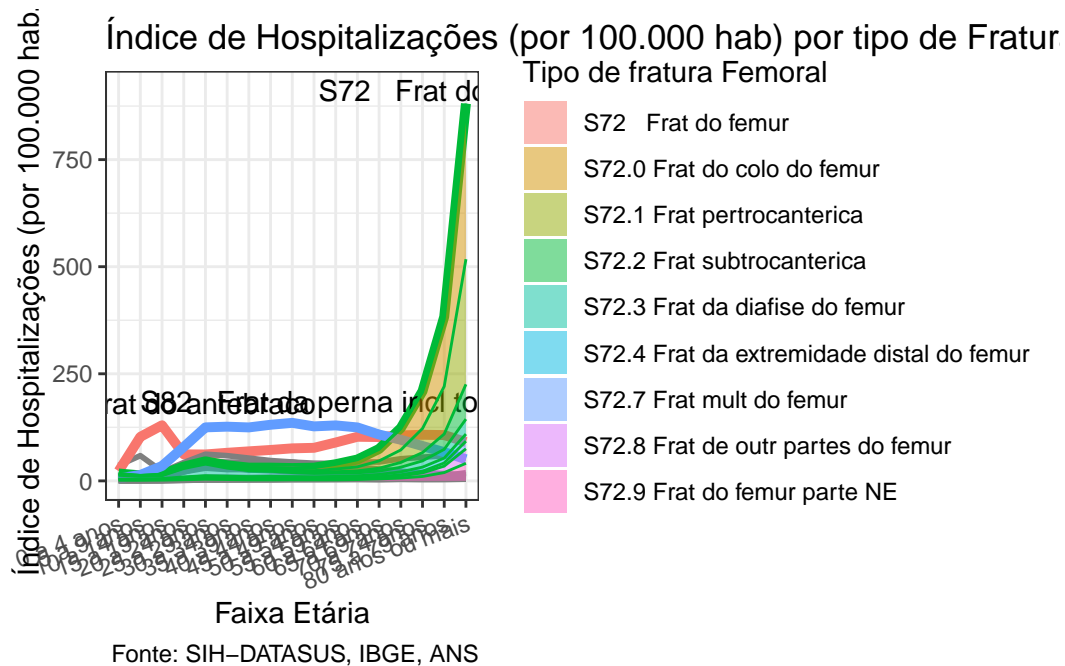
```
#Hospitalizations RATE by Fracture Type and Age Group (2022) (PORTUGUES)
FracLabelInd <- FracTotRate %>% arrange (desc(IndFrac)) %>% group_by (DIAG_CAP) %>% filter

p <- ggplot (FracTotRate, aes(x = FaixaEtr, y=IndFrac, group = DIAG_CAP,
                             color = case_when(DIAG_CAP== "S72" ~ "green",
                                                  DIAG_CAP== "S52" ~ "blue",
                                                  DIAG_CAP== "S82" ~ "red",
                                                  FALSE ~ "black")))
)) +
  geom_line(aes(size = replace_na(case_when(DIAG_CAP== "S72" ~ 1.2,
                                             DIAG_CAP== "S52" ~ 1.2,
                                             DIAG_CAP== "S82" ~ 1.2,
                                             FALSE ~ 1),1))) +
  geom_text(aes(label = DS_CID_CAP), data = FracLabelInd, nudge_x= c(0,-1,3), nudge_y = c(
  labs(title = "Índice de Hospitalizações (por 100.000 hab) por tipo de Fratura e Faixa Et
  theme_bw() +
  theme(axis.text.x = element_text(angle = 20, hjust = 1)) +
  scale_colour_discrete(guide = FALSE) +
  scale_size_continuous(guide = FALSE, limits = c(1,10))
```

p



```
#|fig-width: 10
p + geom_area(data = FracTotRate72, aes(x = FaixaEtr, y=IndFrac, group = DS_CID, fill = DS
```



```
library(scales)
```

Attaching package: 'scales'

The following object is masked from 'package:purrr':

