

Title Placeholder

Load in Specific Packages

```
library(readr)
library(tidyr)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
## The following objects are masked from 'package:stats':
##
##   filter, lag
## The following objects are masked from 'package:base':
##
##   intersect, setdiff, setequal, union
```

```
library(here)
```

```
## here() starts at C:/Users/romin/ToyRepo
```

```
library(lemon)
```

```
## Warning: package 'lemon' was built under R version 4.4.2
```

```
library(kableExtra)
```

```
## Warning: package 'kableExtra' was built under R version 4.4.2
```

```
##
## Attaching package: 'kableExtra'
## The following object is masked from 'package:dplyr':
##
##   group_rows
```

```
library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 4.4.2
```

```
library(reshape())
```

```
## Warning: package 'reshape' was built under R version 4.4.2
```

```
##
## Attaching package: 'reshape'
## The following object is masked from 'package:dplyr':
##
##   rename
## The following objects are masked from 'package:tidyr':
##
##   expand, smiths
```

```
library(hexbin)
```

```
## Warning: package 'hexbin' was built under R version 4.4.2
```

```
library(data.table)
```

```
##
```

```
## Attaching package: 'data.table'
```

```
## The following object is masked from 'package:reshape':
```

```
##
```

```
##      melt
```

```
## The following objects are masked from 'package:dplyr':
```

```
##
```

```
##      between, first, last
```

```
library(GGally)
```

```
## Warning: package 'GGally' was built under R version 4.4.2
```

```
## Registered S3 method overwritten by 'GGally':
```

```
##      method from
```

```
##      +.gg      ggplot2
```

```
library(formattable)
```

```
## Warning: package 'formattable' was built under R version 4.4.2
```

```
library(viridis)
```

```
## Warning: package 'viridis' was built under R version 4.4.2
```

```
## Loading required package: viridisLite
```

Load in the data

```
cancerReg <- read.csv("C:\\Users\\romin\\ToyRepo\\Models\\cancerReg.csv")
```

Remove Unecessary Data for Analysis

```
cancerReg <- cancerReg %>% select(-period,-area_type,-type_definition,-indicator, -upper_confidence_int  
cancerReg
```

```
##      area_code      area_name year measure  
## 1 S08000015 NHS Ayrshire & Arran 2003 649.7  
## 2 S08000016 NHS Borders 2003 614.6  
## 3 S08000017 NHS Dumfries & Galloway 2003 620.5  
## 4 S08000019 NHS Forth Valley 2003 651.8  
## 5 S08000020 NHS Grampian 2003 617.8  
## 6 S08000022 NHS Highland 2003 602.9  
## 7 S08000024 NHS Lothian 2003 655.1  
## 8 S08000025 NHS Orkney 2003 589.0  
## 9 S08000026 NHS Shetland 2003 616.0  
## 10 S08000028 NHS Western Isles 2003 652.0  
## 11 S08000029 NHS Fife 2003 611.4  
## 12 S08000030 NHS Tayside 2003 611.2  
## 13 S08000031 NHS Greater Glasgow & Clyde 2003 697.3
```

