R Notebook on United Nations database on Food and Agriculture Organization(FAO) [(1961-2013)]

Importing the libraries

```
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('ggplot2')
library('ggthemes')
library('corrplot')
```

```
## corrplot 0.84 loaded
```

```
library('lubridate')
```

```
##
## Attaching package: 'lubridate'
```

```
## The following object is masked from 'package:base':
##
##     date
```

```
library('purrr')
library('cowplot')
```

```
##
## Attaching package: 'cowplot'
```

```
## The following object is masked from 'package:ggthemes':
##
##     theme_map
```

```
## The following object is masked from 'package:ggplot2':
##
##     ggsave
```

```
library('maps')
```

```
##
## Attaching package: 'maps'

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

library('viridis')

## Loading required package: viridisLite

library('treemap')
library('leaflet')
library('dygraphs')
library('graphics')
library('forecast')
library('xts')

## Loading required package: zoo

##
## Attaching package: 'zoo'

## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric

##
## Attaching package: 'xts'

## The following object is masked from 'package:leaflet':
##
##     addLegend

## The following objects are masked from 'package:dplyr':
##
##     first, last

library('IRdisplay')
```

Uploading the csv FAO datset

```
data = read.csv("C:/Users/HP/Downloads/unfao/unfao1.csv")
head(data)
```

```
##   Area.Abbreviation Area.Code        Area Item.Code
## 1               AFG         2 Afghanistan      2511
## 2               AFG         2 Afghanistan      2805
## 3               AFG         2 Afghanistan      2513
## 4               AFG         2 Afghanistan      2513
## 5               AFG         2 Afghanistan      2514
## 6               AFG         2 Afghanistan      2514
##                       Item Element.Code Element        Unit latitude
```

```
## 1       Wheat and products         5142    Food 1000 tonnes    33.94
## 2 Rice (Milled Equivalent)         5142    Food 1000 tonnes    33.94
## 3      Barley and products         5521    Feed 1000 tonnes    33.94
## 4      Barley and products         5142    Food 1000 tonnes    33.94
## 5       Maize and products         5521    Feed 1000 tonnes    33.94
## 6       Maize and products         5142    Food 1000 tonnes    33.94
##   longitude Y1961 Y1962 Y1963 Y1964 Y1965 Y1966 Y1967 Y1968 Y1969 Y1970
## 1     67.71  1928  1904  1666  1950  2001  1808  2053  2045  2154  1819
## 2     67.71   183   183   182   220   220   195   231   235   238   213
## 3     67.71    76    76    76    76    76    75    71    72    73    74
## 4     67.71   237   237   237   238   238   237   225   227   230   234
## 5     67.71   210   210   214   216   216   216   235   232   236   200
## 6     67.71   403   403   410   415   415   413   454   448   455   383
##   Y1971 Y1972 Y1973 Y1974 Y1975 Y1976 Y1977 Y1978 Y1979 Y1980 Y1981 Y1982
## 1  1963  2215  2310  2335  2434  2512  2282  2454  2443  2129  2133  2068
## 2   205   233   246   246   255   263   235   254   270   259   248   217
## 3    71    70    72    76    77    80    60    65    64    64    60    55
## 4   223   219   225   240   244   255   185   203   198   202   189   174
## 5   201   216   228   231   234   240   228   234   228   226   210   199
## 6   386   416   439   445   451   463   439   451   440   437   407   384
##   Y1983 Y1984 Y1985 Y1986 Y1987 Y1988 Y1989 Y1990 Y1991 Y1992 Y1993 Y1994
## 1  1994  1851  1791  1683  2194  1801  1754  1640  1539  1582  1840  1855
## 2   217   197   186   200   193   202   191   199   197   249   218   260
## 3    53    51    48    46    46    47    46    43    43    40    50    46
## 4   167   160   151   145   145   148   145   135   132   120   155   143
## 5   192   182   173   170   154   148   137   144   126    90   141   150
## 6   371   353   334   330   298   287   265   279   245   170   272   289
##   Y1995 Y1996 Y1997 Y1998 Y1999 Y2000 Y2001 Y2002 Y2003 Y2004 Y2005 Y2006
## 1  1853  2177  2343  2407  2463  2600  2668  2776  3095  3249  3486  3704
## 2   319   254   326   347   270   372   411   448   460   419   445   546
## 3    41    44    50    48    43    26    29    70    48    58   236   262
## 4   125   138   159   154   141    84    83   122   144   185    43    44
## 5   159   108    90    99    72    35    48    89    63   120   208   233
## 6   310   209   173   192   141    66    93   170   117   231    67    82
##   Y2007 Y2008 Y2009 Y2010 Y2011 Y2012 Y2013
## 1  4164  4252  4538  4605  4711  4810  4895
## 2   455   490   415   442   476   425   422
## 3   263   230   379   315   203   367   360
## 4    48    62    55    60    72    78    89
## 5   249   247   195   178   191   200   200
## 6    67    69    71    82    73    77    76
```

A sneak peak in the dataset

```
str(data)

## 'data.frame':    21477 obs. of  63 variables:
##  $ Area.Abbreviation: Factor w/ 169 levels "AFG","AGO","ALB",..: 1 1 1 1 1
1 1 1 1 1 ...
##  $ Area.Code        : int  2 2 2 2 2 2 2 2 2 2 ...
```

```
##  $ Area             : Factor w/ 174 levels "Afghanistan",..: 1 1 1 1 1 1 1
1 1 1 ...
##  $ Item.Code        : int  2511 2805 2513 2513 2514 2514 2517 2520 2531
2536 ...
##  $ Item             : Factor w/ 115 levels "Alcoholic Beverages",..: 113
84 8 8 46 46 53 18 78 100 ...
##  $ Element.Code     : int  5142 5142 5521 5142 5521 5142 5142 5142 5142
5521 ...
##  $ Element          : Factor w/ 2 levels "Feed","Food": 2 2 1 2 1 2 2 2 2
1 ...
##  $ Unit             : Factor w/ 1 level "1000 tonnes": 1 1 1 1 1 1 1 1 1 1
...
