Final report on Data Collection & Analysis of Delhi for the 14 variables

FOSSEE Project

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Contents

Abstract

In this report, results from the analysis of publicly available data related to Delhi from various government online portals and statistical handbooks are represented in order to better understand the status of development in the district level. Various data variables were analyzed like Fair Price Shops, Pending cases in the District Court, Population, Literacy, Kisan Credit Card, Loan, just to name a few. Analysis is done completely using a **Free-Libre / Open Source Software (FLOSS)** known as **'R'** as a part of **FOSSEE Project** by **IIT Bombay** and **MHRD, Government of India.** FOSSEE project is part of the National Mission on Education through ICT with the thrust area being adaptation and deployment of open source simulation packages equivalent to proprietary software, funded by MHRD, based at the Indian Institute of Technology Bombay (IITB). Results from analysis were found to indicate increase in population, literacy rate, pending court cases, usage of networking devices and much more. Please refer to each data variable section in order to better understand the data used, analysis performed and results obtained for each of the respective variable.

1. Gross District Domestic Product Report

Gross State Value Added (GSVA) is a method of total output and income in the economy of a particular district. It gives us the rupee value for the amount of goods and services produced in an economy after deducting the cost of inputs and raw materials that have gone into the production of those goods and services.

Gross State Domestic Product (GSDP) gives the economic output from the consumers' side. It is the sum of private consumption, gross investment in the economy, government investment, government spending and net foreign trade (difference between exports and imports).[1]

This report is based on **Gross State Value Added (GSVA)** and **Gross State Domestic Product (GSDP)** economic activity of **Delhi district**. This includes revenue earned in 3 sectors which are as follows:

- Primary Sector - Agriculture, Forestry & Fishing, Crops, Livestock, Forestry & Logging, Fishing, Mining & Quarrying.
- Secondary Sector - Manufacturing, Electricity, Gas & Water Supply & Other Utility Services, Construction.
- Tertiary Sector - Trade, Hotels & Restaurants, Trade & Repair Services, Hotel & Restaurants, Transport, Storage & Communication, Railways, Road transport, Water transport, Air Transport, Services incidental to transport, Real estate ownership of dwellings & professional services.

Table

Here is the tabulation data for the **Gross District Domestic Product (GDDP)** of Delhi which is mainly judged on the basis of Primary, Secondary and Tertiary sectors :

```
GDDP=read.csv("GDDP.csv")
GDDP
```

```
##                                                        SECTOR   X X2011.12
## 1                              Agriculture, Forestry & Fishing   1   285471
## 2                                                        Crops 1.1    65772
## 3                                                    Livestock 1.2   217867
## 4                                            Forestry & Logging 1.3     1007
## 5                                                      Fishing 1.4      826
## 6                                            Mining & Quarrying   2   772879
## 7                                                      PRIMARY   a  1058350
## 8                                                Manufacturing   3  1890728
## 9    Electricity, Gas & Water Supply & Other Utility Services    4   410538
## 10                                                 Construction   5  1666852
## 11                                                    SECONDARY   b  3968117
## 12                                 Trade, Hotels & Restaurants   6  4212068
## 13                                     Trade & Repair Services 6.1  3806351
## 14                                         Hotel & Restaurants 6.2   405718
## 15                           Transport, Storage & Communication   7  3929455
## 16                                                   Railways 7.1   190731
## 17                                            Road transport 7.2   664297
## 18                                           Water transport 7.3      546
## 19                                             Air Transport 7.4    98961
## 20                             Services incidental to transport 7.5  2368549
## 21                                                   Storage 7.6    21247
## 22            Communication & Services related to broadcasting 7.7   585124
## 23                                        Financial Services   8  5388295
## 24 Real estate, ownership of dwellings & professional services   9  7248036
## 25                                      Public Administration  10  1957156
```

```
## 26                                              Other Services  11  2558685
## 27                                                    TERTIARY   c 25293696
## 28                TOTAL GROSS STATE VALUE ADDED At Basic Prices   d 30320163
## 29                                               Product Taxes   e  4442090
## 30                                           Product Subsidies   f   385589
## 31                GROSS STATE DOMESTIC PRODUCT At Market Prices   g  3437664
## 32                                                 Population   h   169750
## 33                                     Per Capita GSDP (In Rs.)   i   202513
##    X2012.13 X2013.14 X2014.15 X2015.16 X2016.17
## 1    257046   255884   250568   339032   407746
## 2     72448    74852    64959   103388   108376
## 3    182767   179135   183770   233615   297333
## 4       991      950      861     1000     1053
## 5       840      947      978     1029      983
## 6    746562  1015528   963777  1084338  1167318
## 7   1003608  1271412  1214345  1423370  1575064
## 8   2334979  2533769  2749307  3630007  4568863
## 9    728273   909613   971255  1176605  1309075
## 10  1786576  1982965  2048788  2116833  2186958
## 11  4849828  5426347  5769350  6923445  8064896
## 12  4905111  5653195  5896633  6105266  6357232
## 13  4458194  5170922  5359605  5525480  5729645
## 14   446917   482273   537028   579786   627587
## 15  4534332  4997533  5597141  6047627  6549455
## 16   207226   258697   293836   307520   336670
## 17   718643   713493   718343   722346   726279
## 18      597      541      574      607      639
## 19   178752   146607   420460   444250   537371
## 20  2748292  3059301  3259417  3584423  3867212
## 21    24271    27667    29922    36012    40992
## 22   656551   791227   874588   952470  1040291
## 23  5992774  6449101  6974870  7516907  8058944
## 24  8242110  9618416 11733335 13454970 16199181
## 25  1802787  1876644  2008191  2219503  2424599
## 26  2913283  3282734  3829385  4392490  5108606
## 27 28390396 31877623 36039554 39736762 44698016
## 28 34243833 38575381 43023249 48083578 54337976
## 29  5380588  6308016  6611719  7686011  8700135
## 30   500578   505118   392546   573248   799647
## 31 39123843 44378279 49242422 55196341 62238464
## 32    17300   176310   179690   183140   186640
## 33   226149   251706   274041   301389   333468
```

Visualization

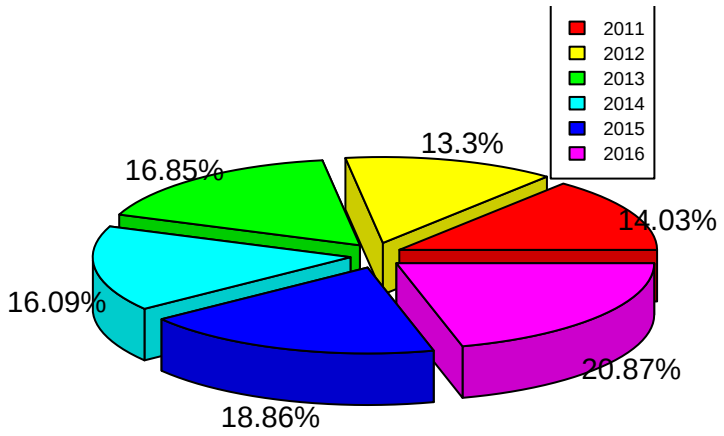
Let's analyse the pie charts for the years 2011 to 2016 :

Primary Sector maximum growth was in year 2016 which was about 20.87 % of the total. Secondary Sector maximum growth was in year 2016 which was about 23.04 % of the total. Primary Sector maximum growth was in year 2016 which was about 21.69 % of the total.

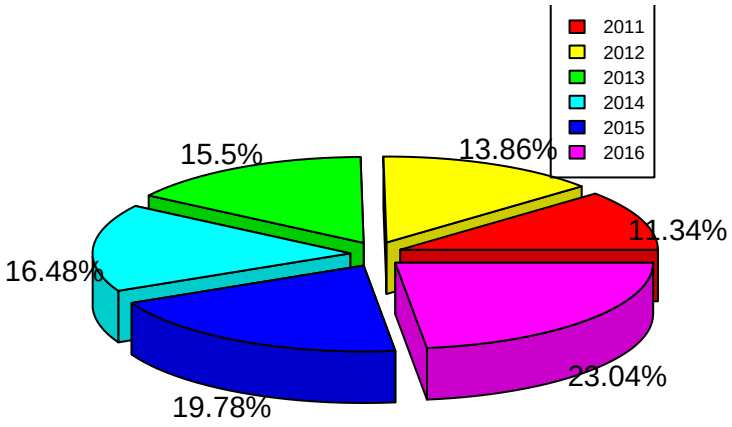
Net growth rate in 3 sectors from 2011 to 2016 can be visualized as:

a1= Net revenue in Primary sector; a2= Net revenue in Secondary sector; a3= Net revenue in Tertiary sector;

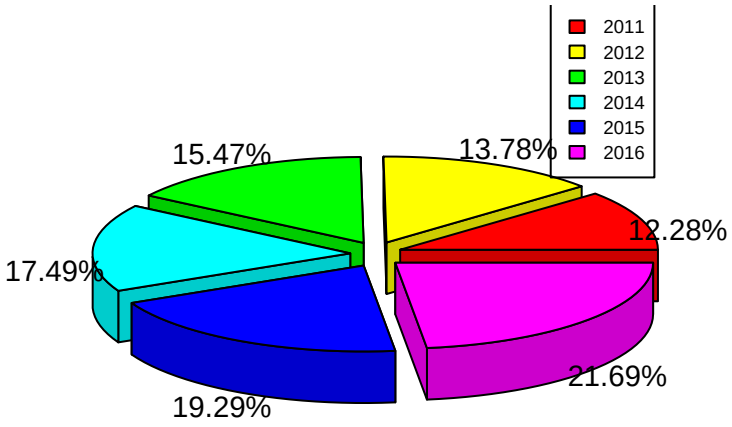
```r
#Load Package--->plotrix
library(plotrix)
a1=c(1058350,1003608,1271412,1214345,1423370,1575064)
piepercent<- round(100*a1/sum(a1),2)
lbls1=paste(piepercent,"%",sep="")
pie3D(a1,labels=lbls1,explode=0.1,labelcex=0.9,main="Primary Sector",col=rainbow(length(a1)))
legend("topright", c("2011","2012","2013","2014","2015","2016"),
       cex = 0.6,fill = rainbow(length(piepercent)))
```




```r
a2=c(3968117,4849828,5426347,5769350,6923445,8064896)
piepercent2<- round(100*a2/sum(a2),2)
lbls2=paste(piepercent2,"%",sep="")
pie3D(a2,labels=lbls2,explode=0.1,labelcex=0.9,main="Secondary Sector",col=rainbow(length(a2)))
legend("topright", c("2011","2012","2013","2014","2015","2016"),
       cex = 0.6,fill = rainbow(length(piepercent)))
```