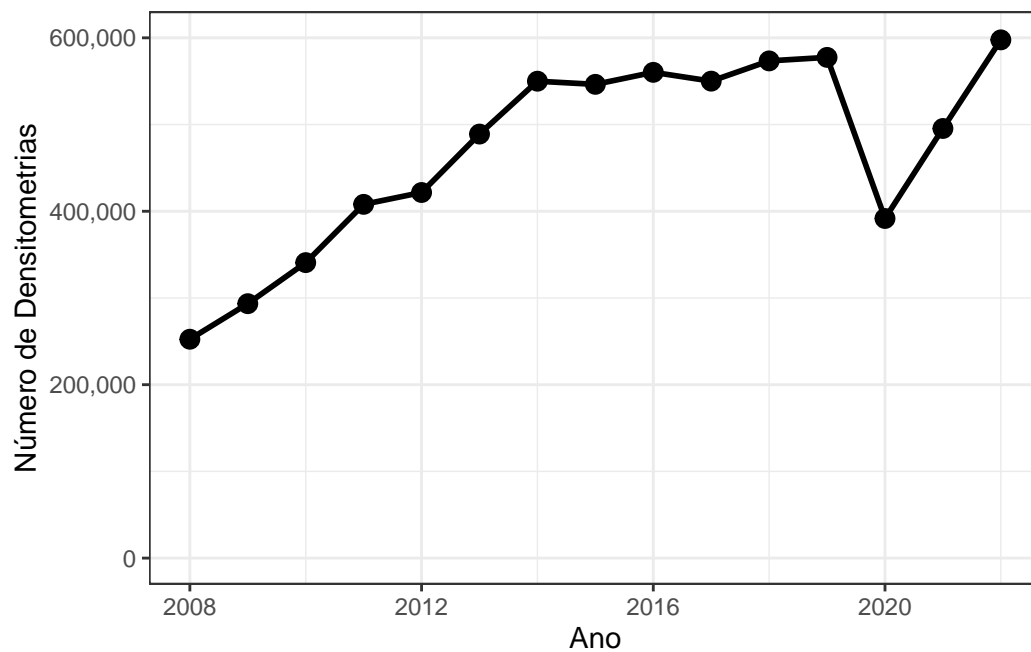
discard

The following object is masked from 'package:readr':

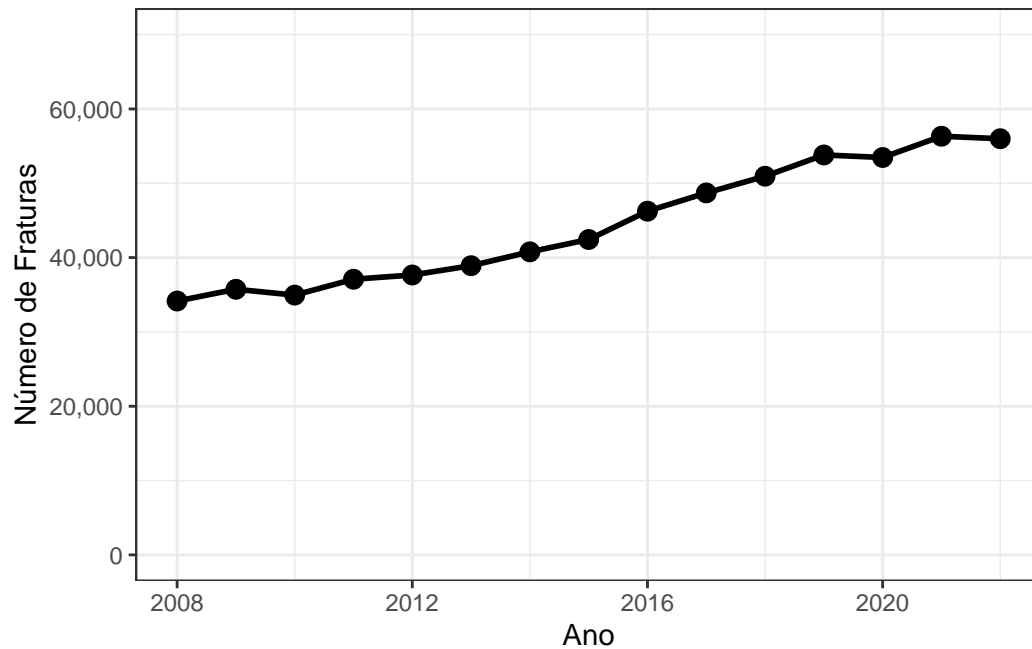
col_factor

```
PA %>%
  group_by(ano) %>%
  summarise(nDens = sum(PA_QTDPRO), .groups = "keep") %>%
```