##  $ latitude         : num  33.9 33.9 33.9 33.9 33.9 ...
##  $ longitude        : num  67.7 67.7 67.7 67.7 67.7 ...
##  $ Y1961            : int  1928 183 76 237 210 403 17 0 111 45 ...
##  $ Y1962            : int  1904 183 76 237 210 403 18 0 97 45 ...
##  $ Y1963            : int  1666 182 76 237 214 410 19 0 103 45 ...
##  $ Y1964            : int  1950 220 76 238 216 415 20 0 110 45 ...
##  $ Y1965            : int  2001 220 76 238 216 415 21 0 113 31 ...
##  $ Y1966            : int  1808 195 75 237 216 413 22 0 117 14 ...
##  $ Y1967            : int  2053 231 71 225 235 454 23 0 128 19 ...
##  $ Y1968            : int  2045 235 72 227 232 448 24 0 130 30 ...
##  $ Y1969            : int  2154 238 73 230 236 455 25 0 134 34 ...
##  $ Y1970            : int  1819 213 74 234 200 383 26 0 125 15 ...
##  $ Y1971            : int  1963 205 71 223 201 386 26 0 147 0 ...
##  $ Y1972            : int  2215 233 70 219 216 416 27 0 138 0 ...
##  $ Y1973            : int  2310 246 72 225 228 439 27 0 143 28 ...
##  $ Y1974            : int  2335 246 76 240 231 445 28 0 160 32 ...
##  $ Y1975            : int  2434 255 77 244 234 451 29 0 169 20 ...
##  $ Y1976            : int  2512 263 80 255 240 463 37 0 324 28 ...
##  $ Y1977            : int  2282 235 60 185 228 439 32 0 176 24 ...
##  $ Y1978            : int  2454 254 65 203 234 451 33 0 225 24 ...
##  $ Y1979            : int  2443 270 64 198 228 440 31 0 232 34 ...
##  $ Y1980            : int  2129 259 64 202 226 437 31 0 240 61 ...
##  $ Y1981            : int  2133 248 60 189 210 407 29 0 247 50 ...
##  $ Y1982            : int  2068 217 55 174 199 384 27 0 248 43 ...
##  $ Y1983            : int  1994 217 53 167 192 371 28 0 242 38 ...
##  $ Y1984            : int  1851 197 51 160 182 353 26 0 235 46 ...
##  $ Y1985            : int  1791 186 48 151 173 334 25 0 226 23 ...
##  $ Y1986            : int  1683 200 46 145 170 330 23 0 217 25 ...
##  $ Y1987            : int  2194 193 46 145 154 298 23 0 196 3 ...
##  $ Y1988            : int  1801 202 47 148 148 287 23 0 198 45 ...
##  $ Y1989            : int  1754 191 46 145 137 265 23 0 184 54 ...
##  $ Y1990            : int  1640 199 43 135 144 279 24 0 205 47 ...
##  $ Y1991            : int  1539 197 43 132 126 245 24 0 203 29 ...
##  $ Y1992            : int  1582 249 40 120 90 170 18 0 210 29 ...
##  $ Y1993            : int  1840 218 50 155 141 272 22 0 210 29 ...
##  $ Y1994            : int  1855 260 46 143 150 289 20 0 211 29 ...
##  $ Y1995            : int  1853 319 41 125 159 310 21 0 212 29 ...
##  $ Y1996            : int  2177 254 44 138 108 209 17 0 213 29 ...
```