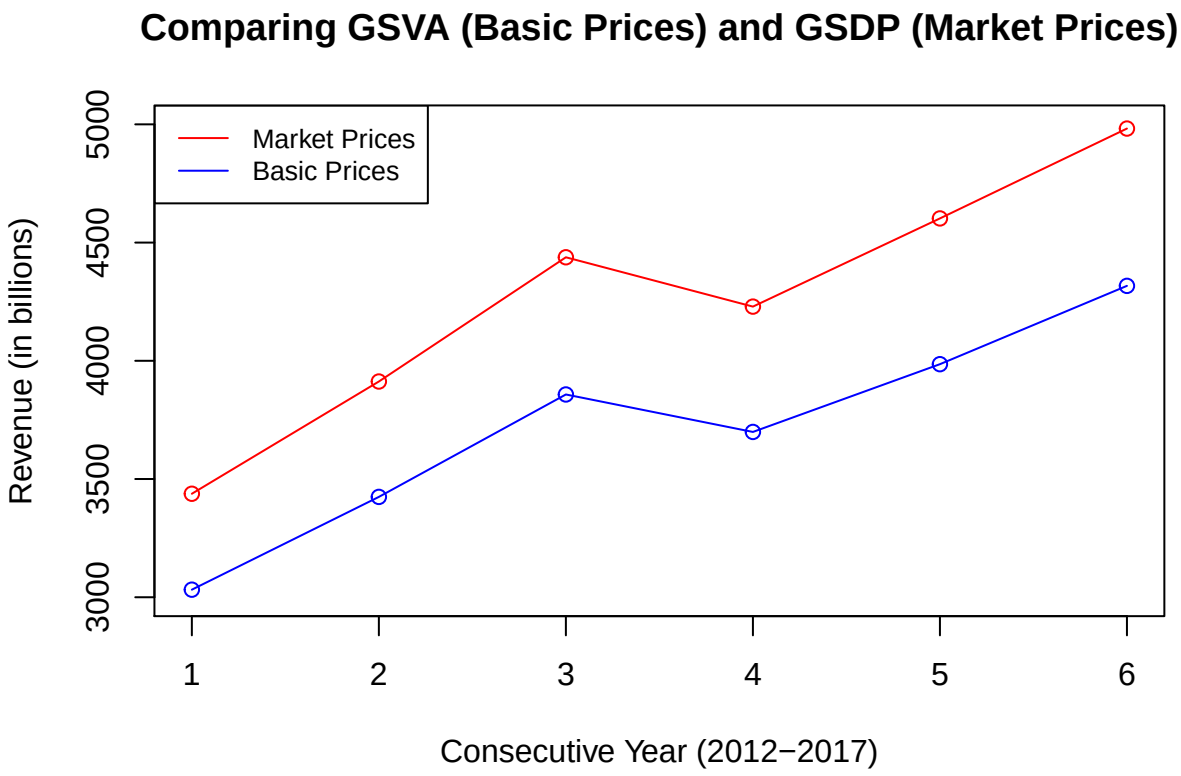



```
a3=c(25293696,28390396,31877623,36039554,39736762,44698016)
piepercent3<- round(100*a3/sum(a3),2)
lbls3=paste(piepercent3,"%",sep="")
pie3D(a2,labels=lbls3,explode=0.1,labelcex=0.9,main="Tertiary Sector",col=rainbow(length(a3)))
legend("topright", c("2011","2012","2013","2014","2015","2016"),
       cex = 0.6,fill = rainbow(length(piepercent)))
```



Let's see the together growth of GSVA (at basic prices) and GSDP (at market prices)

```
market=c(3437.67,3912.38,4437.83,4229.20,4602.17,4982.17)
basic=c(3032.02,3424.38,3857.54,3699.15,3985.63,4316.87)
plot(market,type = "o", col = "red", xlab = "Consecutive Year (2012-2017)",
     ylab = "Revenue (in billions)",ylim=c(3000,5000),
     main = "Comparing GSVA (Basic Prices) and GSDP (Market Prices)")
lines(basic, type = "o", col = "blue")
legend("topleft", c("Market Prices","Basic Prices"),cex = 0.85,col=c("red","blue"),lty=1)
```



Analysis

We are going to analyse that how these 3 sectors are interrelated to each other. In this cor(), is termed as the correlation function which is used to find the relation between two variables.

```
summary(GDDP)
```

```
##                                                SECTOR         X
##   Railways                                        : 1   1      : 1
##   Storage                                         : 1   1.1    : 1
##  Agriculture, Forestry & Fishing                  : 1   1.2    : 1
##  Air Transport                                    : 1   1.3    : 1
##  Communication & Services related to broadcasting: 1   1.4    : 1
##  Construction                                     : 1   10     : 1
##  (Other)                                          :27   (Other):27
##     X2011.12          X2012.13          X2013.14          X2014.15
##  Min.   :     546   Min.   :     597   Min.   :     541   Min.   :     574
##  1st Qu.:  202513   1st Qu.:  207226   1st Qu.:  251706   1st Qu.:  274041
##  Median :  772879   Median :  746562   Median : 1015528   Median :  971255
##  Mean   : 3273488   Mean   : 4778074   Mean   : 5401581   Mean   : 5985288
##  3rd Qu.: 3806351   3rd Qu.: 4534332   3rd Qu.: 5170922   3rd Qu.: 5597141
##  Max.   :30320163   Max.   :39123843   Max.   :44378279   Max.   :49242422
##
##     X2015.16          X2016.17
##  Min.   :     607   Min.   :     639
##  1st Qu.:  307520   1st Qu.:  336670
```

```
##  Median : 1176605   Median : 1309075
##  Mean   : 6687357   Mean   : 7532931
##  3rd Qu.: 6047627   3rd Qu.: 6357232
##  Max.   :55196341   Max.   :62238464
##
```

```
#Net primary revenue from 2011 to 2016
a1=c(1058350,1003608,1271412,1214345,1423370,1575064)
#Net secondary revenue from 2011 to 2016
a2=c(3968117,4849828,5426347,5769350,6923445,8064896)
#Net tertiary revenue from 2011 to 2016
a3=c(25293696,28390396,31877623,36039554,39736762,44698016)
#Correlation between Primary and Secondary sector
cor(a1,a2)
```

```
## [1] 0.948038
```

```
#Correlation between Tertiary and Secondary sector
cor(a2,a3)
```

```
## [1] 0.9887236
```

```
#Correlation between Primary and Tertiary sector
cor(a1,a3)
```

```
## [1] 0.9415312
```

```
data=GDDP[1:33,3:8]
#pairs(data)
cor(data)
```

```
##           X2011.12  X2012.13  X2013.14  X2014.15  X2015.16  X2016.17
## X2011.12 1.0000000 0.7744305 0.7717676 0.7754447 0.7724135 0.7722075
## X2012.13 0.7744305 1.0000000 0.9999318 0.9997004 0.9994658 0.9987887
## X2013.14 0.7717676 0.9999318 1.0000000 0.9997766 0.9995933 0.9989742
## X2014.15 0.7754447 0.9997004 0.9997766 1.0000000 0.9998572 0.9994750
## X2015.16 0.7724135 0.9994658 0.9995933 0.9998572 1.0000000 0.9998506
## X2016.17 0.7722075 0.9987887 0.9989742 0.9994750 0.9998506 1.0000000
```

Here from the correlation data, the years which are consecutive to each other have values closer to 1. We can judge that the growth in these sectors are interrelated to each other.

Summary

From the above report we can see that the 3 sectors as follows:

- Primary Sector
- Secondary Sector
- Tertiary Sector

All are dependent on each other very closely. Without the increment in the revenue of one sector other sectors can not developed.

So, in order to **increase the GSDP of Delhi, the government should equally work on all 3 sectors**

2. Employment and Earnings

Delhi is the capital city of India and is regarded as the heart of India. The city is popular for its enriched culture, heritage and sky touching buildings whereas on the outskirts of Delhi lies the villages and refuges of Bangladesh where lies the most of the poverty.

Unemployment is also major factor of poverty because of the lack of skill-sets. All this results in the growing path towards the crime.

This report is based on 3 parameters of **Delhi**:

- Number of Below Poverty Line Households
- Unemployment
- Crime rate

Table

Here is the tabulation data:

1. Table for Poverty line (In Lakhs) where we can see the data of Rural and Urban people corresponding to their percentage below poverty line with their respective year:

```
pl=read.csv("Poverty_Line(Statistics).csv")
pl
```

```
##          Year Rural Urban Combined
## 1   1993-1994  0.19 15.32    15.51
## 2  Percentage  1.90 16.03    14.69
## 3   1999-2000  0.07 11.42    11.49
## 4  Percentage  0.40  9.42     8.23
## 5   2004-2005  1.40 18.90    20.40
## 6  Percentage 15.60 12.90    13.10
## 7   2009-2010  0.30 22.90    23.30
## 8  Percentage  7.70 14.40    14.20
## 9   2011-2012  0.50 16.50    17.00
## 10 Percentage 12.90  9.80     9.90
```

2. Table for Poverty line (per Ca-pita per Month) which gives the data of average money earned by both Rural and Urban people per month in a particular year:

```
plc=read.csv("Poverty_Line_Capita(Statistics).csv")
plc
```

```
##         Year   Rural   Urban
## 1  1973-1974   49.95   67.95
## 2  1977-1978   59.37   80.17
## 3  1983-1985   88.57  123.29
## 4  1987-1988  122.90  176.91
## 5  1993-1994  233.79  309.48
## 6  1996-1997  289.31  404.96
## 7  1999-2000  362.68  454.11
## 8  2004-2005  541.00  642.00
## 9  2009-2010  748.00 1040.00
## 10 2011-2012 1145.00 1134.00
```