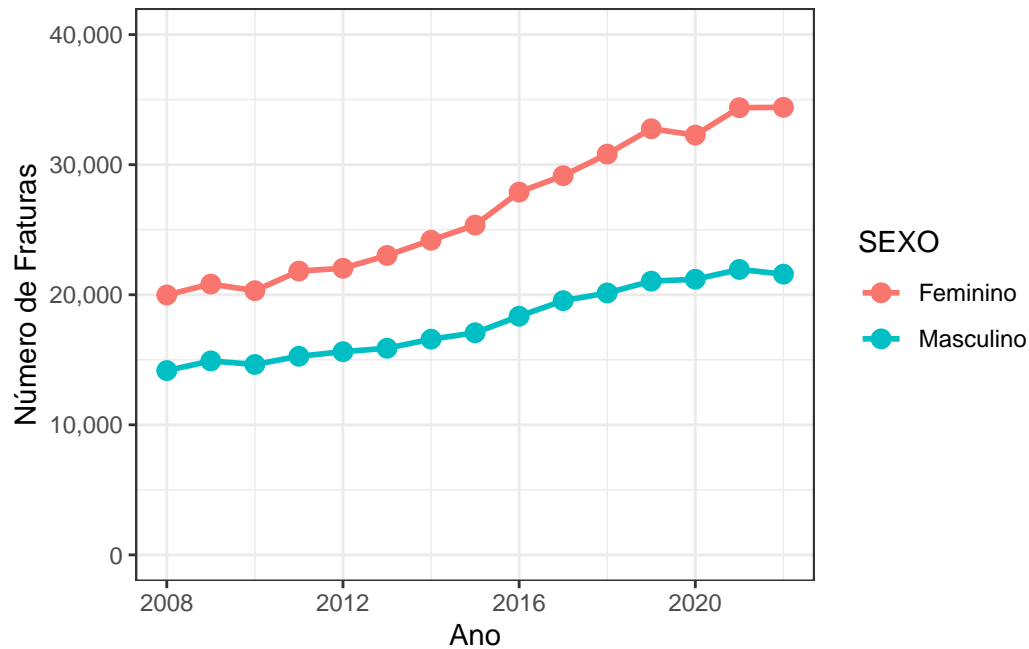
```
ggplot(aes(x = ano, y = nDens)) +
  geom_line(size = 1) +
  geom_point(size = 3)+
  theme_bw() +
  scale_y_continuous(limits = c(0,600000), labels = comma) +
  labs(x = "Ano", y = "Número de Densitometrias")
```



```
RD %>%
  filter(UNICO & CD_CID %in% c("S720","S721","S722")) %>%
  filter(ano >= 2008) %>%
  group_by(ano) %>%
  summarise(nFrac = n_distinct(N_AIH), .groups = "keep") %>%
  ggplot(aes(x = ano, y = nFrac)) +
    geom_line(size = 1) +
    geom_point(size = 3)+
    theme_bw() +
    scale_y_continuous(limits = c(0,70000), labels = comma) +
    labs(x = "Ano", y = "Número de Fraturas")
```



```
RD %>%
  filter(UNICO & CD_CID %in% c("S720","S721","S722")) %>%
  filter(ano >= 2008) %>%
  group_by(ano, SEXO) %>%
  summarise(nFrac = n_distinct(N_AIH), .groups = "keep") %>%
  ggplot(aes(x = ano, y = nFrac, color = SEXO)) +
    geom_line(size = 1) +
    geom_point(size = 3)+
    theme_bw() +
    scale_y_continuous(limits = c(0,40000), labels = comma) +
    labs(x = "Ano", y = "Número de Fraturas")
```



```
library(forecast)
```