## 14	S08000032	NHS Lanarkshire	2003	633.7
## 15	S08000015	NHS Ayrshire & Arran	2004	642.8
## 16	S08000016	NHS Borders	2004	616.8
## 17	S08000017	NHS Dumfries & Galloway	2004	645.2
## 18	S08000019	NHS Forth Valley	2004	648.2
## 19	S08000020	NHS Grampian	2004	601.5
## 20	S08000022	NHS Highland	2004	594.5
## 21	S08000024	NHS Lothian	2004	660.8
## 22	S08000025	NHS Orkney	2004	582.4
## 23	S08000026	NHS Shetland	2004	636.7
## 24	S08000028	NHS Western Isles	2004	628.1
## 25	S08000029	NHS Fife	2004	614.0
## 26	S08000030	NHS Tayside	2004	607.3
## 27	S08000031	NHS Greater Glasgow & Clyde	2004	693.9
## 28	S08000032	NHS Lanarkshire	2004	632.7
## 29	S08000015	NHS Ayrshire & Arran	2005	631.6
## 30	S08000016	NHS Borders	2005	632.7
## 31	S08000017	NHS Dumfries & Galloway	2005	639.4
## 32	S08000019	NHS Forth Valley	2005	642.8
## 33	S08000020	NHS Grampian	2005	589.7
## 34	S08000022	NHS Highland	2005	598.9
## 35	S08000024	NHS Lothian	2005	659.4
## 36	S08000025	NHS Orkney	2005	587.1
## 37	S08000026	NHS Shetland	2005	571.8
## 38	S08000028	NHS Western Isles	2005	610.3
## 39	S08000029	NHS Fife	2005	630.7
## 40	S08000030	NHS Tayside	2005	600.6
## 41	S08000031	NHS Greater Glasgow & Clyde	2005	695.0
## 42	S08000032	NHS Lanarkshire	2005	643.5
## 43	S08000015	NHS Ayrshire & Arran	2006	626.1
## 44	S08000016	NHS Borders	2006	641.5
## 45	S08000017	NHS Dumfries & Galloway	2006	642.1
## 46	S08000019	NHS Forth Valley	2006	618.3
## 47	S08000020	NHS Grampian	2006	586.6
## 48	S08000022	NHS Highland	2006	613.3
## 49	S08000024	NHS Lothian	2006	666.1
## 50	S08000025	NHS Orkney	2006	598.1
## 51	S08000026	NHS Shetland	2006	574.3
## 52	S08000028	NHS Western Isles	2006	664.4
## 53	S08000029	NHS Fife	2006	641.7
## 54	S08000030	NHS Tayside	2006	596.0
## 55	S08000031	NHS Greater Glasgow & Clyde	2006	687.6
## 56	S08000032	NHS Lanarkshire	2006	637.3
## 57	S08000015	NHS Ayrshire & Arran	2007	636.4
## 58	S08000016	NHS Borders	2007	643.5
## 59	S08000017	NHS Dumfries & Galloway	2007	613.4
## 60	S08000019	NHS Forth Valley	2007	633.2
## 61	S08000020	NHS Grampian	2007	595.9
## 62	S08000022	NHS Highland	2007	627.4
## 63	S08000024	NHS Lothian	2007	668.7
## 64	S08000025	NHS Orkney	2007	587.4
## 65	S08000026	NHS Shetland	2007	562.6
## 66	S08000028	NHS Western Isles	2007	707.2
## 67	S08000029	NHS Fife	2007	648.9

## 68	S08000030	NHS Tayside	2007	617.6
## 69	S08000031	NHS Greater Glasgow & Clyde	2007	698.1
## 70	S08000032	NHS Lanarkshire	2007	640.5
## 71	S08000015	NHS Ayrshire & Arran	2008	648.2
## 72	S08000016	NHS Borders	2008	627.5
## 73	S08000017	NHS Dumfries & Galloway	2008	619.8
## 74	S08000019	NHS Forth Valley	2008	638.9
## 75	S08000020	NHS Grampian	2008	605.0
## 76	S08000022	NHS Highland	2008	627.6
## 77	S08000024	NHS Lothian	2008	683.4
## 78	S08000025	NHS Orkney	2008	589.3
## 79	S08000026	NHS Shetland	2008	594.9
## 80	S08000028	NHS Western Isles	2008	726.0
## 81	S08000029	NHS Fife	2008	643.9
## 82	S08000030	NHS Tayside	2008	621.1
## 83	S08000031	NHS Greater Glasgow & Clyde	2008	710.9
## 84	S08000032	NHS Lanarkshire	2008	649.8
## 85	S08000015	NHS Ayrshire & Arran	2009	652.2
## 86	S08000016	NHS Borders	2009	633.8
## 87	S08000017	NHS Dumfries & Galloway	2009	609.1
## 88	S08000019	NHS Forth Valley	2009	649.8
## 89	S08000020	NHS Grampian	2009	605.4
## 90	S08000022	NHS Highland	2009	625.8
## 91	S08000024	NHS Lothian	2009	681.6
## 92	S08000025	NHS Orkney	2009	543.0
## 93	S08000026	NHS Shetland	2009	596.0
## 94	S08000028	NHS Western Isles	2009	715.0
## 95	S08000029	NHS Fife	2009	640.4
## 96	S08000030	NHS Tayside	2009	613.7
## 97	S08000031	NHS Greater Glasgow & Clyde	2009	715.4
## 98	S08000032	NHS Lanarkshire	2009	665.6
## 99	S08000015	NHS Ayrshire & Arran	2010	643.8
## 100	S08000016	NHS Borders	2010	614.8
## 101	S08000017	NHS Dumfries & Galloway	2010	628.9
## 102	S08000019	NHS Forth Valley	2010	634.1
## 103	S08000020	NHS Grampian	2010	608.5
## 104	S08000022	NHS Highland	2010	625.4
## 105	S08000024	NHS Lothian	2010	691.8
## 106	S08000025	NHS Orkney	2010	569.2
## 107	S08000026	NHS Shetland	2010	663.4
## 108	S08000028	NHS Western Isles	2010	674.4
## 109	S08000029	NHS Fife	2010	650.0
## 110	S08000030	NHS Tayside	2010	603.1
## 111	S08000031	NHS Greater Glasgow & Clyde	2010	714.4
## 112	S08000032	NHS Lanarkshire	2010	675.0
## 113	S08000015	NHS Ayrshire & Arran	2011	643.2
## 114	S08000016	NHS Borders	2011	614.5
## 115	S08000017	NHS Dumfries & Galloway	2011	617.6
## 116	S08000019	NHS Forth Valley	2011	620.3
## 117	S08000020	NHS Grampian	2011	606.2
## 118	S08000022	NHS Highland	2011	616.8
## 119	S08000024	NHS Lothian	2011	684.3
## 120	S08000025	NHS Orkney	2011	531.3
## 121	S08000026	NHS Shetland	2011	685.6