3. Table for Employment and Unemployment Data (from June,2011-July,2012) with the corresponding data of how many are working in labor force and how many are out of labor force:

```
emp=read.csv("Unemployment_and_Emploment(Statistics).csv")
emp
```

```
##          Sector Employment Unemployment Labour.Force Out.of.Labour.Force
## 1   Male(Rural)      70421         8216        78637              132436
## 2 Female(Rural)      11901          293        12194              168319
## 3   Male(Urban)    5095753       204690      5300443             3617228
## 4 Female(Urban)     528042        53227       581269             7198275
```

4. Table for Crime Rates:

```
crime=read.csv("Crime(Statistics).csv")
crime
```

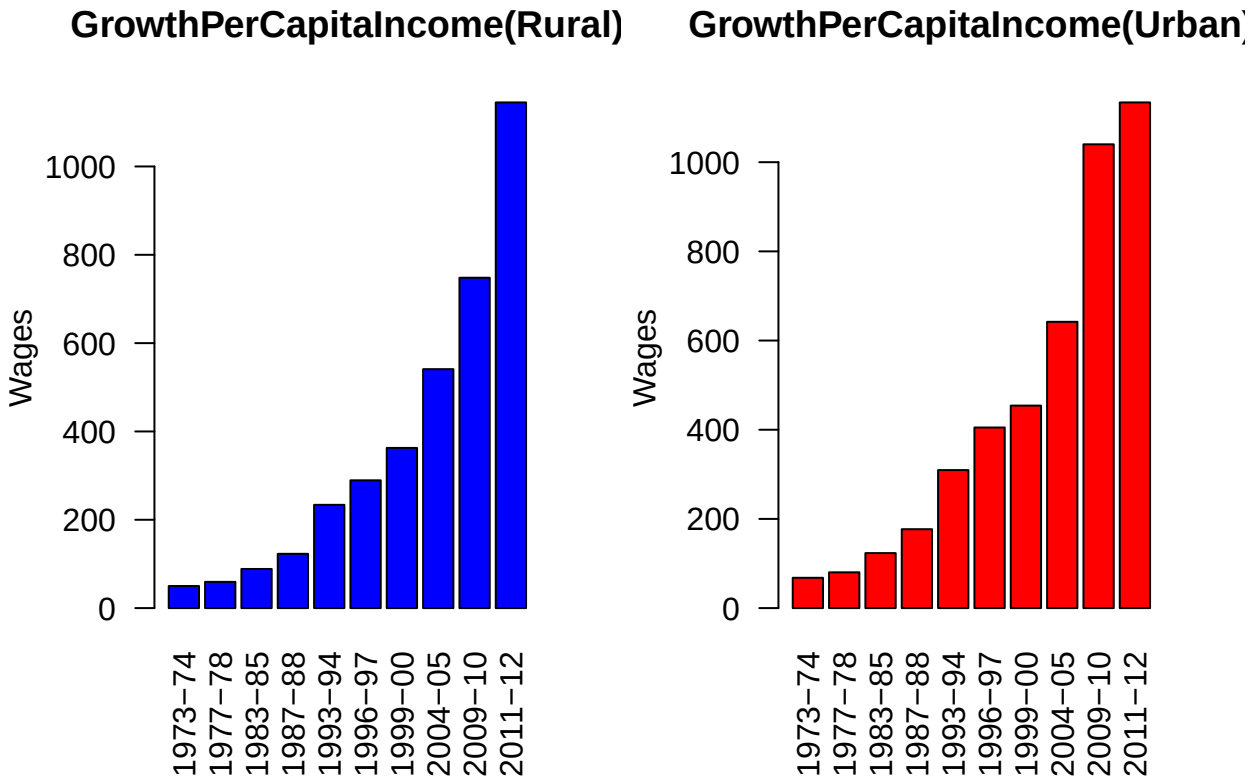
```
##                    Description X2013 X2014  X2015  X2016
## 1                       Murder   517   586    570    528
## 2                      Dacoity    33    82     75     46
## 3                      Robbery  1245  6464   7407   4761
## 4                     Burglary  2835 10309  12848  14307
## 5                        Theft 30124 78753 104432 130928
## 6            Attempt to Murder   585   770    770    646
## 7                        Arson    97   190    224    183
## 8       Crime under local laws  6616  9908   8599   7401
## 9  Miscellaneous I.P.C. Cases. 38537 50498  55871  50720
## 10                       Rape  1636  2166   2199   2155
## 11                Dowry Death   144   153    122    162
## 12                Eve Teasing   916  1361   1492    918
## 13        Molestation of Women  3515  4322   5367   4165
```

Visualization

From the given graphs we can see that there is sudden increment in Growth Per Capita income from 2009 to 2012.

Growth in per Capita income can be shown as follows:

```
par(mfrow=c(1,2))
H <- c(plc$Rural)
M <- c("1973-74","1977-78","1983-85","1987-88","1993-94","1996-97","1999-00","2004-05","2009-10",
"2011-12")
barplot(H,names.arg = M,ylab = "Wages",col="blue",main="GrowthPerCapitaIncome(Rural)",las=2)

P <- c(plc$Urban)
Q <- c("1973-74","1977-78","1983-85","1987-88","1993-94","1996-97","1999-00","2004-05","2009-10",
"2011-12")
barplot(P,names.arg = Q,ylab = "Wages",col="red",main="GrowthPerCapitaIncome(Urban)",las=2)
```



Employment and Unemployment Rate in Delhi:

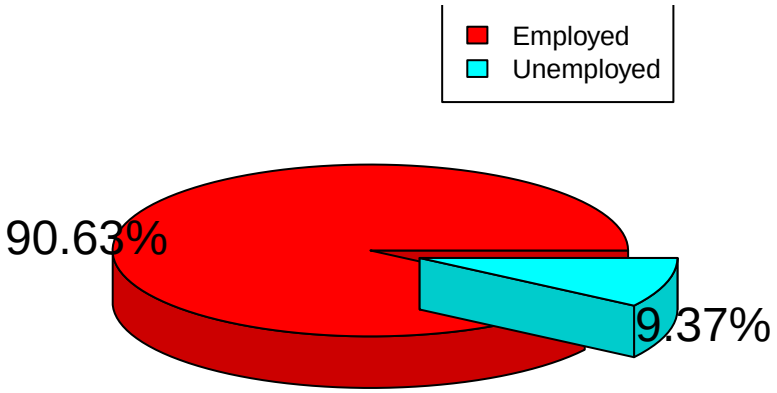
We can see from the below pie-charts that:

- In rural sector employment is 90.63 % and unemployment is 9.37 %.
- In urban sector employment is 95.61 % and unemployment is 4.39 %. So, there is high employment rates in Delhi district.

a1= Employment vs unemployment in rural sector including male and female community

a2= Employment vs unemployment in urban sector including male and female community

```
library(plotrix)

a1=c(70421+11901,8216+293)
piepercent<- round(100*a1/sum(a1),2)
lbls1=paste(piepercent,"%",sep="")
pie3D(a1,labels=lbls1,explode=0.1,main="Rural",col=rainbow(length(a1)))
legend("topright", c("Employed","Unemployed"), cex = 0.8,fill = rainbow(length(piepercent)))
```



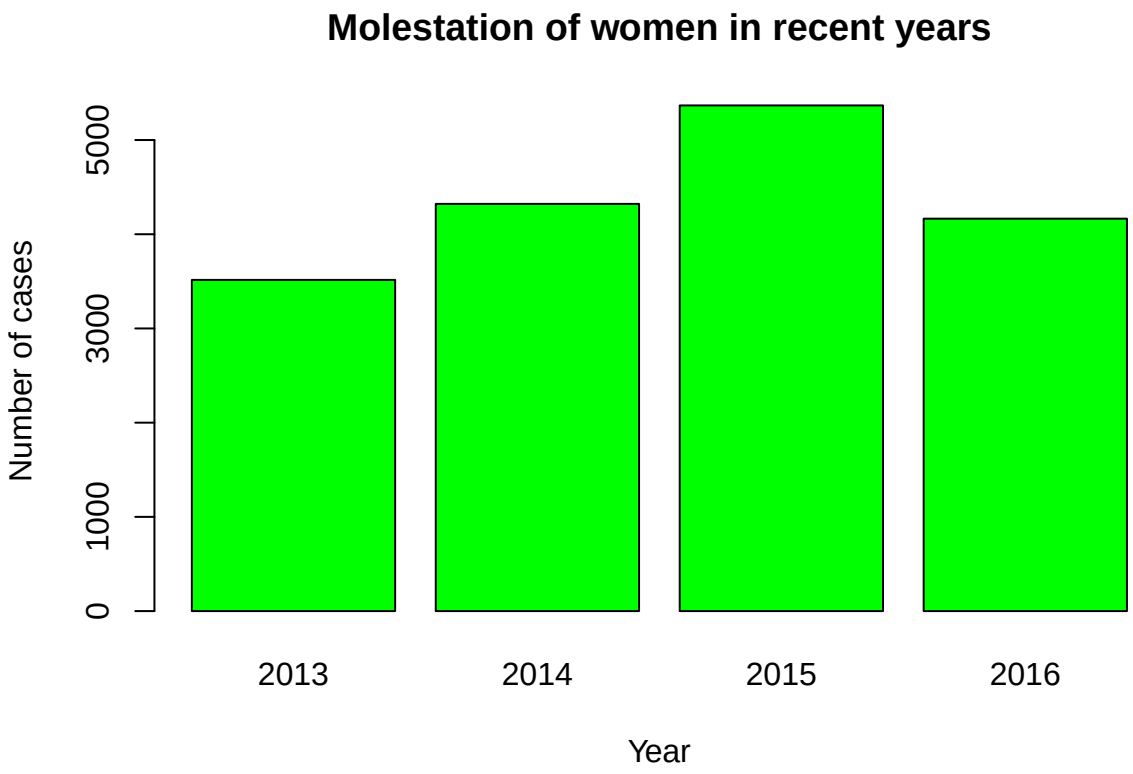

```
a2=c(5095753+528042,204690+53227)
piepercent2<- round(100*a2/sum(a2),2)
lbls2=paste(piepercent2,"%",sep="")
pie3D(a2,labels=lbls2,explode=0.1,main="Urban",col=rainbow(length(a2)))
legend("topright", c("Employed","Unemployed"), cex = 0.8,fill = rainbow(length(piepercent2)))
```

Rates of crime activities in Delhi:

Crime rates were at peak in 2015 but decreased in the consecutive year as the employments rates were increasing.