```
##  $ Y1997            : int  2343 326 50 159 90 173 20 0 214 28 ...
##  $ Y1998            : int  2407 347 48 154 99 192 21 0 214 28 ...
##  $ Y1999            : int  2463 270 43 141 72 141 17 0 217 28 ...
##  $ Y2000            : int  2600 372 26 84 35 66 20 0 219 29 ...
##  $ Y2001            : int  2668 411 29 83 48 93 20 0 215 29 ...
##  $ Y2002            : int  2776 448 70 122 89 170 18 0 217 29 ...
##  $ Y2003            : int  3095 460 48 144 63 117 16 1 347 51 ...
##  $ Y2004            : int  3249 419 58 185 120 231 15 2 276 50 ...
##  $ Y2005            : int  3486 445 236 43 208 67 21 1 294 29 ...
##  $ Y2006            : int  3704 546 262 44 233 82 11 1 294 61 ...
##  $ Y2007            : int  4164 455 263 48 249 67 19 0 260 65 ...
##  $ Y2008            : int  4252 490 230 62 247 69 21 0 242 54 ...
##  $ Y2009            : int  4538 415 379 55 195 71 18 0 250 114 ...
##  $ Y2010            : int  4605 442 315 60 178 82 14 0 192 83 ...
##  $ Y2011            : int  4711 476 203 72 191 73 14 0 169 83 ...
##  $ Y2012            : int  4810 425 367 78 200 77 14 0 196 69 ...
##  $ Y2013            : int  4895 422 360 89 200 76 12 0 230 81 ...
```

```
summary(data)
```

```
##  Area.Abbreviation   Area.Code                  Area         Item.Code
##  CHN    :  541     Min.   :  1.0   Spain          :  150   Min.   :2511
##  THA    :  261     1st Qu.: 63.0   Italy          :  148   1st Qu.:2561
##  AZE    :  240     Median :120.0   Germany        :  147   Median :2640
##  ESP    :  150     Mean   :125.4   China, mainland:  146   Mean   :2694
##  ITA    :  148     3rd Qu.:188.0   Greece         :  143   3rd Qu.:2782
##  DEU    :  147     Max.   :276.0   Japan          :  143   Max.   :2961
##  (Other):19990                      (Other)        :20600
##                         Item        Element.Code  Element
##  Milk - Excluding Butter :  558   Min.   :5142   Feed: 3949
##  Eggs                    :  360   1st Qu.:5142   Food:17528
##  Cereals - Excluding Beer:  347   Median :5142
##  Fish, Seafood           :  337   Mean   :5212
##  Maize and products      :  333   3rd Qu.:5142
##  Pelagic Fish            :  328   Max.   :5521
##  (Other)                 :19214
##           Unit          latitude        longitude           Y1961
##  1000 tonnes:21477   Min.   :-40.90   Min.   :-172.10   Min.   :     0.0
##                      1st Qu.:  6.43   1st Qu.: -11.78   1st Qu.:     0.0
##                      Median : 20.59   Median :  19.15   Median :     1.0
##                      Mean   : 20.45   Mean   :  15.79   Mean   :   195.3
##                      3rd Qu.: 41.15   3rd Qu.:  46.87   3rd Qu.:    21.0
##                      Max.   : 64.96   Max.   : 179.41   Max.   :112227.0
##                                                         NA's   :3539
##      Y1962              Y1963              Y1964
##  Min.   :     0.0   Min.   :     0.0   Min.   :     0.0
##  1st Qu.:     0.0   1st Qu.:     0.0   1st Qu.:     0.0
##  Median :     1.0   Median :     1.0   Median :     1.0
##  Mean   :   200.8   Mean   :   205.5   Mean   :   209.9
##  3rd Qu.:    22.0   3rd Qu.:    23.0   3rd Qu.:    24.0
```

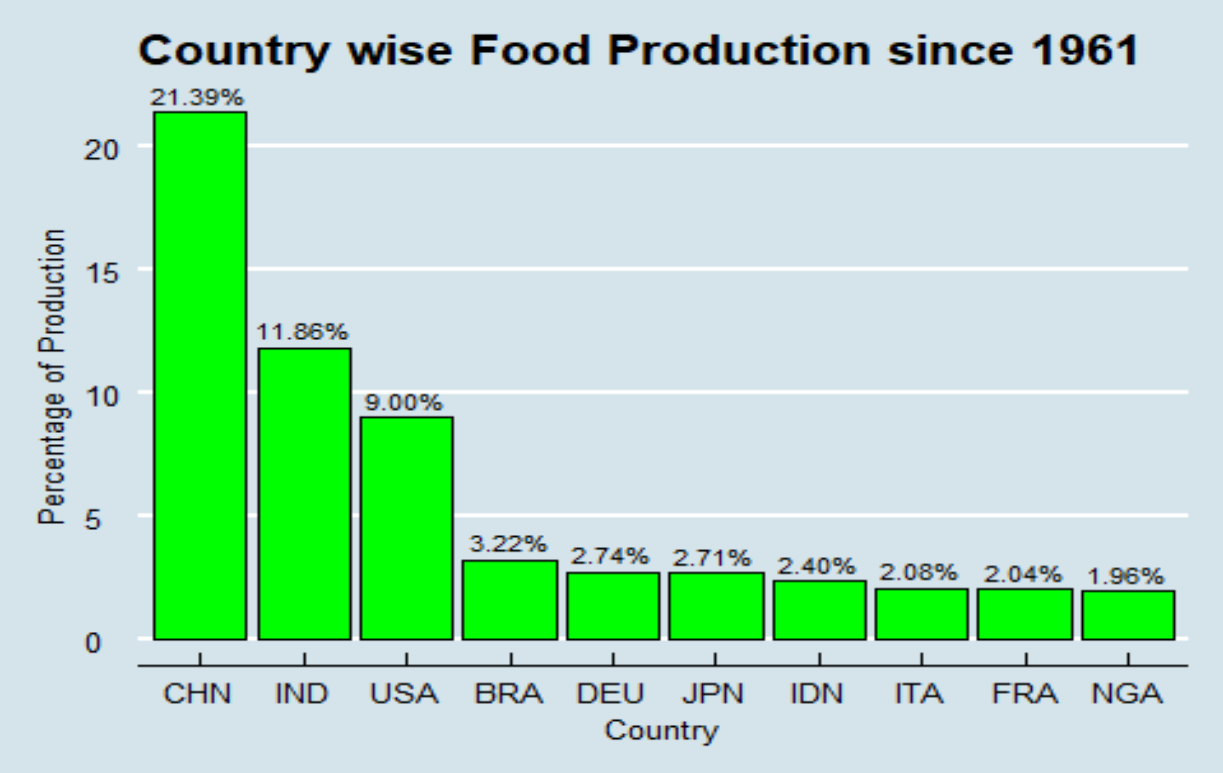
```