## 122	S08000028	NHS Western Isles	2011	646.0
## 123	S08000029	NHS Fife	2011	651.3
## 124	S08000030	NHS Tayside	2011	606.9
## 125	S08000031	NHS Greater Glasgow & Clyde	2011	712.3
## 126	S08000032	NHS Lanarkshire	2011	677.5
## 127	S08000015	NHS Ayrshire & Arran	2012	654.3
## 128	S08000016	NHS Borders	2012	608.5
## 129	S08000017	NHS Dumfries & Galloway	2012	602.7
## 130	S08000019	NHS Forth Valley	2012	617.3
## 131	S08000020	NHS Grampian	2012	606.8
## 132	S08000022	NHS Highland	2012	614.3
## 133	S08000024	NHS Lothian	2012	691.6
## 134	S08000025	NHS Orkney	2012	549.1
## 135	S08000026	NHS Shetland	2012	731.7
## 136	S08000028	NHS Western Isles	2012	651.6
## 137	S08000029	NHS Fife	2012	659.4
## 138	S08000030	NHS Tayside	2012	616.1
## 139	S08000031	NHS Greater Glasgow & Clyde	2012	713.3
## 140	S08000032	NHS Lanarkshire	2012	672.7
## 141	S08000015	NHS Ayrshire & Arran	2013	659.6
## 142	S08000016	NHS Borders	2013	621.2
## 143	S08000017	NHS Dumfries & Galloway	2013	619.9
## 144	S08000019	NHS Forth Valley	2013	626.7
## 145	S08000020	NHS Grampian	2013	607.1
## 146	S08000022	NHS Highland	2013	604.8
## 147	S08000024	NHS Lothian	2013	686.7
## 148	S08000025	NHS Orkney	2013	496.1
## 149	S08000026	NHS Shetland	2013	689.3
## 150	S08000028	NHS Western Isles	2013	626.6
## 151	S08000029	NHS Fife	2013	654.5
## 152	S08000030	NHS Tayside	2013	622.6
## 153	S08000031	NHS Greater Glasgow & Clyde	2013	718.2
## 154	S08000032	NHS Lanarkshire	2013	666.5
## 155	S08000015	NHS Ayrshire & Arran	2014	662.1
## 156	S08000016	NHS Borders	2014	625.5
## 157	S08000017	NHS Dumfries & Galloway	2014	616.1
## 158	S08000019	NHS Forth Valley	2014	630.4
## 159	S08000020	NHS Grampian	2014	610.3
## 160	S08000022	NHS Highland	2014	612.2
## 161	S08000024	NHS Lothian	2014	684.5
## 162	S08000025	NHS Orkney	2014	529.1
## 163	S08000026	NHS Shetland	2014	683.1
## 164	S08000028	NHS Western Isles	2014	641.8
## 165	S08000029	NHS Fife	2014	638.3
## 166	S08000030	NHS Tayside	2014	627.8
## 167	S08000031	NHS Greater Glasgow & Clyde	2014	712.0
## 168	S08000032	NHS Lanarkshire	2014	654.8
## 169	S08000015	NHS Ayrshire & Arran	2015	643.4
## 170	S08000016	NHS Borders	2015	618.9
## 171	S08000017	NHS Dumfries & Galloway	2015	617.9
## 172	S08000019	NHS Forth Valley	2015	628.9
## 173	S08000020	NHS Grampian	2015	617.1
## 174	S08000022	NHS Highland	2015	602.4
## 175	S08000024	NHS Lothian	2015	659.9