R= Recorded crimes against women

```
R <- c(3515,4322,5367,4165)
S <- c("2013","2014","2015","2016")
barplot(R,names.arg = S,xlab = "Year",ylab = "Number of cases",col="green",
        main="Molestation of women in recent years")
```



Analysis

We are going to analyse that how poverty line, employment and crime varies over the past years.

Poverty line analysis

pl = Poverty Line; plc = Poverty Line Capita

```
summary(pl)
```

```
##          Year       Rural           Urban          Combined
##  1993-1994 :1   Min.   : 0.070   Min.   : 9.42   Min.   : 8.23
##  1999-2000 :1   1st Qu.: 0.325   1st Qu.:11.79   1st Qu.:11.89
##  2004-2005 :1   Median : 0.950   Median :14.86   Median :14.45
##  2009-2010 :1   Mean   : 4.096   Mean   :14.76   Mean   :14.78
##  2011-2012 :1   3rd Qu.: 6.250   3rd Qu.:16.38   3rd Qu.:16.63
##  Percentage:5   Max.   :15.600   Max.   :22.90   Max.   :23.30
```

```
summary(plc)
```

```
##         Year       Rural            Urban
##  1973-1974:1   Min.   :  49.95   Min.   :  67.95
##  1977-1978:1   1st Qu.:  97.15   1st Qu.: 136.69
##  1983-1985:1   Median : 261.55   Median : 357.22
##  1987-1988:1   Mean   : 364.06   Mean   : 443.29
##  1993-1994:1   3rd Qu.: 496.42   3rd Qu.: 595.03
##  1996-1997:1   Max.   :1145.00   Max.   :1134.00
```

```
##  (Other)  :4
```

```
data=pl[1:10,2:4]
data1=plc[1:10,2:3]
# Correlation between Rural and Urban
cor(data)
```

```
##               Rural      Urban   Combined
## Rural     1.0000000 -0.3946116 -0.3516308
## Urban    -0.3946116  1.0000000  0.9874945
## Combined -0.3516308  0.9874945  1.0000000
```

```
cor(data1)
```

```
##           Rural     Urban
## Rural 1.0000000 0.9769177
## Urban 0.9769177 1.0000000
```

Employment analysis

emp= Employment-Unemployment Data

```
summary(emp)
```

```
##            Sector    Employment       Unemployment     Labour.Force
##  Female(Rural):1   Min.   :  11901   Min.   :   293   Min.   :  12194
##  Female(Urban):1   1st Qu.:  55791   1st Qu.:  6235   1st Qu.:  62026
##  Male(Rural)  :1   Median : 299232   Median : 30722   Median : 329953
##  Male(Urban)  :1   Mean   :1426529   Mean   : 66606   Mean   :1493136
##                    3rd Qu.:1669970   3rd Qu.: 91093   3rd Qu.:1761062
##                    Max.   :5095753   Max.   :204690   Max.   :5300443
##  Out.of.Labour.Force
##  Min.   : 132436
##  1st Qu.: 159348
##  Median :1892774
##  Mean   :2779064
##  3rd Qu.:4512490
##  Max.   :7198275
```

```
data3=emp[1:4,2:5]
# Correlation between employment, unemployment, labour force and out of labour force
cor(data3)
```

```
##                    Employment Unemployment Labour.Force Out.of.Labour.Force
## Employment          1.0000000    0.9881570    0.9999837           0.2571965
## Unemployment        0.9881570    1.0000000    0.9890174           0.4003685
## Labour.Force        0.9999837    0.9890174    1.0000000           0.2626355
## Out.of.Labour.Force 0.2571965    0.4003685    0.2626355           1.0000000
```

Crime analysis

- Here from the summary below we can conclude that the mean of number of crime rates are increasing every year and this point can be made stronger by using the correlation function.
- In correlation function, we see that every year the number of crime rates closely depends on the previous year rates.

```
summary(crime)
```

```
##                 Description     X2013           X2014           X2015
##  Arson                :1    Min.   :   33   Min.   :   82   Min.   :    75
```

```
##  Attempt to Murder     :1    1st Qu.:  517   1st Qu.:  586   1st Qu.:   570
##  Burglary              :1    Median : 1245   Median : 2166   Median :  2199
##  Crime under local laws:1    Mean   : 6677   Mean   :12736   Mean   : 15383
##  Dacoity               :1    3rd Qu.: 3515   3rd Qu.: 9908   3rd Qu.:  8599
##  Dowry Death           :1    Max.   :38537   Max.   :78753   Max.   :104432
##  (Other)               :7
##      X2016
##  Min.   :    46
##  1st Qu.:   528
##  Median :  2155
##  Mean   : 16686
##  3rd Qu.:  7401
##  Max.   :130928
##
```

```
data4=crime[1:13,2:5]
# Correlation between crime rate over years
cor(data4)
```

```
##           X2013     X2014     X2015     X2016
## X2013 1.0000000 0.9246138 0.8875990 0.8215656
## X2014 0.9246138 1.0000000 0.9957088 0.9751882
## X2015 0.8875990 0.9957088 1.0000000 0.9911230
## X2016 0.8215656 0.9751882 0.9911230 1.0000000
```

Summary

From the above report we can summarize that:

- **For Poverty line report:**

1. Most of people from urban sector are present in Poverty line in Delhi.
2. So, the government should work in the urban sector more to reduce these numbers.
3. While talking about Growth in per Capita income in urban and rural sector they both running hand in hand of each other.

- **For Employment and Unemployment report:**

1. Female employment in both urban and rural are very less as compared to the Male employment.
2. This is extremely good that in both sectors we have employment of more than 90 %.

- **For Crime report:**

1. Crime rates are increasing like in burglary rates from 2013 were 2,835 rises to 14,307 in 2016.
2. From the correlation plot, we can analyse that any crime, one or the other way they are interrelated to each other.
3. So, the government need to take measures to stop causality the society is taking.

3. Fair Price Shops

Fair Price Shops - Major commodities distributed include staple food grains, such as wheat, rice, pulses, sugar, and kerosene, through a network of fair price shops (also known as ration shops) established in several states across the country by the distribution (i.e. medium) of **ration cards**.[2]

This report is based on 2 parameters of **Delhi**:

- Availability and the number of fair price shops
- Number of people with ration cards

Table

Here is the tabulation data for the number of ration card holders and number of fair price distribution in a particular year:

```
FPS=read.csv("Fair_Price_Shops(Statistics).csv")
FPS
```

```
##      Year Ration_Cards Fair_Price_Shops
## 1 2011-12         3339             2498
## 2 2012-13         3455             2479
## 3 2013-14         1779             2396
## 4 2014-15         1700             2310
## 5 2015-16         1957             2281
## 6 2016-17         1940             2254
```

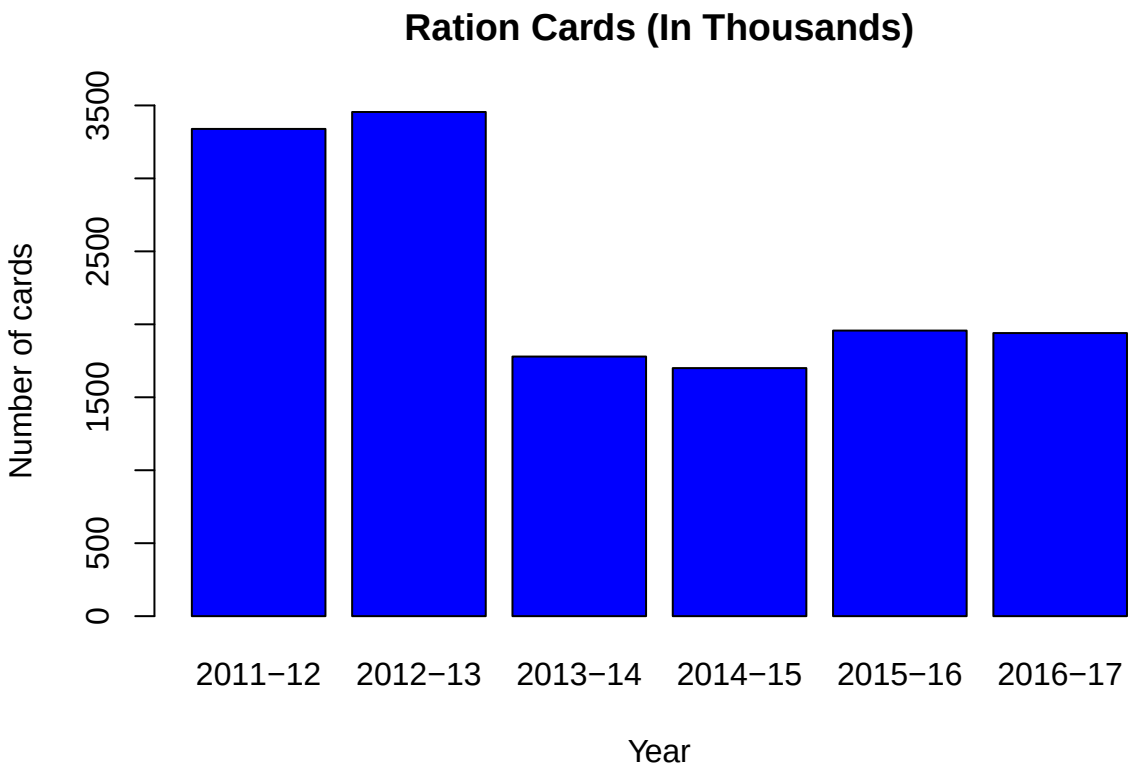
Visualization

Ration Cards distribution across years:

There is a significant decline in the number of **ration cards** from 3,455 in year 2012-13 to 1,779 in year 2013-2014.

RC = Number of ration cards

```
RC <- c(FPS$Ration_Cards)
M <- c("2011-12","2012-13","2013-14","2014-15","2015-16","2016-17")
barplot(RC,names.arg = M,ylim=c(0,3500),xlab = "Year",ylab = "Number of cards",col="blue",
        main="Ration Cards (In Thousands)")
```



Fair Price Shops Distribution:

The number of **fair of price shops** are gradually declining from 2011 to 2016.