##  Max.   :109130.0   Max.   :106356.0   Max.   :104234.0
##  NA's   :3539       NA's   :3539       NA's   :3539
##      Y1965              Y1966             Y1967              Y1968
##  Min.   :     0.0   Min.   :     0   Min.   :     0.0   Min.   :     0.0
##  1st Qu.:     0.0   1st Qu.:     0   1st Qu.:     0.0   1st Qu.:     0.0
##  Median :     1.0   Median :     1   Median :     1.0   Median :     2.0
##  Mean   :   217.6   Mean   :   226   Mean   :   230.4   Mean   :   238.4
##  3rd Qu.:    25.0   3rd Qu.:    26   3rd Qu.:    27.0   3rd Qu.:    28.0
##  Max.   :119378.0   Max.   :118495   Max.   :118725.0   Max.   :127512.0
##  NA's   :3539       NA's   :3539     NA's   :3539       NA's   :3539
##      Y1969              Y1970              Y1971
##  Min.   :     0.0   Min.   :     0.0   Min.   :     0.0
##  1st Qu.:     0.0   1st Qu.:     0.0   1st Qu.:     0.0
##  Median :     2.0   Median :     2.0   Median :     2.0
##  Mean   :   244.3   Mean   :   250.3   Mean   :   254.2
##  3rd Qu.:    29.0   3rd Qu.:    30.0   3rd Qu.:    30.0
##  Max.   :134937.0   Max.   :131871.0   Max.   :143407.0
##  NA's   :3539       NA's   :3539       NA's   :3539
##      Y1972              Y1973              Y1974
##  Min.   :     0.0   Min.   :     0.0   Min.   :     0.0
##  1st Qu.:     0.0   1st Qu.:     0.0   1st Qu.:     0.0
##  Median :     2.0   Median :     2.0   Median :     2.0
##  Mean   :   257.4   Mean   :   267.3   Mean   :   267.1
##  3rd Qu.:    31.0   3rd Qu.:    32.0   3rd Qu.:    33.0
##  Max.   :147793.0   Max.   :142439.0   Max.   :118872.0
##  NA's   :3539       NA's   :3539       NA's   :3539
##      Y1975              Y1976              Y1977             Y1978
##  Min.   :     0.0   Min.   :     0.0   Min.   :     0   Min.   :     0.0
##  1st Qu.:     0.0   1st Qu.:     0.0   1st Qu.:     0   1st Qu.:     0.0
##  Median :     2.0   Median :     2.0   Median :     2   Median :     2.0
##  Mean   :   274.4   Mean   :   276.6   Mean   :   286   Mean   :   299.8
##  3rd Qu.:    34.0   3rd Qu.:    35.0   3rd Qu.:    37   3rd Qu.:    38.0
##  Max.   :123842.0   Max.   :126359.0   Max.   :128840   Max.   :142403.0
##  NA's   :3539       NA's   :3539       NA's   :3539     NA's   :3539
##      Y1979              Y1980              Y1981
##  Min.   :     0.00   Min.   :     0.0   Min.   :     0.0
##  1st Qu.:     0.00   1st Qu.:     0.0   1st Qu.:     0.0
##  Median :     2.00   Median :     3.0   Median :     3.0
##  Mean   :   305.84   Mean   :   305.7   Mean   :   311.7
##  3rd Qu.:    39.75   3rd Qu.:    41.0   3rd Qu.:    42.0
##  Max.   :147401.00   Max.   :151742.0   Max.   :157179.0
##  NA's   :3539        NA's   :3539       NA's   :3539
##      Y1982             Y1983              Y1984              Y1985
##  Min.   :     0   Min.   :     0.0   Min.   :     0.0   Min.   :     0.0
##  1st Qu.:     0   1st Qu.:     0.0   1st Qu.:     0.0   1st Qu.:     0.0
##  Median :     3   Median :     3.0   Median :     3.0   Median :     3.0
##  Mean   :   321   Mean   :   326.9   Mean   :   339.6   Mean   :   344.4
##  3rd Qu.:    43   3rd Qu.:    44.0   3rd Qu.:    45.0   3rd Qu.:    46.0
##  Max.   :172222   Max.   :182221.0   Max.   :187020.0   Max.   :188438.0
##  NA's   :3539     NA's   :3539       NA's   :3539       NA's   :3539
```

```
##      Y1986             Y1987             Y1988             Y1989        
##  Min.   :     0.0   Min.   :     0.0   Min.   :     0   Min.   :     0.0  
##  1st Qu.:     0.0   1st Qu.:     0.0   1st Qu.:     0   1st Qu.:     0.0  
##  Median :     3.0   Median :     3.0   Median :     4   Median :     4.0  
##  Mean   :   351.7   Mean   :   361.9   Mean   :   364   Mean   :   372.4  
##  3rd Qu.:    48.0   3rd Qu.:    50.0   3rd Qu.:    51   3rd Qu.:    53.0  
##  Max.   :189999.0   Max.   :190010.0   Max.   :189180   Max.   :192403.0  
##  NA's   :3539       NA's   :3539       NA's   :3539     NA's   :3539      
##      Y1990             Y1991             Y1992             Y1993        
##  Min.   :     0.0   Min.   :     0.0   Min.   :     0   Min.   :     0.0  
##  1st Qu.:     0.0   1st Qu.:     0.0   1st Qu.:     0   1st Qu.:     0.0  
##  Median :     4.0   Median :     4.0   Median :     4   Median :     4.0  
##  Mean   :   375.4   Mean   :   379.4   Mean   :   386   Mean   :   389.3  
##  3rd Qu.:    53.0   3rd Qu.:    54.0   3rd Qu.:    56   3rd Qu.:    58.0  
##  Max.   :201072.0   Max.   :193224.0   Max.   :197464   Max.   :202770.0  
##  NA's   :3415       NA's   :3415       NA's   :987      NA's   :612       
##      Y1994             Y1995             Y1996        
##  Min.   :     0.0   Min.   :     0.0   Min.   :     0.0  
##  1st Qu.:     0.0   1st Qu.:     0.0   1st Qu.:     0.0  
##  Median :     4.0   Median :     4.0   Median :     5.0  
##  Mean   :   397.1   Mean   :   404.5   Mean   :   415.3  
##  3rd Qu.:    58.0   3rd Qu.:    60.0   3rd Qu.:    61.0  
##  Max.   :204581.0   Max.   :208137.0   Max.   :210855.0  
##  NA's   :612        NA's   :612        NA's   :612       
##      Y1997             Y1998             Y1999        
##  Min.   :     0.0   Min.   :     0.0   Min.   :     0.0  
##  1st Qu.:     0.0   1st Qu.:     0.0   1st Qu.:     0.0  
##  Median :     5.0   Median :     5.0   Median :     5.0  
##  Mean   :   421.6   Mean   :   428.9   Mean   :   441.7  
##  3rd Qu.:    63.0   3rd Qu.:    62.0   3rd Qu.:    65.0  
##  Max.   :221456.0   Max.   :229928.0   Max.   :255625.0  
##  NA's   :612        NA's   :612        NA's   :612       
##      Y2000             Y2001             Y2002        
##  Min.   :     0.0   Min.   :     0.0   Min.   :     0.0  
##  1st Qu.:     0.0   1st Qu.:     0.0   1st Qu.:     0.0  
##  Median :     5.0   Median :     6.0   Median :     6.0  
##  Mean   :   451.8   Mean   :   458.7   Mean   :   465.5  
##  3rd Qu.:    67.0   3rd Qu.:    68.0   3rd Qu.:    70.0  
##  Max.   :311110.0   Max.   :327370.0   Max.   :352172.0  
##  NA's   :349        NA's   :349        NA's   :349       
##      Y2003             Y2004             Y2005        
##  Min.   :     0.0   Min.   :     0.0   Min.   :     0.0  
##  1st Qu.:     0.0   1st Qu.:     0.0   1st Qu.:     0.0  
##  Median :     6.0   Median :     6.0   Median :     6.0  
##  Mean   :   472.7   Mean   :   486.7   Mean   :   493.2  
##  3rd Qu.:    71.0   3rd Qu.:    75.0   3rd Qu.:    77.0  
##  Max.   :354850.0   Max.   :360767.0   Max.   :373694.0  
##  NA's   :349        NA's   :349        NA's   :349       
##      Y2006             Y2007             Y2008        
##  Min.   :     0.0   Min.   :     0.0   Min.   :     0.0
```

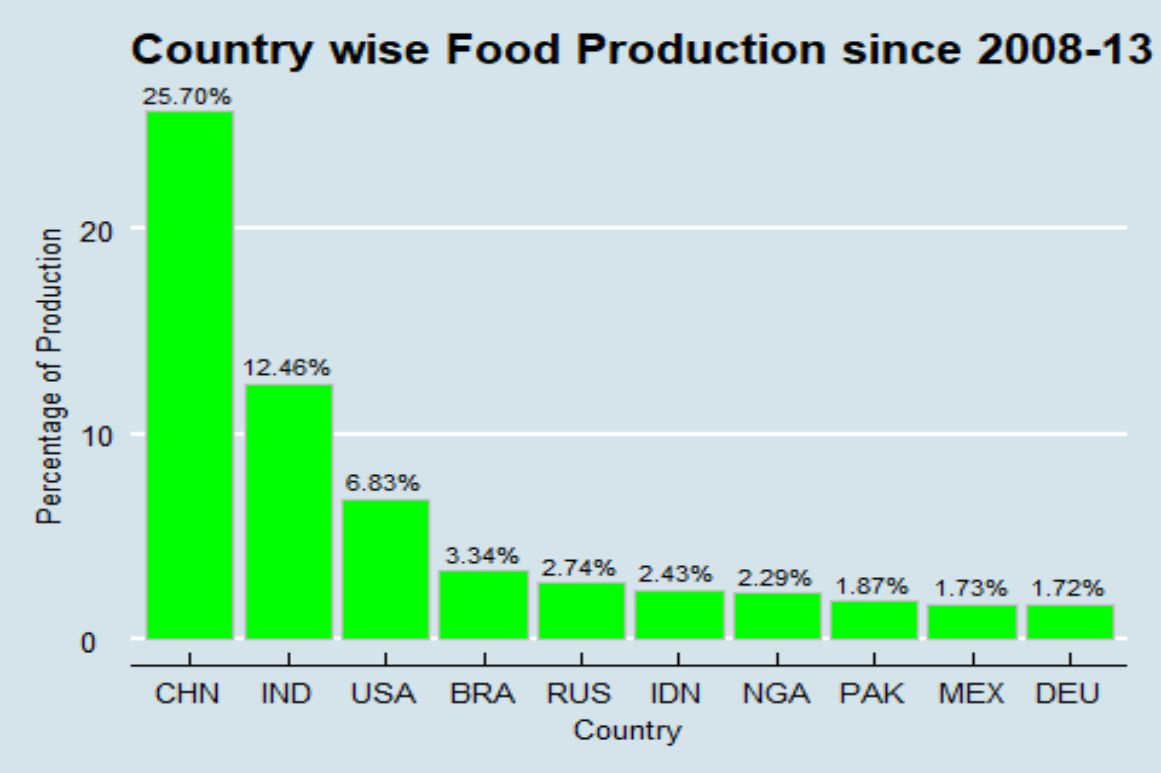
```
##  1st Qu.:     0.0   1st Qu.:     0.0   1st Qu.:     0.0
##  Median :     7.0   Median :     7.0   Median :     7.0
##  Mean   :   496.3   Mean   :   508.5   Mean   :   522.8
##  3rd Qu.:    78.0   3rd Qu.:    80.0   3rd Qu.:    82.0
##  Max.   :388100.0   Max.   :402975.0   Max.   :425537.0
##  NA's   :104        NA's   :104        NA's   :104
##      Y2009              Y2010              Y2011
##  Min.   :     0.0   Min.   :     0.0   Min.   :     0.0
##  1st Qu.:     0.0   1st Qu.:     0.0   1st Qu.:     0.0
##  Median :     7.0   Median :     7.0   Median :     8.0
##  Mean   :   524.6   Mean   :   535.5   Mean   :   553.4
##  3rd Qu.:    83.0   3rd Qu.:    83.0   3rd Qu.:    86.0
##  Max.   :434724.0   Max.   :451838.0   Max.   :462696.0
##  NA's   :104        NA's   :104        NA's   :104
##      Y2012              Y2013
##  Min.   :  -169.0   Min.   :  -246.0
##  1st Qu.:     0.0   1st Qu.:     0.0
##  Median :     8.0   Median :     8.0
##  Mean   :   560.6   Mean   :   575.6
##  3rd Qu.:    88.0   3rd Qu.:    90.0
##  Max.   :479028.0   Max.   :489299.0
##
```

Let's plot the dataset accordingly!