## 176	S08000025	NHS Orkney	2015	508.0
## 177	S08000026	NHS Shetland	2015	693.4
## 178	S08000028	NHS Western Isles	2015	614.6
## 179	S08000029	NHS Fife	2015	628.3
## 180	S08000030	NHS Tayside	2015	632.1
## 181	S08000031	NHS Greater Glasgow & Clyde	2015	711.5
## 182	S08000032	NHS Lanarkshire	2015	649.1
## 183	S08000015	NHS Ayrshire & Arran	2016	633.9
## 184	S08000016	NHS Borders	2016	628.1
## 185	S08000017	NHS Dumfries & Galloway	2016	580.9
## 186	S08000019	NHS Forth Valley	2016	638.2
## 187	S08000020	NHS Grampian	2016	614.8
## 188	S08000022	NHS Highland	2016	597.5
## 189	S08000024	NHS Lothian	2016	641.4
## 190	S08000025	NHS Orkney	2016	521.7
## 191	S08000026	NHS Shetland	2016	697.4
## 192	S08000028	NHS Western Isles	2016	598.1
## 193	S08000029	NHS Fife	2016	617.1
## 194	S08000030	NHS Tayside	2016	631.2
## 195	S08000031	NHS Greater Glasgow & Clyde	2016	699.3
## 196	S08000032	NHS Lanarkshire	2016	650.3
## 197	S08000015	NHS Ayrshire & Arran	2017	627.2
## 198	S08000016	NHS Borders	2017	638.1
## 199	S08000017	NHS Dumfries & Galloway	2017	588.7
## 200	S08000019	NHS Forth Valley	2017	657.4
## 201	S08000020	NHS Grampian	2017	637.4
## 202	S08000022	NHS Highland	2017	598.8
## 203	S08000024	NHS Lothian	2017	632.7
## 204	S08000025	NHS Orkney	2017	516.3
## 205	S08000026	NHS Shetland	2017	696.2
## 206	S08000028	NHS Western Isles	2017	573.3
## 207	S08000029	NHS Fife	2017	637.5
## 208	S08000030	NHS Tayside	2017	632.1
## 209	S08000031	NHS Greater Glasgow & Clyde	2017	700.2
## 210	S08000032	NHS Lanarkshire	2017	659.8
## 211	S08000015	NHS Ayrshire & Arran	2018	632.8
## 212	S08000016	NHS Borders	2018	629.3
## 213	S08000017	NHS Dumfries & Galloway	2018	618.5
## 214	S08000019	NHS Forth Valley	2018	664.7
## 215	S08000020	NHS Grampian	2018	651.1
## 216	S08000022	NHS Highland	2018	613.4
## 217	S08000024	NHS Lothian	2018	635.3
## 218	S08000025	NHS Orkney	2018	550.7
## 219	S08000026	NHS Shetland	2018	610.8
## 220	S08000028	NHS Western Isles	2018	588.7
## 221	S08000029	NHS Fife	2018	645.9
## 222	S08000030	NHS Tayside	2018	623.9
## 223	S08000031	NHS Greater Glasgow & Clyde	2018	702.0
## 224	S08000032	NHS Lanarkshire	2018	661.0
## 225	S08000015	NHS Ayrshire & Arran	2019	616.0
## 226	S08000016	NHS Borders	2019	575.6
## 227	S08000017	NHS Dumfries & Galloway	2019	611.7
## 228	S08000019	NHS Forth Valley	2019	643.7
## 229	S08000020	NHS Grampian	2019	623.3