P = Number of fair price shops

```
P <- c(FPS$Fair_Price_Shops)
Q <- c("2011-12","2012-13","2013-14","2014-15","2015-16","2016-17")
barplot(P,names.arg = M,xlab = "Year",ylim=c(0,2500),ylab = "Number of fair price shops",col="red",main=
```

Analysis

We are going to analyse that how ration cards and fair price shops varies over the past years. In what way they are inter-related to each other.

Fair price shops analysis:

From the summary we can find out that the mean of number of ration cards is about 2,362 and mean of number of fair price shop is about 2,370.

```
summary(FPS)
```

```
##       Year    Ration_Cards  Fair_Price_Shops
##  2011-12:1   Min.   :1700   Min.   :2254
##  2012-13:1   1st Qu.:1819   1st Qu.:2288
##  2013-14:1   Median :1948   Median :2353
##  2014-15:1   Mean   :2362   Mean   :2370
##  2015-16:1   3rd Qu.:2994   3rd Qu.:2458
##  2016-17:1   Max.   :3455   Max.   :2498
```

```
#plot(FPS)
data=FPS[1:6,2:3]
# Correlation between Ration Cards and Fair Price Shops
cor(data)
```

```
##                 Ration_Cards Fair_Price_Shops
## Ration_Cards       1.0000000        0.8425556
```

```
## Fair_Price_Shops    0.8425556        1.0000000
```

Summary

From the above report we can summarize that:

- Average number of ration cards and fair price shops in the community are 2362 and 2370 respectively.
- Maximum number of fair price shops were 2498 with 3455 ration card holders in year 2012-2013 and 2011-2012 respectively.
- The ration cards distribution and the number of fair price shops are both dependent on each other.
- In recent years, we can see there is a decline in the number of ration cards and fair price shops.

4. Courts

There are in total 5 district courts in Delhi. There names are as follows:

- Tis Hazari
- Karkardooma
- Patiala House
- Rohini
- Dwarka

This report is based on 2 parameters of **Delhi**:

- Number of judges in district courts
- Number of cases open in district courts

Table

The following data has been taken from the link [3]

Here is the tabulation data:

Number of Judges in District courts:

```
judges=read.csv("Judges(Statistics).csv")
judges
```

```
##            Court Number.of.Judges
## 1 Tis Hazari\xa0              120
## 2    Karkardooma               61
## 3  Patiala House               41
## 4         Rohini               44
## 5     Dwarka\xa0               35
```

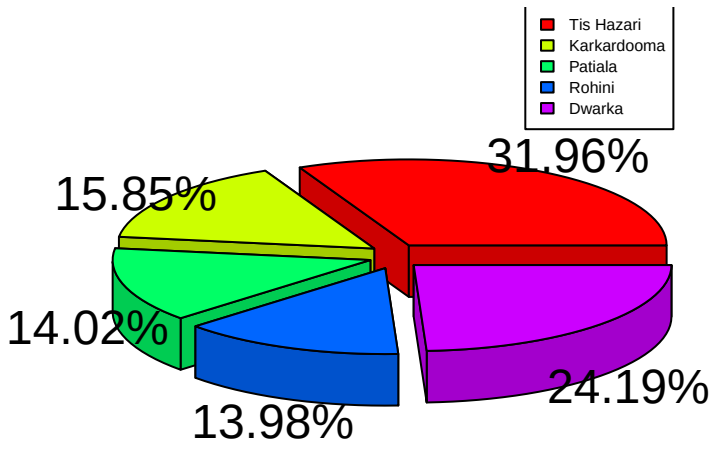
Number of cases pending in District courts:

```
cases=read.csv("Cases(Statistics).csv")
cases
```

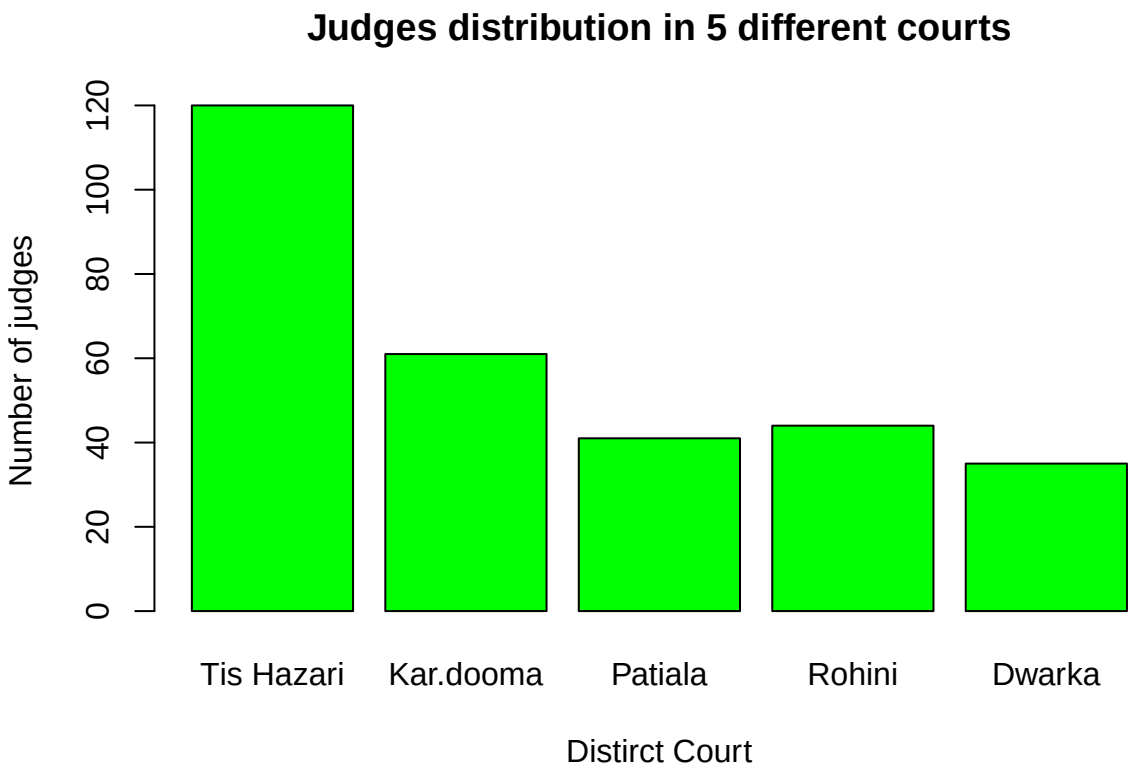
```
##            Court Number.of.Pending.cases
## 1 Tis Hazari\xa0                  101016
## 2    Karkardooma                   50104
## 3        Patiala                   44323
## 4         Rohini                   44178
## 5     Dwarka\xa0                   76480
```

Visualization

```
library(plotrix)

a1=c(cases$Number.of.Pending.cases)
piepercent<- round(100*a1/sum(a1),2)
lbls1=paste(piepercent,"%",sep="")
pie3D(a1,labels=lbls1,explode=0.1,main="Pending cases distribution",col=rainbow(length(a1)))
legend("topright", c("Tis Hazari","Karkardooma","Patiala","Rohini","Dwarka"),
       cex = 0.5,fill = rainbow(length(piepercent)))
```




```
H <- c(judges$Number.of.Judges)
M <- c("Tis Hazari","Kar.dooma","Patiala","Rohini","Dwarka")
barplot(H,names.arg = M,xlab = "Distirct Court",ylab = "Number of judges",col="green",
        main="Judges distribution in 5 different courts")
```



Analysis

We are analyzing that one judge is with what number of pending cases in each district court.

```
## [1] "We can see that number of cases with each judge in Tis Hazari: 841.800000"
## [1] "We can see that number of cases with each judge in Karkardooma: 821.380000"
## [1] "We can see that number of cases with each judge in Patiala House: 1081.050000"
## [1] "We can see that number of cases with each judge in Rohini: 1004.050000"
## [1] "We can see that number of cases with each judge in Dwarka: 2185.140000"
```

Summary

From the above report we can summarize that:

- Most of the pending cases are in Tiz Hazari court i.e. 1,01,016 (more than one lakh cases).
- We should recruit more judges in every district court in order to decrease the number of case to judge ratio.
- Dwarka court is under most pressure as each judge is having approximately 2,185 cases pending.

5. Electricity

The **Delhi Vidyut Board (DVB)** was formed by the Government of Delhi in 1997 for the purpose of generation and distribution of power to the entire area of NCT of Delhi except the areas falling within the jurisdiction of New Delhi Municipal Council and Delhi Cantonment Board. On 1 July 2002, The Delhi Vidyut Board was unbundled into six successor companies:[4]

- Delhi Power Company Limited (DPCL) - Holding Company
- Indraprastha Power Generation Company Limited (IPGCL) - GENCO
- Delhi Transco Limited (DTL) - TRANSCO
- BSES Rajdhani Power Limited (BRPL) - DISCOM for South & West Delhi
- BSES Yamuna Power Limited (BYPL) - DISCOM for Central & East Delhi
- North Delhi Power Limited (NDPL) - DISCOM for North Delhi

This report is based on 2 parameters of **Delhi**:

- Electricity Generated and Purchased from other states
- Electricity Consumed

Table

Here is the tabulation data:

1. Table for amount of **Electricity generated and purchased from other state** for Delhi:

```
EGP=read.csv("Elec_Gen_Purchased(Statistics).csv")
EGP
```

```
##   X2013 X2014 X2015 X2016    X2017                       Items
## 1  4970  4723  4763  5941  4013.52          Locally Generated
## 2 28472 30006 21044 24618 24892.74 Purchased from other state
## 3 33442 34729 25807 30559 28906.26                       Total
```

2. Table for amount of **Electricity consumed** in Delhi:

```
EC=read.csv("Elec_Consumed(Statistics).csv")
EC
```

```
##   X2013 X2014 X2015 X2016    X2017                                  Items
## 1 10796 11609 12386 12560 14059.68                    Domestic purposes
## 2  5569  6786  6814  6053  7257.06                   Commercial purposes
## 3  2979  3064  3068  3135  3088.37                   Industrial purposes
## 4   870   838  1007  1027  1097.65 Public Water Work and Street Lighting
## 5  1147  1484  1202  1262  1362.39                                 Others
## 6 21361 23781 24477 24037 26865.15                                  Total
```