Registered S3 method overwritten by 'quantmod':

```
method      from
as.zoo.data.frame zoo
```

```
fracano <- RD %>%
  filter(UNICO & CD_CID %in% c("S720","S721","S722")) %>%
  filter(ano >= 2008) %>%
  group_by(ano) %>%
  summarise(nFrac = n_distinct(N_AIH))
```

```
model <- auto.arima(fracano$nFrac[1:8])
forecast <- forecast(model)
forecast<- as.data.frame(forecast)
```

```
fracano$nFracPred <- NA
fracano$nFracPredlo80<- NA
fracano$nFracPredlo95<- NA
fracano$nFracPredhi80<- NA
```



```
fracano$nFracPredhi95<- NA
```

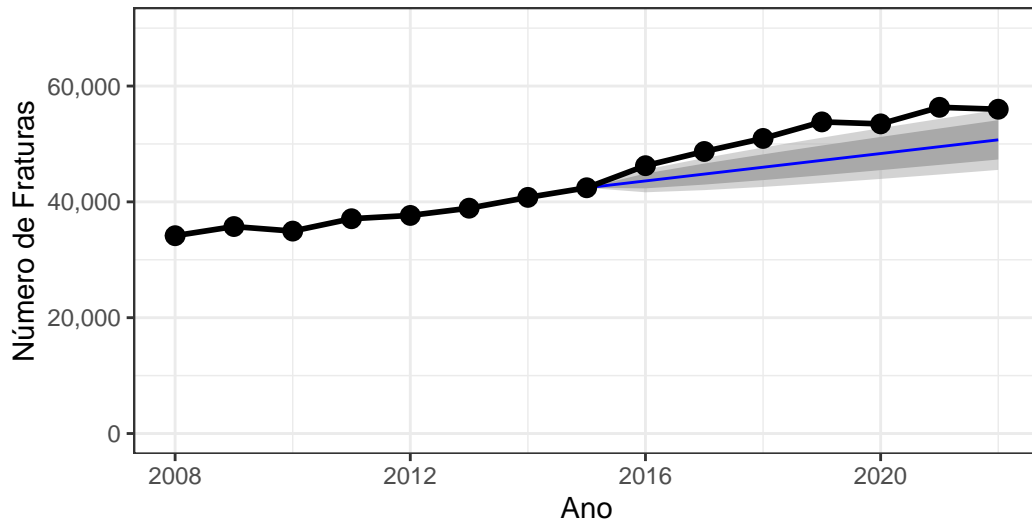
```
fracano$nFracPred[8] <- fracano$nFrac[8]  
fracano$nFracPredlo80[8] <- fracano$nFrac[8]  
fracano$nFracPredlo95[8] <- fracano$nFrac[8]  
fracano$nFracPredhi80[8] <- fracano$nFrac[8]  
fracano$nFracPredhi95[8] <- fracano$nFrac[8]  
fracano$nFracPred[9:15] <- forecast$`Point Forecast`[1:7]  
fracano$nFracPredlo80[9:15] <- forecast$`Lo 80`[1:7]  
fracano$nFracPredlo95[9:15] <- forecast$`Lo 95`[1:7]  
fracano$nFracPredhi80[9:15] <- forecast$`Hi 80`[1:7]  
fracano$nFracPredhi95[9:15] <- forecast$`Hi 95`[1:7]
```

```
fracano %>%  
  ggplot(aes(x = ano, y = nFrac)) +  
    theme_bw() +  
    scale_y_continuous(limits = c(0,70000), labels = comma) +  
    labs(x = "Ano", y = "Número de Fraturas") +  
    geom_ribbon(aes(ymin = nFracPredlo95, ymax = nFracPredhi95), alpha = 0.5, fill = "da  
    geom_ribbon(aes(ymin = nFracPredlo80, ymax = nFracPredhi80), alpha = 1, fill = "da  
    geom_line(aes(y = nFracPred), color = "blue") +  
    geom_line(size = 1) +  
    geom_point(size = 3) +  
    labs(title = "Número de Fraturas de Quadril", subtitle = "Em comparação com um mod  
    caption = "Fonte: SIH-SUS")
```

Warning: Removed 7 rows containing missing values (‘geom_line()’).