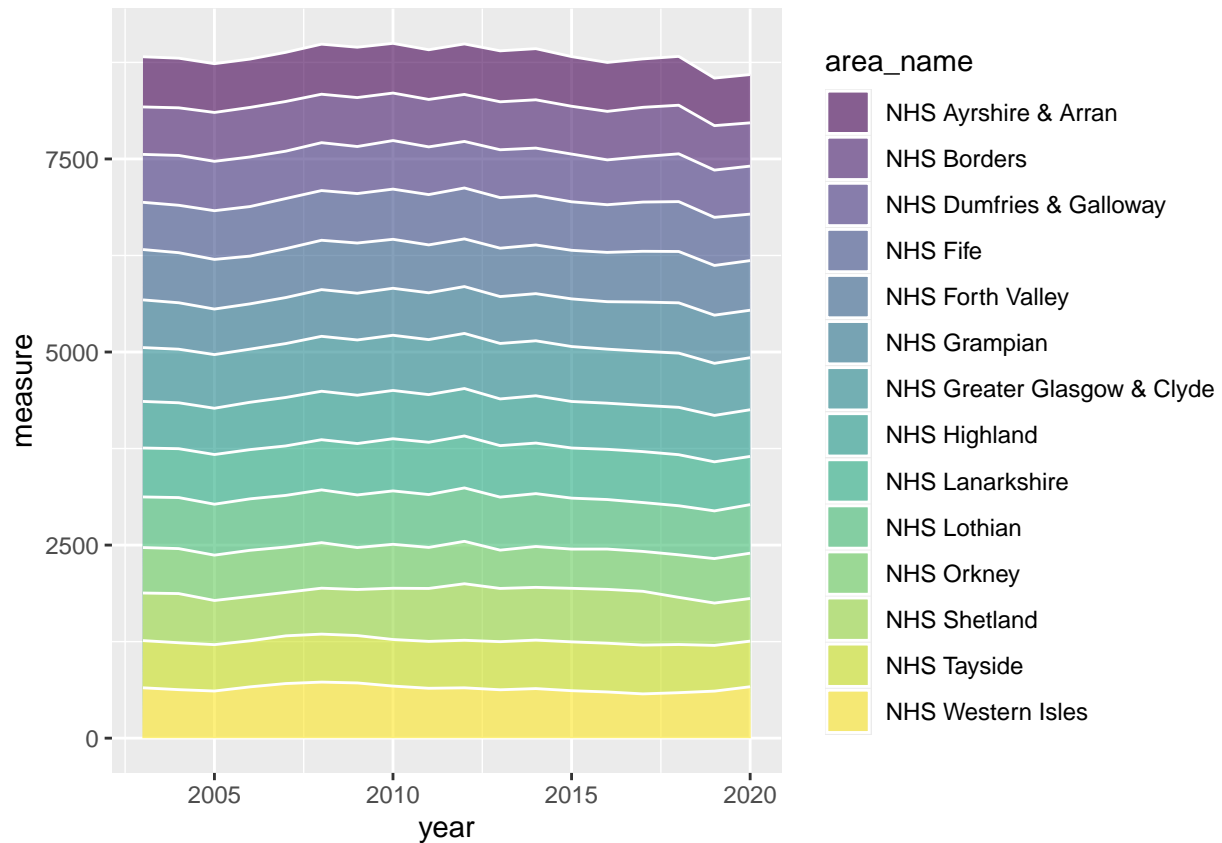
##	230	S08000022	NHS Highland	2019	600.8
##	231	S08000024	NHS Lothian	2019	617.5
##	232	S08000025	NHS Orkney	2019	575.9
##	233	S08000026	NHS Shetland	2019	548.4
##	234	S08000028	NHS Western Isles	2019	609.0
##	235	S08000029	NHS Fife	2019	623.1
##	236	S08000030	NHS Tayside	2019	592.0
##	237	S08000031	NHS Greater Glasgow & Clyde	2019	674.8
##	238	S08000032	NHS Lanarkshire	2019	635.4
##	239	S08000015	NHS Ayrshire & Arran	2020	625.5
##	240	S08000016	NHS Borders	2020	560.1
##	241	S08000017	NHS Dumfries & Galloway	2020	621.7
##	242	S08000019	NHS Forth Valley	2020	642.4
##	243	S08000020	NHS Grampian	2020	614.9
##	244	S08000022	NHS Highland	2020	604.9
##	245	S08000024	NHS Lothian	2020	628.9
##	246	S08000025	NHS Orkney	2020	586.6
##	247	S08000026	NHS Shetland	2020	551.9
##	248	S08000028	NHS Western Isles	2020	665.8
##	249	S08000029	NHS Fife	2020	602.0
##	250	S08000030	NHS Tayside	2020	590.5
##	251	S08000031	NHS Greater Glasgow & Clyde	2020	673.5
##	252	S08000032	NHS Lanarkshire	2020	624.1
##	253	S08000015	NHS Ayrshire & Arran	2021	NA
##	254	S08000016	NHS Borders	2021	NA
##	255	S08000017	NHS Dumfries & Galloway	2021	NA
##	256	S08000019	NHS Forth Valley	2021	NA
##	257	S08000020	NHS Grampian	2021	NA
##	258	S08000022	NHS Highland	2021	NA
##	259	S08000024	NHS Lothian	2021	NA
##	260	S08000025	NHS Orkney	2021	NA
##	261	S08000026	NHS Shetland	2021	NA
##	262	S08000028	NHS Western Isles	2021	NA
##	263	S08000029	NHS Fife	2021	NA
##	264	S08000030	NHS Tayside	2021	NA
##	265	S08000031	NHS Greater Glasgow & Clyde	2021	NA
##	266	S08000032	NHS Lanarkshire	2021	NA