Visualization

Electricity generated and purchased:

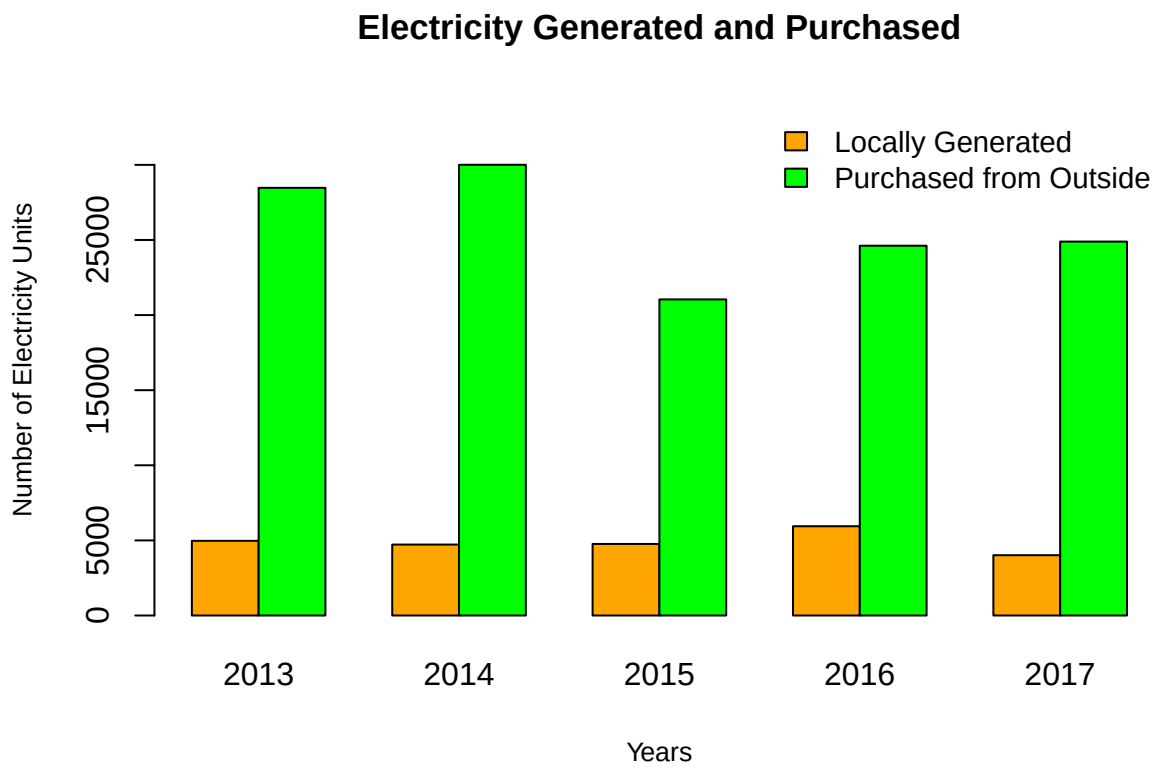
From the below graph we can see that our capacity to generate electricity locally is extremely low as comparing it to purchasing it from other states. We need to improve on our generation of electricity locally to control electric cut-off and overload problems. By generating locally we also increase our economy by stop buying electricity from other states.

```
data=structure(list(A=c(4970,28472),B= c(4723,30006),C= c(4763,21044),
D= c(5941,24618),E=c(4013.52,24892.74)),
```

```
.Names = c("2013", "2014", "2015","2016","2017"),
class = "data.frame",row.names = c(NA, 2))
attach(data)
print(data)
```

```
##    2013  2014  2015  2016     2017
## 1  4970  4723  4763  5941  4013.52
## 2 28472 30006 21044 24618 24892.74
```

```
colours <- c("orange","green")
barplot(as.matrix(data), main="Electricity Generated and Purchased",
xlab="Years",ylab = "Number of Electricity Units",ylim=c(0,34000),
 cex.lab = 0.8, cex.main = 1.1, beside=TRUE, col=colours)
legend("topright", c("Locally Generated","Purchased from Outside"), cex=0.95, bty="n", fill=colours)
```



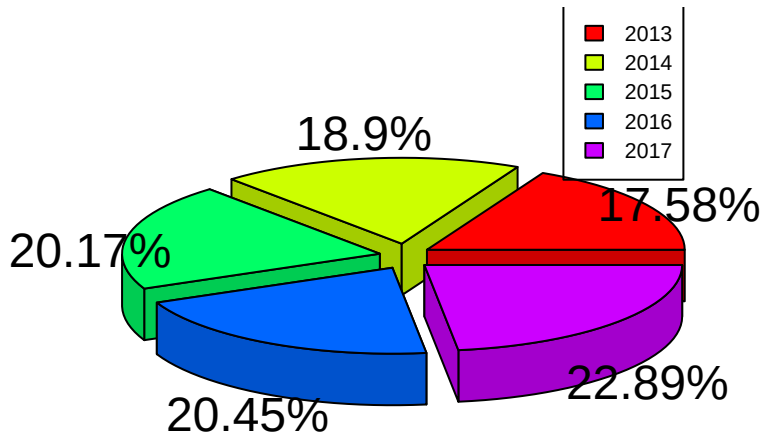
Electricity consumed:

In this visualization, we can see that consumption of electricity is increasing from year 2013 to 2017 data in all domains such as domestic purposes, commercial purposes, industrial purposes, public water work and street lighting and other purposes.

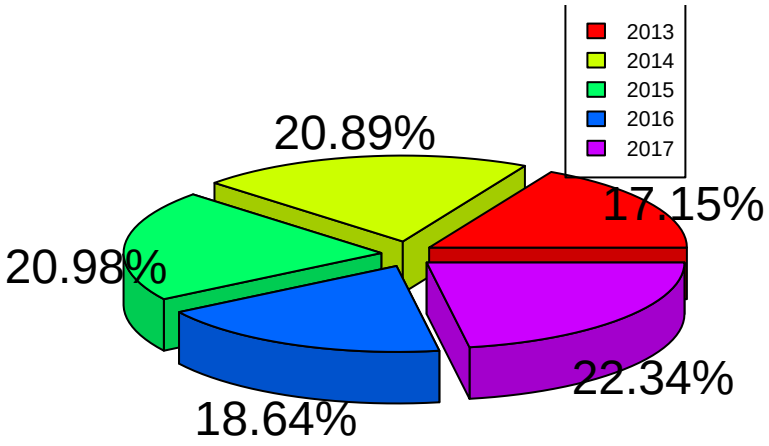
EC = Electricity Consumed

```
library(plotrix)
#par(mfrow=c(1,2))

a1=c(EC$X2013[1],EC$X2014[1],EC$X2015[1],EC$X2016[1],EC$X2017[1])
piepercent<- round(100*a1/sum(a1),2)
```

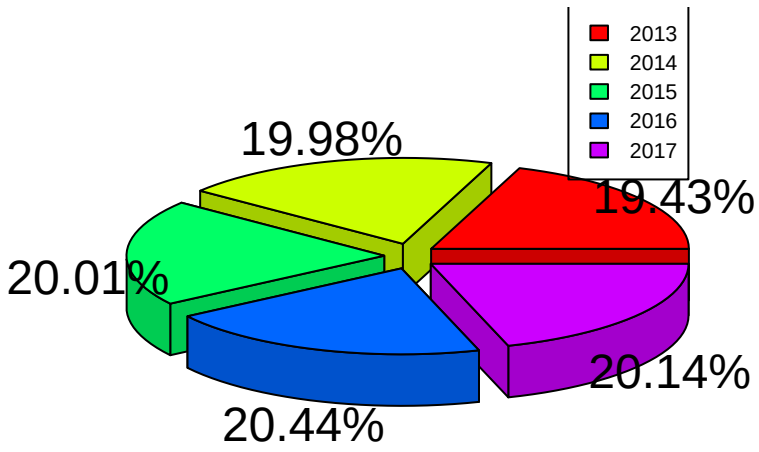
```
lbls1=paste(piepercent,"%",sep="")
pie3D(a1,labels=lbls1,explode=0.1,main="Domestic purposes",col=rainbow(length(a1)))
legend("topright", c("2013","2014","2015","2016","2017"), cex = 0.7,fill = rainbow(length(piepercent)))
```



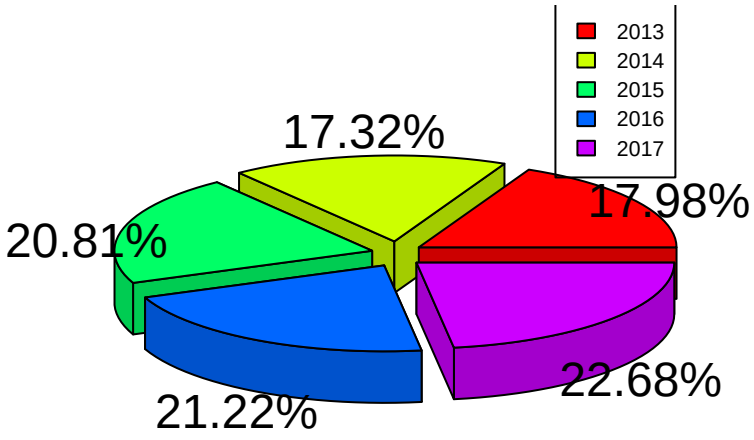

```
a1=c(EC$X2013[2],EC$X2014[2],EC$X2015[2],EC$X2016[2],EC$X2017[2])
piepercent<- round(100*a1/sum(a1),2)
lbls1=paste(piepercent,"%",sep="")
pie3D(a1,labels=lbls1,explode=0.1,main="Commercial purposes",col=rainbow(length(a1)))
legend("topright", c("2013","2014","2015","2016","2017"), cex = 0.7,fill = rainbow(length(piepercent)))
```



