

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(formattable)
```

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

Load in the data

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

Remove Unecessary Data for Analysis

```
cancerReg <- cancerReg %>% select(-area_type,-period,-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

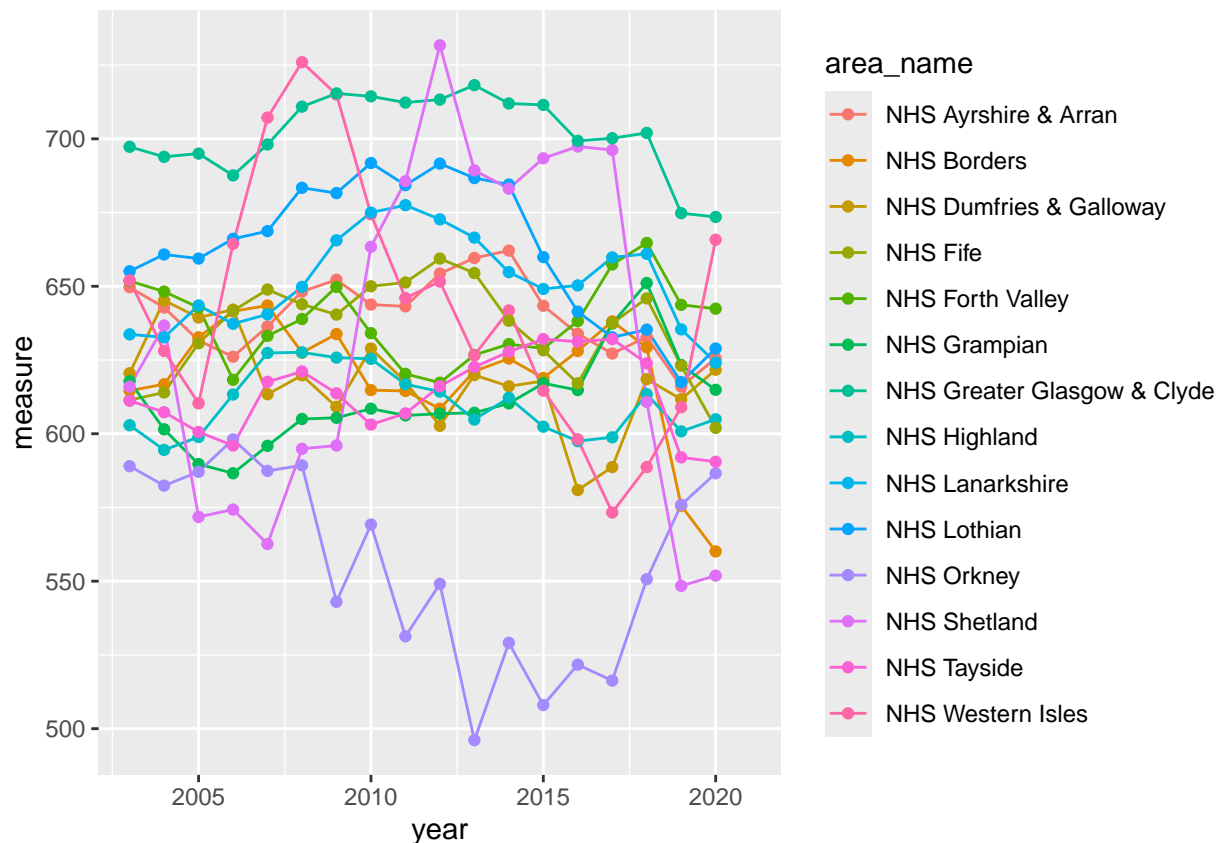
## 242	S08000019	NHS Forth Valley	2020	642.4
## 243	S08000020	NHS Grampian	2020	614.9
## 244	S08000022	NHS Highland	2020	604.9
## 245	S08000024	NHS Lothian	2020	628.9
## 246	S08000025	NHS Orkney	2020	586.6
## 247	S08000026	NHS Shetland	2020	551.9
## 248	S08000028	NHS Western Isles	2020	665.8
## 249	S08000029	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()
```

```
## Warning: Removed 14 rows containing missing values or values outside the scale range
## (`geom_line()`).
```

```
## Warning: Removed 14 rows containing missing values or values outside the scale range
## (`geom_point()`).
```



Summary Table of Data Within Graph

```
customGreen0 = "#DeF7E9"
customGreen = "#71CA97"
customRed = "#ff7f7f"

healthBoardData <- reshape(cancerReg, idvar = "area_name", timevar = "year", v.names = "measure", direction = "long",
colnames(healthBoardData))