Número de Fraturas de Quadril

Em comparação com um modelo ARIMA utilizando dados de 2008 a 20



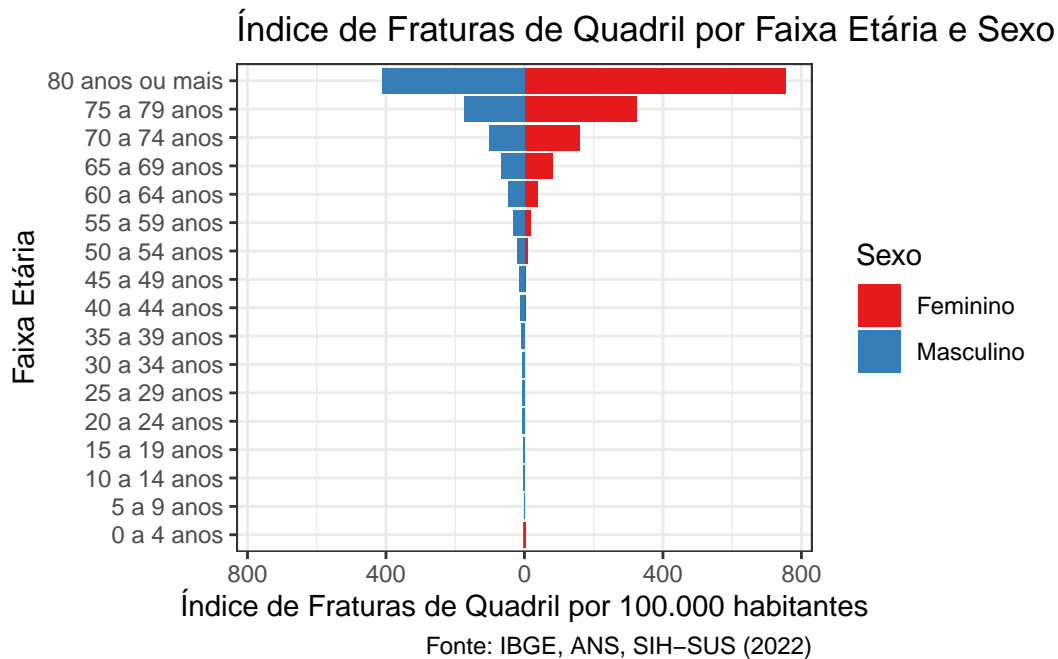
Fonte: SIH-SUS

```

FracTotRateSexo <- RD %>% filter (year(DT_INTER) == 2022) %>%
  filter(UNICO & CD_CID %in% c("S720","S721","S722")) %>%
  group_by(FaixaEtr, SEXO) %>%
  summarize(n = n_distinct(N_AIH), .groups = "keep") %>%
  left_join(popSUSBR %>% filter(ano == 2022) %>% group_by(FaixaEtr, Sexo) %>% summarise(PopSUS = sum(N_AIH))) %>%
  mutate(IndFrac = n*100000/PopSUS)

FracRate <- ggplot(FracTotRateSexo, aes(x = FaixaEtr, y = if_else(SEXO == "Masculino", -IndFrac, IndFrac))) +
  geom_bar(data = subset (FracTotRateSexo, SEXO == "Feminino"), stat = "identity") +
  geom_bar(data = subset (FracTotRateSexo, SEXO == "Masculino"), stat = "identity") +
  scale_y_continuous(labels = abs, limits = max(FracTotRateSexo$IndFrac) * c(-1,1)) +
  coord_flip() +
  scale_fill_brewer(palette = "Set1") +
  theme_bw() +
  labs(x = "Faixa Etária", y = "Índice de Fraturas de Quadril por 100.000 habitantes", title = "Número de Fraturas de Quadril",
       caption = "Fonte: IBGE, ANS, SIH-SUS (2022)", fill = "Sexo")
  