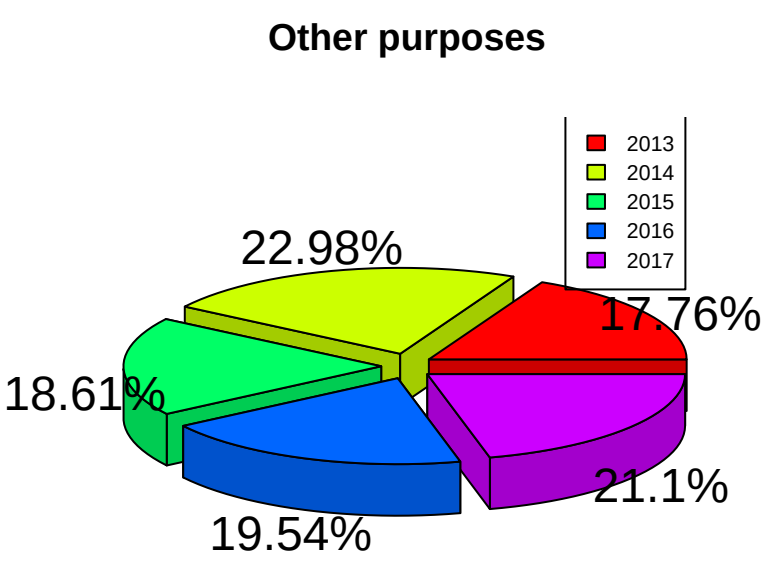

```
#par(mfrow=c(1,2))
a1=c(EC$X2013[3],EC$X2014[3],EC$X2015[3],EC$X2016[3],EC$X2017[3])
piepercent<- round(100*a1/sum(a1),2)
lbls1=paste(piepercent,"%",sep="")
pie3D(a1,labels=lbls1,explode=0.1,main="Industrial purposes",col=rainbow(length(a1)))
legend("topright", c("2013","2014","2015","2016","2017"), cex = 0.7,fill = rainbow(length(piepercent)))
```




```
a1=c(EC$X2013[4],EC$X2014[4],EC$X2015[4],EC$X2016[4],EC$X2017[4])
piepercent<- round(100*a1/sum(a1),2)
lbls1=paste(piepercent,"%",sep="")
pie3D(a1,labels=lbls1,explode=0.1,main="Public Water Work and Street Lighting",col=rainbow(length(a1)))
legend("topright", c("2013","2014","2015","2016","2017"), cex = 0.7,fill = rainbow(length(piepercent)))
```




```
a1=c(EC$X2013[5],EC$X2014[5],EC$X2015[5],EC$X2016[5],EC$X2017[5])
piepercent<- round(100*a1/sum(a1),2)
lbls1=paste(piepercent,"%",sep="")
pie3D(a1,labels=lbls1,explode=0.1,main="Other purposes",col=rainbow(length(a1)))
legend("topright", c("2013","2014","2015","2016","2017"), cex = 0.7,fill = rainbow(length(piepercent)))
```

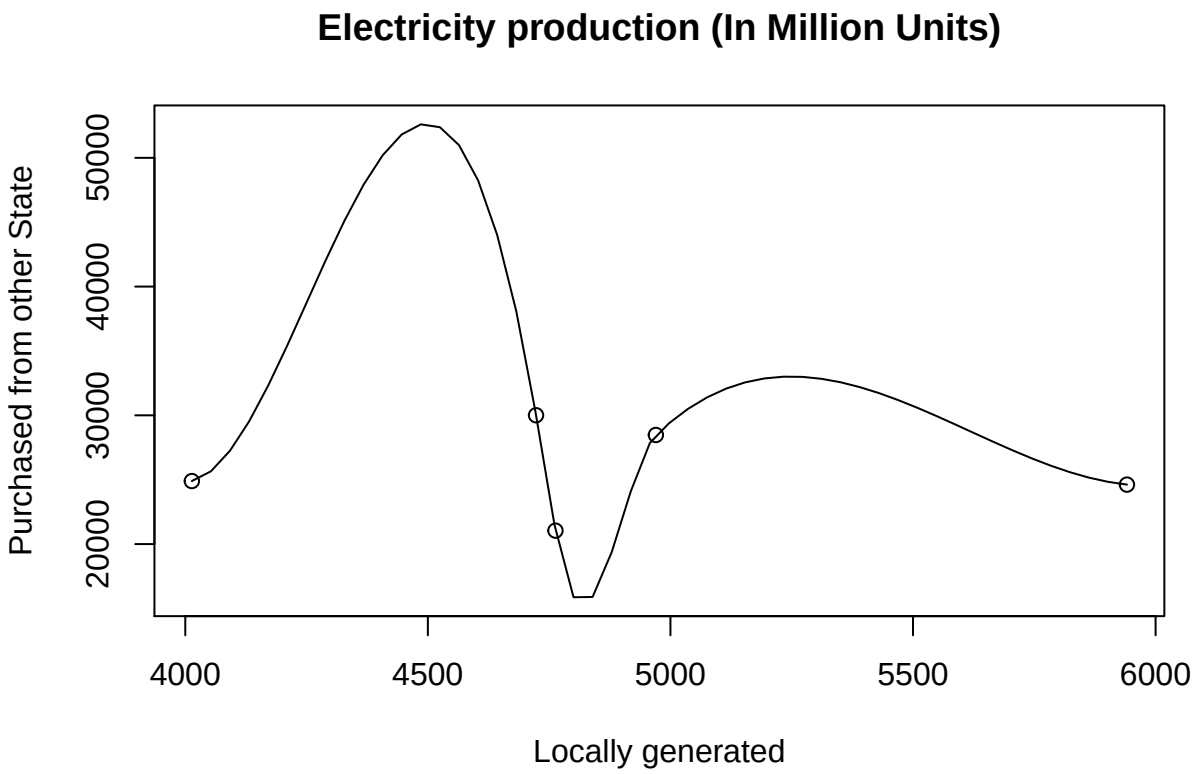


Analysis

We are analyzing that how the energy locally generated vs purchased from other state over the past years can be viewed by this scatter-plot.

EGP = Electricity Generated and Produced

```
# scatter plot
scatter.smooth(x=c(EGP$X2013[1],EGP$X2014[1],EGP$X2015[1],EGP$X2016[1],EGP$X2017[1]), y=c(EGP$X2013[2],
                                                                                          EGP$X2014[2],
xlab="Locally generated",ylab="Purchased from other State",
main="Electricity production (In Million Units)")
```

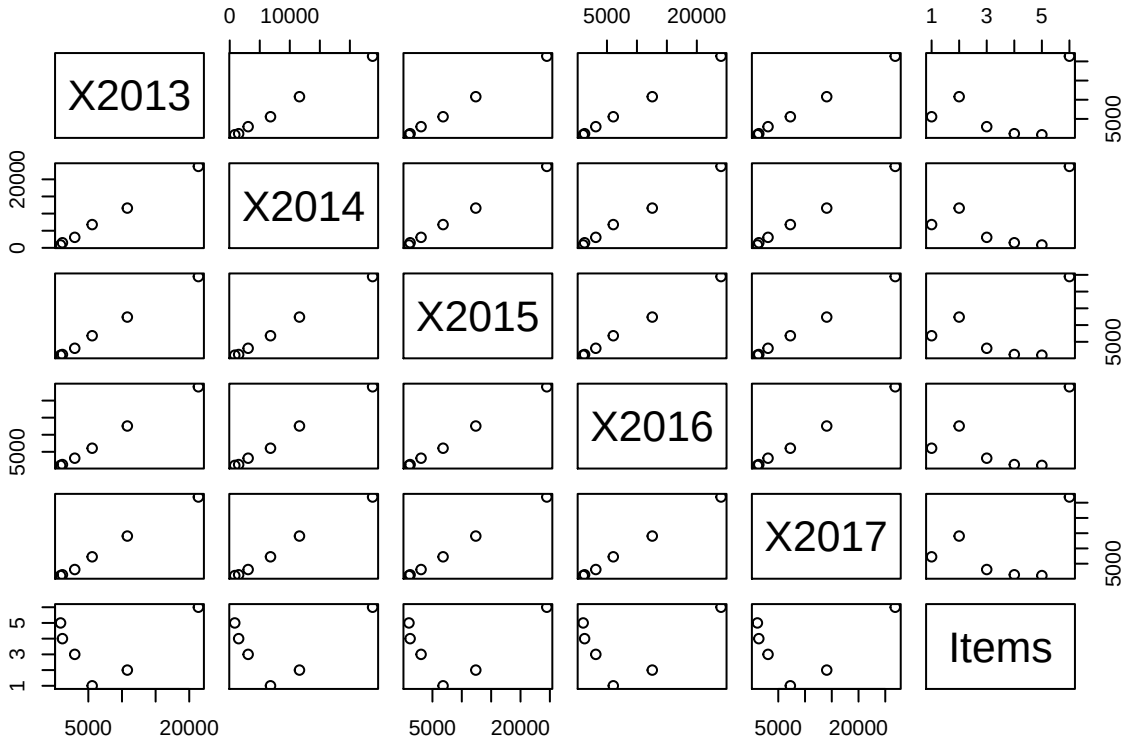


We are analyzing that how the energy is consumed over the past years and can be understood with this summary. We got that there is the minimal consumption of energy in the public and street lighting sector and highest energy consumption for the domestic usage. The median energy consumption is for the commercial sector in Delhi.

```
summary(EC)
```

```
##      X2013           X2014           X2015           X2016
##  Min.   :  870   Min.   :  838   Min.   : 1007   Min.   : 1027
##  1st Qu.: 1605   1st Qu.: 1879   1st Qu.: 1668   1st Qu.: 1730
##  Median : 4274   Median : 4925   Median : 4941   Median : 4594
##  Mean   : 7120   Mean   : 7927   Mean   : 8159   Mean   : 8012
##  3rd Qu.: 9489   3rd Qu.:10403   3rd Qu.:10993   3rd Qu.:10933
##  Max.   :21361   Max.   :23781   Max.   :24477   Max.   :24037
##      X2017                                         Items
##  Min.   : 1098   Commercial purposes                  :1
##  1st Qu.: 1794   Domestic purposes                    :1
##  Median : 5173   Industrial purposes                  :1
##  Mean   : 8955   Others                               :1
##  3rd Qu.:12359   Public Water Work and Street Lighting:1
##  Max.   :26865   Total                                :1
```

```
plot(EC)
```




```
data=EC[1:5,1:5]
# Correlation between consumption of electricity for different purposes over the past years
cor(data)
```

```
##           X2013     X2014     X2015     X2016     X2017
## X2013 1.0000000 0.9963209 0.9984241 0.9991035 0.9982000
## X2014 0.9963209 1.0000000 0.9988088 0.9933019 0.9968004
## X2015 0.9984241 0.9988088 1.0000000 0.9968436 0.9990863
## X2016 0.9991035 0.9933019 0.9968436 1.0000000 0.9983843
## X2017 0.9982000 0.9968004 0.9990863 0.9983843 1.0000000
```

Summary

From the above report we can summarize that:

1. We need to do tremendous work in order to generate your own electricity, to be self dependent.
2. We also need to keep in mind that with increasing technology, there is a continuous demand of electricity.
3. From the correlation plot we can judge that electricity consumption by domestic purposes, commercial purposes and industrial purposes are all interrelated to each other.