## [1] "area_code"      "area_name"      "measure.2003"  "measure.2004"  "measure.2005"
## [6] "measure.2006"  "measure.2007"  "measure.2008"  "measure.2009"  "measure.2010"
## [11] "measure.2011"  "measure.2012"  "measure.2013"  "measure.2014"  "measure.2015"
## [16] "measure.2016"  "measure.2017"  "measure.2018"  "measure.2019"  "measure.2020"
## [21] "measure.2021"

healthBoardData <- healthBoardData %>%
  mutate(
    Average = round(rowMeans(select(., starts_with("measure."))), na.rm = TRUE), 2),
  )
#Calculate the difference in all the values from 2003- 2021
healthBoardData
```

##	area_code	area_name	measure.2003	measure.2004	measure.2005
## 1	S08000015	NHS Ayrshire & Arran	649.7	642.8	631.6
## 2	S08000016	NHS Borders	614.6	616.8	632.7

## 3	S08000017	NHS Dumfries & Galloway	620.5	645.2	639.4
## 4	S08000019	NHS Forth Valley	651.8	648.2	642.8
## 5	S08000020	NHS Grampian	617.8	601.5	589.7
## 6	S08000022	NHS Highland	602.9	594.5	598.9
## 7	S08000024	NHS Lothian	655.1	660.8	659.4
## 8	S08000025	NHS Orkney	589.0	582.4	587.1
## 9	S08000026	NHS Shetland	616.0	636.7	571.8
## 10	S08000028	NHS Western Isles	652.0	628.1	610.3
## 11	S08000029	NHS Fife	611.4	614.0	630.7
## 12	S08000030	NHS Tayside	611.2	607.3	600.6
## 13	S08000031	NHS Greater Glasgow & Clyde	697.3	693.9	695.0
## 14	S08000032	NHS Lanarkshire	633.7	632.7	643.5
##	measure.2006	measure.2007	measure.2008	measure.2009	measure.2010
## 1	626.1	636.4	648.2	652.2	643.8
## 2	641.5	643.5	627.5	633.8	614.8
## 3	642.1	613.4	619.8	609.1	628.9
## 4	618.3	633.2	638.9	649.8	634.1
## 5	586.6	595.9	605.0	605.4	608.5
## 6	613.3	627.4	627.6	625.8	625.4
## 7	666.1	668.7	683.4	681.6	691.8
## 8	598.1	587.4	589.3	543.0	569.2
## 9	574.3	562.6	594.9	596.0	663.4
## 10	664.4	707.2	726.0	715.0	674.4
## 11	641.7	648.9	643.9	640.4	650.0
## 12	596.0	617.6	621.1	613.7	603.1
## 13	687.6	698.1	710.9	715.4	714.4
## 14	637.3	640.5	649.8	665.6	675.0
##	measure.2011	measure.2012	measure.2013	measure.2014	measure.2015
## 1	643.2	654.3	659.6	662.1	643.4
## 2	614.5	608.5	621.2	625.5	618.9
## 3	617.6	602.7	619.9	616.1	617.9
## 4	620.3	617.3	626.7	630.4	628.9
## 5	606.2	606.8	607.1	610.3	617.1
## 6	616.8	614.3	604.8	612.2	602.4
## 7	684.3	691.6	686.7	684.5	659.9
## 8	531.3	549.1	496.1	529.1	508.0
## 9	685.6	731.7	689.3	683.1	693.4
## 10	646.0	651.6	626.6	641.8	614.6
## 11	651.3	659.4	654.5	638.3	628.3
## 12	606.9	616.1	622.6	627.8	632.1
## 13	712.3	713.3	718.2	712.0	711.5
## 14	677.5	672.7	666.5	654.8	649.1
##	measure.2016	measure.2017	measure.2018	measure.2019	measure.2020
## 1	633.9	627.2	632.8	616.0	625.5
## 2	628.1	638.1	629.3	575.6	560.1
## 3	580.9	588.7	618.5	611.7	621.7
## 4	638.2	657.4	664.7	643.7	642.4
## 5	614.8	637.4	651.1	623.3	614.9
## 6	597.5	598.8	613.4	600.8	604.9
## 7	641.4	632.7	635.3	617.5	628.9
## 8	521.7	516.3	550.7	575.9	586.6
## 9	697.4	696.2	610.8	548.4	551.9
## 10	598.1	573.3	588.7	609.0	665.8
## 11	617.1	637.5	645.9	623.1	602.0

## 12	631.2	632.1	623.9	592.0	590.5
## 13	699.3	700.2	702.0	674.8	673.5
## 14	650.3	659.8	661.0	635.4	624.1
##	measure.2021	Average			
## 1	NA	640.49			
## 2	NA	619.17			
## 3	NA	617.45			
## 4	NA	638.17			
## 5	NA	611.08			
## 6	NA	610.09			
## 7	NA	662.76			
## 8	NA	556.13			
## 9	NA	633.53			
## 10	NA	644.05			
## 11	NA	635.47			
## 12	NA	613.66			
## 13	NA	701.65			
## 14	NA	651.63			