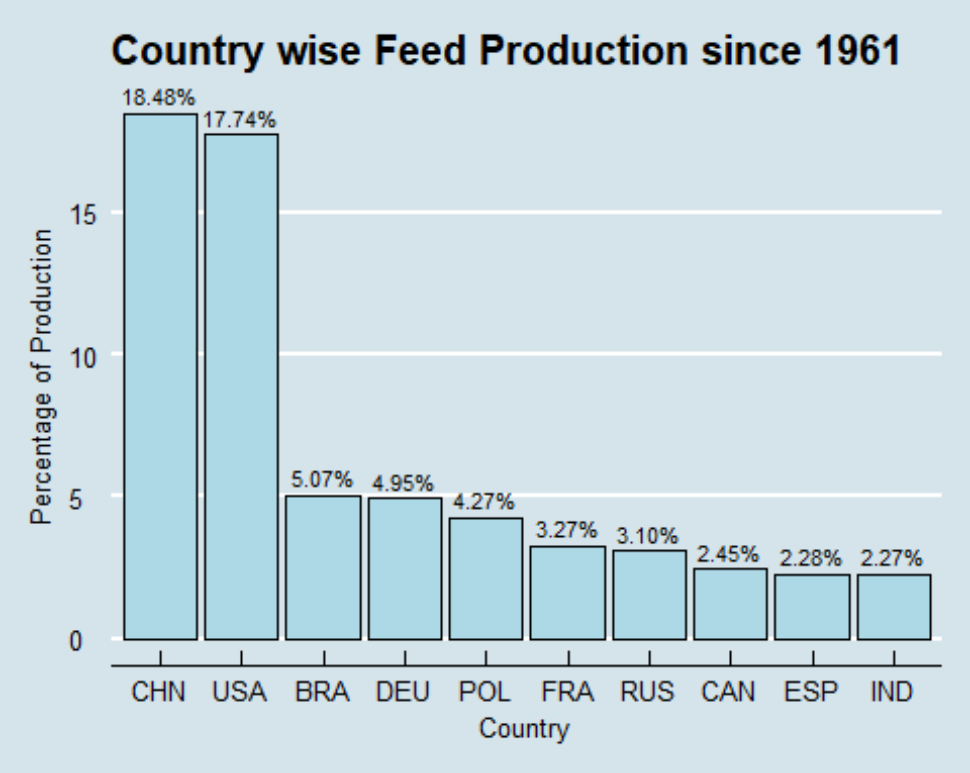
```
options(repr.plot.width=15, repr.plot.height=4)
data = mutate(data, Total=apply(data[11:63], 1, sum, na.rm = T))
data = mutate(data, last5=apply(data[58:63], 1, sum, na.rm = T))

p1 = data %>% group_by(Area.Abbreviation, Element) %>% filter(Element ==
'Food')%>%
  summarise(TFO = sum(Total)) %>% ungroup()%>%mutate(pct =
prop.table(TFO)*100)%>%
  top_n(10, wt = pct)%>%
  ggplot(aes(x = reorder(Area.Abbreviation, -pct), y = pct)) +
  geom_bar(stat = 'identity', fill = "green", aes(color = I('black')), size =
0.1) + ggtitle("Country wise Food Production since 1961") +
  geom_text(aes(label = sprintf("%.2f%%", pct)), hjust = 0.5,
            vjust = -0.5, size = 3)+ theme_economist()+ xlab("Country") +
ylab("Percentage of Production")

plot(p1)
```



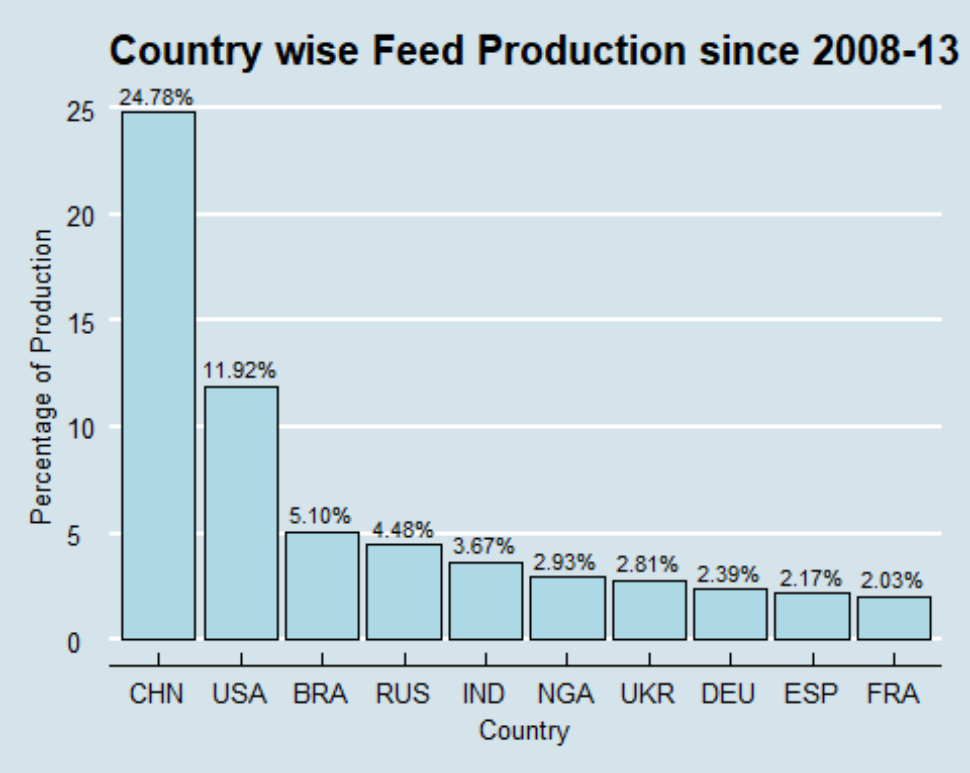

```
p2 = data %>% group_by(Area.Abbreviation, Element) %>%filter(Element ==
'Food')%>%
  summarise(TFO = sum(last5)) %>% ungroup()%>%mutate(pct =
prop.table(TFO)*100)%>%
  top_n(10, wt = pct)%>%
  ggplot(aes(x = reorder(Area.Abbreviation, -pct), y = pct)) +
  geom_bar(stat = 'identity', fill = "green", aes(color = I('gray')), size =
0.1) + ggtitle("Country wise Food Production since 2008-13") +
  geom_text(aes(label = sprintf("%.2f%%", pct)), hjust = 0.5,
            vjust = -0.5, size =3)+ theme_economist()+ xlab("Country") +
ylab("Percentage of Production")

plot(p2)
```



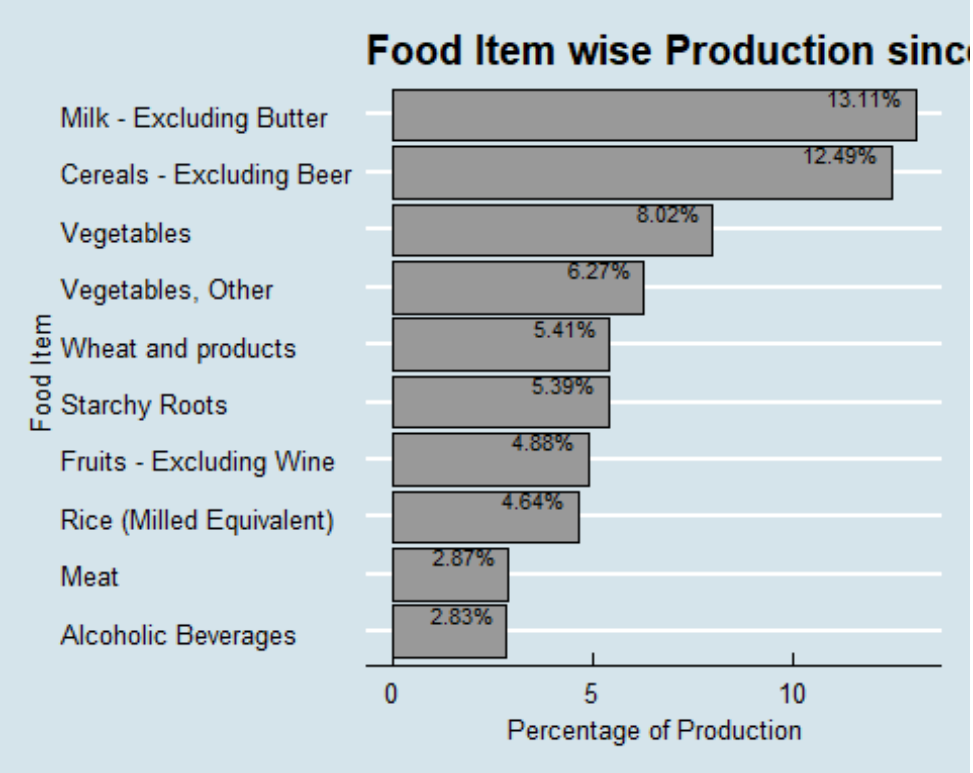

```
p3 = data %>% group_by(Area.Abbreviation, Element) %>%filter(Element ==
'Feed')%>%
  summarise(TFE = sum(Total)) %>% ungroup()%>%mutate(pct =
prop.table(TFE)*100)%>%
  top_n(10, wt = pct)%>%
  ggplot(aes(x = reorder(Area.Abbreviation, -pct), y = pct)) +
  geom_bar(stat = 'identity', fill = "lightblue", aes(color = I('black')),