Display Summary of All Data

```
# ggplot(cancerReg,aes(x=year, y= measure, col=area_name)) + geom_line() + geom_point()
# ggplot(cancerReg, aes(x=area_name, y=measure, fill=area_name)) + geom_violin()
# ggparcoord(data= cancerReg, columns = c(), groupColumn = "area_name")
# ggplot(cancerReg, aes(fill=year, y=measure, x=area_name)) + geom_bar(position = "stack", stat = "identity")
ggplot(cancerReg, aes(x = year, y = measure, fill = area_name)) + geom_area(alpha=0.6 , size=.5, colour="black")
  scale_fill_viridis(discrete = T)
```

```
## Warning: Using `size` aesthetic for lines was deprecated in ggplot2 3.4.0.
## i Please use `linewidth` instead.
## This warning is displayed once every 8 hours.
## Call `lifecycle::last_lifecycle_warnings()` to see where this warning was
## generated.
```

```
## Warning: Removed 14 rows containing non-finite outside the scale range
## (`stat_align()`).
```



Summary Table of Data Within Graph

```

customGreen0 = "#DeF7E9"

customGreen = "#71CA97"

customRed = "#ff7f7f"
# colnames(healthBoardData)
# healthBoardData <- healthBoardData %>%
#   mutate(
#     Average = round(rowMeans(select(., starts_with("measure."))), na.rm = TRUE), 2),
#   )
### This one works for creating some weird random diff
# healthBoardData <- reshape(cancerReg, idvar = "area_name", timevar = "year", v.names = "measure", dir
# healthBoardData <- cancerReg %>%
#   arrange(area_name, year) %>%
#   group_by(area_name) %>%
#   mutate(measure_diff = c(NA, diff(measure)))
# healthBoardData

healthBoardData <- cancerReg %>% pivot_wider(names_from = year, values_from = measure)
healthBoardData <- healthBoardData %>%

```



```

mutate(
  Average = rowMeans(select(., `2003`:`2020`), na.rm = TRUE),
  Difference = across(`2003`:`2020`, ~ . - lag(.))
)
print(healthBoardData$Difference)

## # A tibble: 14 x 18
##   `2003` `2004` `2005` `2006` `2007` `2008` `2009` `2010` `2011` `2012`
##   <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
## 1 NA      NA      NA      NA      NA      NA      NA      NA      NA      NA
## 2 -35.1    -26      1.10   15.4     7.10  -20.7   -18.4   -29     -28.7   -45.8
## 3  5.90    28.4     6.70    0.600  -30.1   -7.70  -24.7   14.1     3.10   -5.80
## 4  31.3     3      3.40  -23.8    19.8    19.1   40.7    5.20    2.70   14.6
## 5 -34     -46.7  -53.1  -31.7   -37.3  -33.9  -44.4  -25.6   -14.1  -10.5
## 6 -14.9     -7     9.20   26.7    31.5   22.6   20.4   16.9    10.6    7.5
## 7  52.2    66.3   60.5   52.8    41.3   55.8   55.8   66.4    67.5   77.3
## 8 -66.1   -78.4  -72.3   -68    -81.3  -94.1  -139.  -123.  -153   -142.
## 9  27      54.3  -15.3  -23.8  -24.8    5.60   53     94.2   154.   183.
## 10 36      -8.60  38.5   90.1   145.   131.   119     11    -39.6  -80.1
## 11 -40.6   -14.1   20.4  -22.7  -58.3  -82.1  -74.6  -24.4    5.30   7.80
## 12 -0.200  -6.70  -30.1  -45.7  -31.3  -22.8  -26.7  -46.9  -44.4  -43.3
## 13  86.1    86.6   94.4   91.6   80.5   89.8   102.   111.   105.   97.2
## 14 -63.6   -61.2  -51.5  -50.3  -57.6  -61.1  -49.8  -39.4  -34.8  -40.6
## # i 8 more variables: `2013` <dbl>, `2014` <dbl>, `2015` <dbl>, `2016` <dbl>,
## #   `2017` <dbl>, `2018` <dbl>, `2019` <dbl>, `2020` <dbl>

```