```

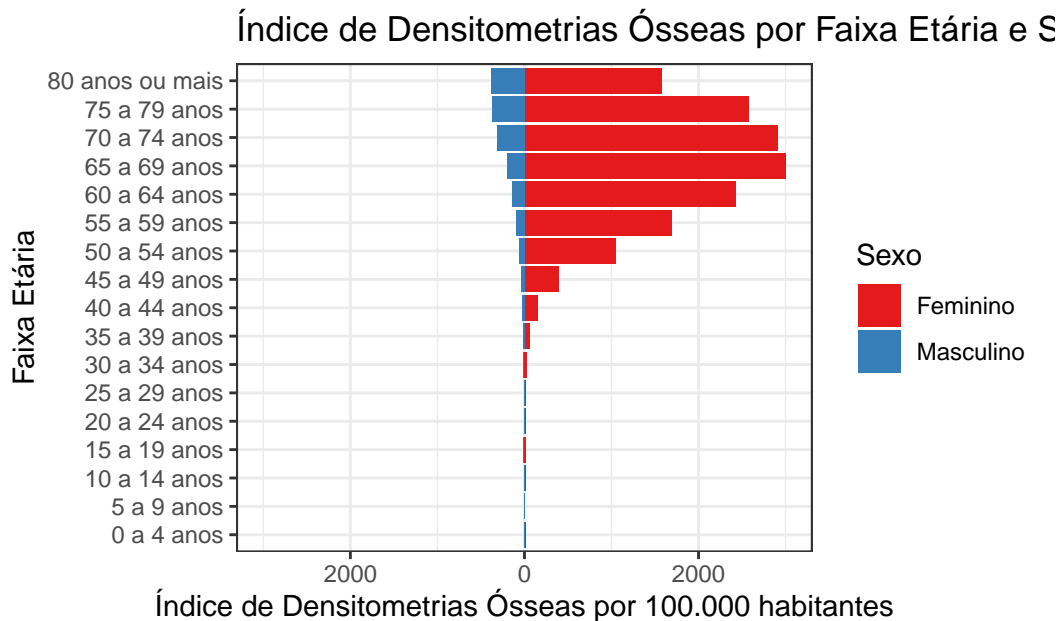
FracRate



```
DensTotRateSexo <- PA %>% filter (year(DATA) == 2022) %>%
  filter(SEXO != "Indefinido") %>%
  group_by(FaixaEtr, SEXO) %>%
  summarize(n = sum(PA_QTDPRO), .groups = "keep") %>%
  left_join(popSUSBR %>% filter(ano == 2022) %>% group_by(FaixaEtr, Sexo) %>% summarise(PopSUS = sum(popSUSBR))) %>%
  mutate(IndDens = n*100000/PopSUS)

DensRate <- ggplot(DensTotRateSexo, aes(x = FaixaEtr, y = if_else(SEXO == "Masculino", -IndDens, IndDens))) +
  geom_bar(data = subset (DensTotRateSexo, SEXO == "Feminino"), stat = "identity") +
  geom_bar(data = subset (DensTotRateSexo, SEXO == "Masculino"), stat = "identity") +
  scale_y_continuous(labels = abs, limits = max(DensTotRateSexo$IndDens) * c(-1,1)) +
  coord_flip() +
  scale_fill_brewer(palette = "Set1") +
  theme_bw() +
  labs(x = "Faixa Etária", y = "Índice de Densitometrias Ósseas por 100.000 habitantes", title = "Índice de Fraturas de Quadril por Faixa Etária e Sexo",
       caption = "Fonte: IBGE, ANS, SIA-SUS (2022)", fill = "Sexo")
```