size = 0.1) + ggtitle("Country wise Feed Production since 1961")+
  geom_text(aes(label = sprintf("%.2f%%", pct)),
            vjust = -.5, size = 3)+ theme_economist()+ xlab("Country") +
ylab("Percentage of Production")
plot_grid(p3)
```



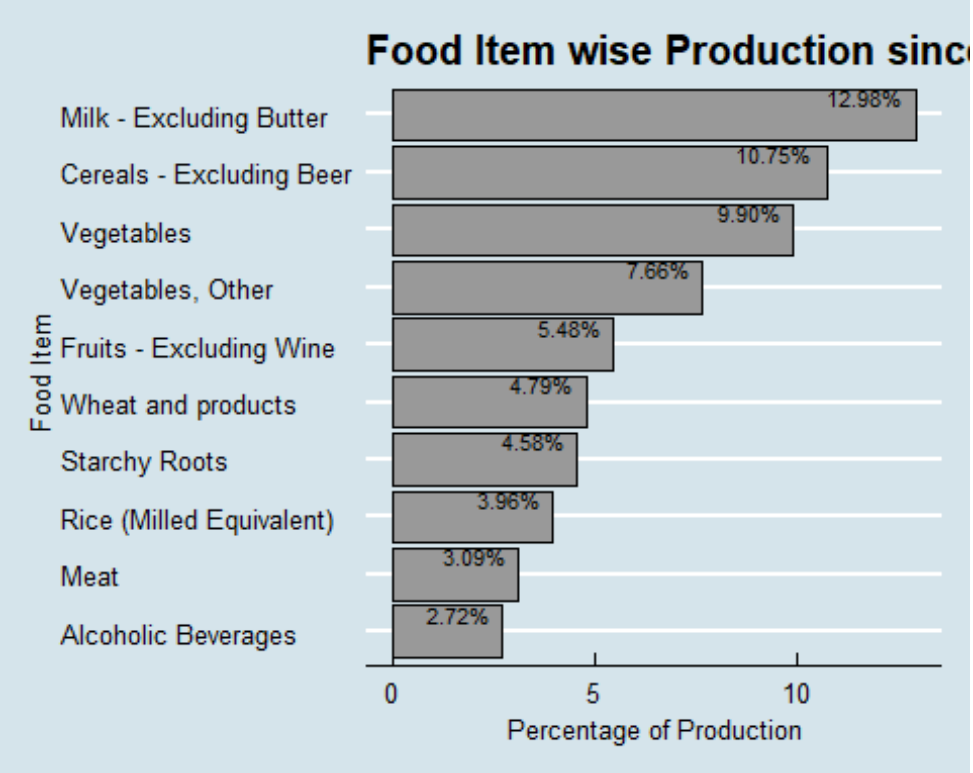

```
p4 = data %>% group_by(Area.Abbreviation, Element) %>%filter(Element ==
'Feed')%>%
  summarise(TFE = sum(last5)) %>% ungroup()%>%mutate(pct =
prop.table(TFE)*100)%>%
  top_n(10, wt = pct)%>%
  ggplot(aes(x = reorder(Area.Abbreviation, -pct), y = pct)) +
  geom_bar(stat = 'identity', fill = "lightblue", aes(color = I('black')),
size = 0.1) + ggtitle("Country wise Feed Production since 2008-13") +
  geom_text(aes(label = sprintf("%.2f%%", pct)),
            vjust = -.5, size = 3)+ theme_economist()+ xlab("Country") +
ylab("Percentage of Production")

plot(p4)
```



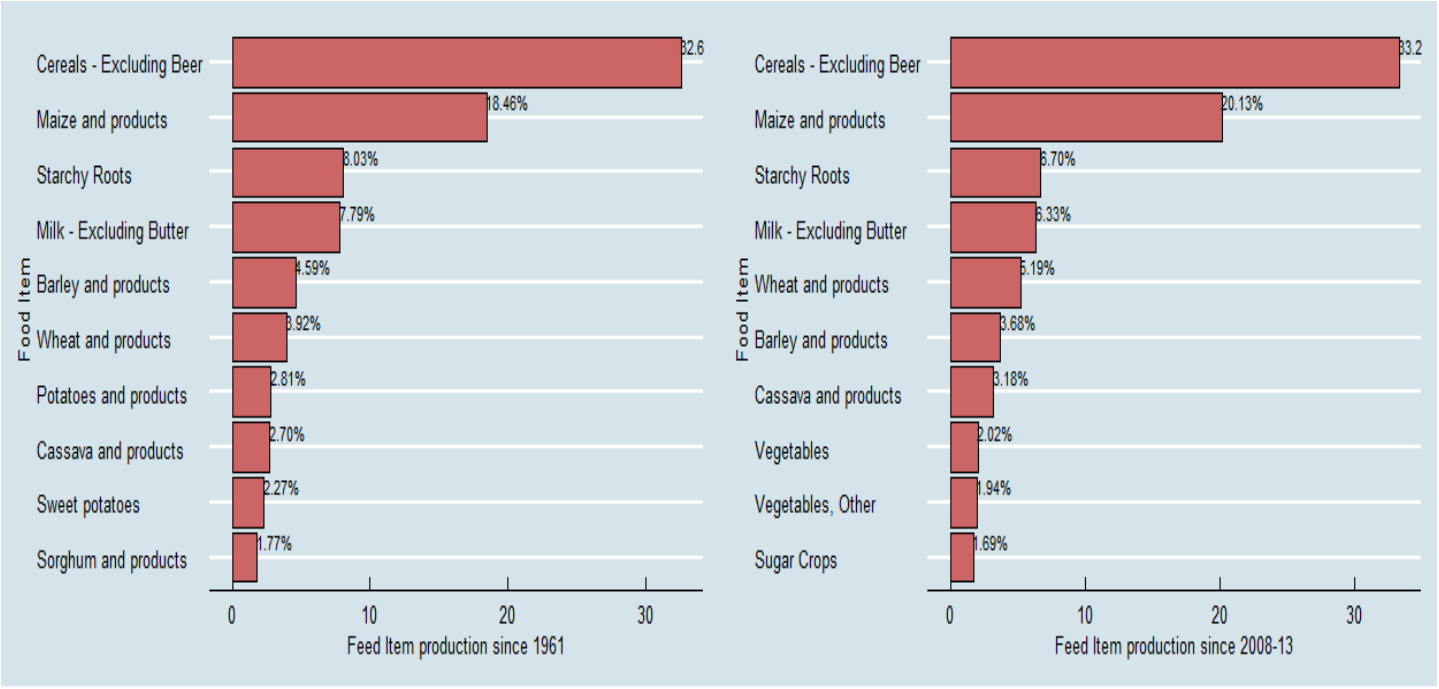

```
p5 = data %>% group_by(Item) %>%filter(Element == 'Food')%>%
  summarise(TFO = sum(Total)) %>% ungroup()%>%mutate(pct =
prop.table(TFO)*100)%>%
  top_n(10, wt = pct)%>%
  ggplot(aes(x = reorder(Item, pct), y = pct)) + ggtitle("Food Item wise
Production since 1961") +
  geom_bar(stat = 'identity', fill = "#999999", aes(color = I('black')), size
= 0.1) + coord_flip()+
  geom_text(aes(label = sprintf("%.2f%%", pct)), hjust = 1.2,
            vjust = -0.5, size = 3)+ theme_economist()+ xlab("Food Item") +
ylab("Percentage of Production")
plot(p5)
```




```
p6 = data %>% group_by(Item) %>%filter(Element == 'Food')%>%
  summarise(TFO = sum(last5)) %>% ungroup()%>%mutate(pct =
prop.table(TFO)*100)%>%
  top_n(10, wt = pct)%>%
  ggplot(aes(x = reorder(Item, pct), y = pct)) + ggtitle("Food Item wise
Production since 2008-13") +
  geom_bar(stat = 'identity', fill = "#999999", aes(color = I('black')), size
= 0.1) + coord_flip()+
  geom_text(aes(label = sprintf("%.2f%%", pct)), hjust = 1.2,
            vjust = -0.5, size =3)+ theme_economist() + xlab("Food Item") +
ylab("Percentage of Production")

plot(p6)
```




```
p7 = data %>% group_by(Item) %>%filter(Element == 'Feed')%>%
  summarise(TFO = sum(Total)) %>% ungroup()%>%mutate(pct =
prop.table(TFO)*100)%>%
  top_n(10, wt = pct)%>%
  ggplot(aes(x = reorder(Item, pct), y = pct)) +
  geom_bar(stat = 'identity', fill = "#CC6666", aes(color = I('black')), size
= 0.1) + coord_flip()+
  geom_text(aes(label = sprintf("%.2f%%", pct)), hjust = 0.01,
            vjust = -0.5, size = 3)+ theme_economist()+ xlab("Food Item") +
ylab("Feed Item production since 1961")

p8 = data %>% group_by(Item) %>%filter(Element == 'Feed')%>%
  summarise(TFO = sum(last5)) %>% ungroup()%>%mutate(pct =
prop.table(TFO)*100)%>%
  top_n(10, wt = pct)%>%
  ggplot(aes(x = reorder(Item, pct), y = pct)) +
  geom_bar(stat = 'identity', fill = "#CC6666", aes(color = I('black')), size
= 0.1) + coord_flip()+
  geom_text(aes(label = sprintf("%.2f%%", pct)), hjust = 0.01,
            vjust = -0.5, size =3)+ theme_economist()+ xlab("Food Item") +
ylab("Feed Item production since 2008-13")


plot_grid(p7,p8, align = "v")
```


Cereals - Excluding Beer
Maize and products
Starchy Roots
Milk - Excluding Butter
Barley and products
Wheat and products
Potatoes and products
Cassava and products
Sweet potatoes
Sorghum and products
Food Item
32.6
18.46%
8.03%
7.79%
4.59%
3.92%
2.81%
2.70%
2.27%
1.77%
0
10
20
30
Feed Item production since 1961
Cereals - Excluding Beer
Maize and products
Starchy Roots
Milk - Excluding Butter
Wheat and products
Barley and products
Cassava and products
Vegetables
Vegetables, Other
Sugar Crops
Food Item
33.2
20.13%
6.70%
6.33%
5.19%
3.68%
3.18%
2.02%
1.94%
1.69%
0
10
20
30
Feed Item production since 2008-13