DensRate



```
DensRateSex <- PA %>%
  filter(SEXO != "Indefinido") %>%
  group_by(FaixaEtr, SEXO, ano) %>%
  summarize(n = sum(PA_QTDPRO), .groups = "keep") %>%
  left_join(popSUSBR %>% group_by(FaixaEtr, Sexo, ano) %>% summarise(PopSUS = sum(PopSUS),
  filter(as.numeric(word(FaixaEtr))>=60) %>%
  group_by(SEXO, ano) %>%
  summarise(n = sum(n),
            PopSUS = sum(PopSUS), .groups = "keep") %>%
  mutate(DensRate = n*100000/PopSUS) %>%
  pivot_wider(id_cols = ano, names_from = SEXO, values_from = DensRate) %>%
  mutate(MaleRateDens = Masculino*100/(Masculino+Feminino))
```

```
FracRateSex <-RD %>%
  filter(SEXO != "Indefinido") %>%
  group_by(FaixaEtr, SEXO, ano) %>%
  summarize(n = n_distinct(N_AIH), .groups = "keep") %>%
  left_join(popSUSBR %>% group_by(FaixaEtr, Sexo, ano) %>% summarise(PopSUS = sum(PopSUS),
  filter(as.numeric(word(FaixaEtr))>=60) %>%
  group_by(SEXO, ano) %>%
  summarise(n = sum(n),
```

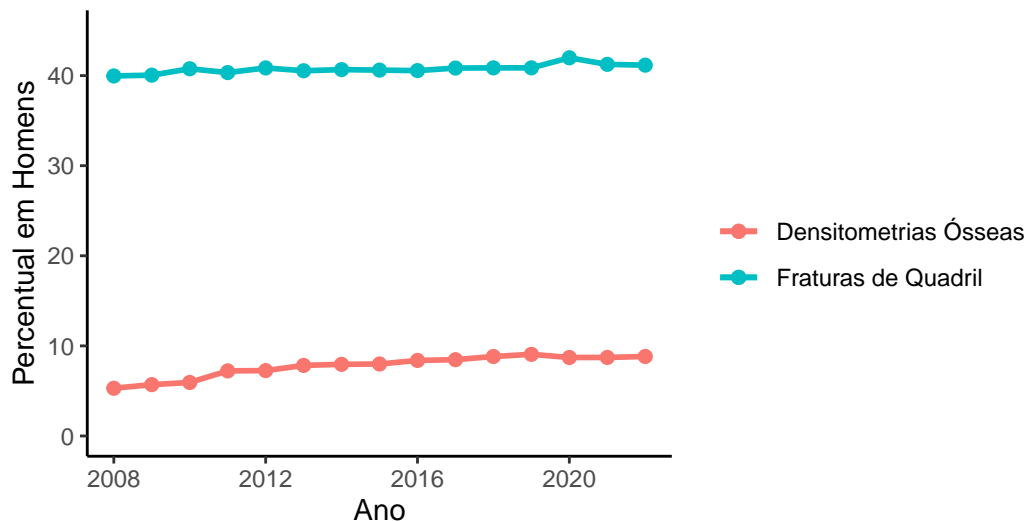
```

      PopSUS = sum(PopSUS), .groups = "keep") %>%
mutate(FracRate = n*100000/PopSUS) %>%
pivot_wider(id_cols = ano, names_from = SEX0, values_from = FracRate) %>%
mutate(MaleRateFrac = Masculino*100/(Masculino+Feminino))

FracRateSex %>%
  select(ano, MaleRateFrac) %>%
  left_join(DensRateSex %>% select(ano, MaleRateDens), by = "ano") %>%
  filter(ano >=2008) %>%
  ggplot(aes(x = ano)) +
  geom_line(aes(y = MaleRateFrac, color = "Fraturas de Quadril"), size = 1) +
  geom_point(aes(y = MaleRateFrac, color = "Fraturas de Quadril"), size = 2) +
  geom_line(aes(y = MaleRateDens, color = "Densitometrias Ósseas"), size = 1) +
  geom_point(aes(y = MaleRateDens, color = "Densitometrias Ósseas"), size = 2) +
  scale_y_continuous(limits = c(0,45)) +
  labs(x = "Ano", y = "Percentual em Homens", colour = "", title = "Percentual de Fraturas
      subtitle = "Considerando eventos apenas em pessoas com mais de 60 anos de idade",
      caption = "Fonte: SIA-SUS, SIH-SUS, IBGE, ANS (2008-2022)" ) +
  theme_classic()

```

Percentual de Fraturas de Quadril e Densitometrias Ósseas em
Considerando eventos apenas em pessoas com mais de 60 anos de idade



Fonte: SIA-SUS, SIH-SUS, IBGE, ANS (2008-2022)