6. Healthcare

Health care or healthcare is the maintenance or improvement of health via the prevention, diagnosis, and treatment of disease, illness, injury, and other physical and mental impairments in people. Health care is delivered by health professionals (providers or practitioners) in allied health fields. Physicians and physician associates are a part of these health professionals. Dentistry, midwifery, nursing, medicine, optometry, audiology, pharmacy, psychology, occupational therapy, physical therapy and other health professions are all part of health care. It includes work done in providing primary care, secondary care, and tertiary care, as well as in public health.[5]

This report is based on 2 parameters of **Delhi**:

- Number of MBBS doctors
- Prevalent diseases in Delhi

Table

Here is the tabulation data:

Number of MBBS Doctors in Delhi which are of two categories i.e. Allopathic Doctors and Dental Surgeons:

The following data has been taken from the link [6]

```
doctors=read.csv("Doctors(Statistics).csv")
doctors
```

```
##        Year Allopathic.Doctors Dental.Surgons
## 1 Upto 2008               5050           5720
## 2      2009                793           6280
## 3      2010                905           6280
## 4      2011               1006           6280
## 5      2012                946           6280
## 6      2013               1073           7642
## 7      2014               1159           7642
```

Prevalent diseases in Delhi:

The following data has been taken from the link [7]

- M-Malaria
- ADD-Acute Diarrhoeal Diseases
- ARI-Acute Respiratory Infection
- VD-Viral Hepatitis

```
diseases=read.csv("Diseases(Statistics).csv")
diseases
```

```
##   Year Cases.M. Deaths.M. Cases.ADD. Deaths.ADD. Cases.ARI. Deaths.ARI.
## 1 2008      253         0     117766          86     370816         140
## 2 2009      169         0     145171         107     200631          76
## 3 2010      251         0     115478          89     249463         182
## 4 2011      413         0     102983          62     198541         102
## 5 2012      382         0     136567          98     290841         232
## 6 2013      353         0     129367          62     390170         175
## 7 2014       98         0     120618          77     369406         106
## 8 2015       54         0     148734          82     307597         108
##   Cases.VH. Deaths.VH.
## 1      6342         62
```

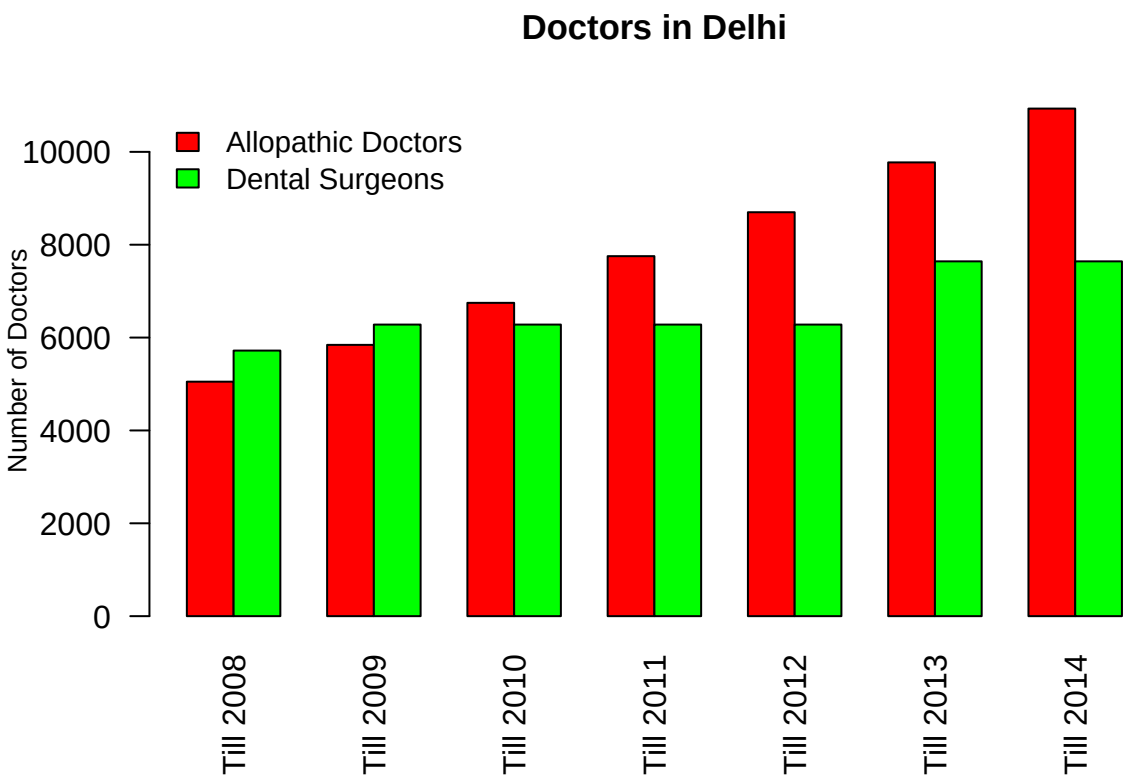
```
## 2      7657          40
## 3      6510          61
## 4      8347          68
## 5      8184          66
## 6      8290         131
## 7      6965          98
## 8      8362          76
```

Visualization

From these we can analyse that till 2009 number of dental surgeons (i.e. 6,280) were more than allopathic doctors but after that the number of allopathic doctors increased dramatically over the years. According to the data, final number of allopathic doctors are pretty more than dental surgeons.

Types of Doctors details:

```
data=structure(list(A=c(5050,5720),B= c(5843,6280),C= c(6748,6280),
D= c(7754,6280),E=c(8700,6280),F=c(9773,7642),G=c(10932,7642)),
.Names = c("Till 2008", "Till 2009", "Till 2010","Till 2011",
"Till 2012","Till 2013","Till 2014"),class = "data.frame",row.names = c(NA, 2))
attach(data)
#print(data)
colours <- c("red","green")
barplot(as.matrix(data), main="Doctors in Delhi",
ylab = "Number of Doctors",ylim=c(0,11000),
 cex.lab = 0.8, cex.main = 1.1, beside=TRUE, col=colours,las=2)
legend("topleft", c("Allopathic Doctors","Dental Surgeons"), cex=0.95, bty="n", fill=colours)
```



Analysis

We are analyzing the number of doctors and which disease is dominant in Delhi over the past years.

```
summary(doctors)
```

```
##         Year   Allopathic.Doctors Dental.Surgons
##  2009     :1   Min.   : 793.0     Min.   :5720
##  2010     :1   1st Qu.: 925.5     1st Qu.:6280
##  2011     :1   Median :1006.0     Median :6280
##  2012     :1   Mean   :1561.7     Mean   :6589
##  2013     :1   3rd Qu.:1116.0     3rd Qu.:6961
##  2014     :1   Max.   :5050.0     Max.   :7642
##  Upto 2008:1
```

```
summary(diseases)
```

```
##       Year         Cases.M.       Deaths.M.   Cases.ADD.      Deaths.ADD.
##  Min.   :2008   Min.   : 54.0   Min.   :0   Min.   :102983   Min.   : 62.00
##  1st Qu.:2010   1st Qu.:151.2   1st Qu.:0   1st Qu.:117194   1st Qu.: 73.25
##  Median :2012   Median :252.0   Median :0   Median :124992   Median : 84.00
##  Mean   :2012   Mean   :246.6   Mean   :0   Mean   :127086   Mean   : 82.88
##  3rd Qu.:2013   3rd Qu.:360.2   3rd Qu.:0   3rd Qu.:138718   3rd Qu.: 91.25
##  Max.   :2015   Max.   :413.0   Max.   :0   Max.   :148734   Max.   :107.00
##    Cases.ARI.      Deaths.ARI.      Cases.VH.      Deaths.VH.
##  Min.   :198541   Min.   : 76.0   Min.   :6342   Min.   : 40.00
```

```
##  1st Qu.:237255   1st Qu.:105.0   1st Qu.:6851   1st Qu.: 61.75
##  Median :299219   Median :124.0   Median :7920   Median : 67.00
##  Mean   :297183   Mean   :140.1   Mean   :7582   Mean   : 75.25
##  3rd Qu.:369758   3rd Qu.:176.8   3rd Qu.:8304   3rd Qu.: 81.50
##  Max.   :390170   Max.   :232.0   Max.   :8362   Max.   :131.00
```

Summary

From the above report we can summarize that:

- There are in **total 10,932 MBBS doctors**.
- **Acute diarrhoeal diseases** and **acute respiratory infection** are prevalent diseases in Delhi as it contains the most number of causes and death tolls.

7. Tourism

Delhi Tourism, a government undertaking facilitating tourism since 1975 will take you to a guided tour of the Delhi through this website which explores the wonders of this city be it its heritage, the art and crafts, the diverse cuisine and culture.

A symbol of the country's rich past and thriving present, Delhi is a city where ancient and modern blend seamlessly together. It is a place that not only touches your pulse but even fastens it to a frenetic speed. Home to millions of dreams, the city takes on unprecedented responsibilities of realizing dreams bringing people closer and inspiring their thoughts.[8]

This report is based on 3 parameters of **Delhi**:

- Tourist destinations number of attractions
- Number of tourists in a year
- Total revenue from tourism in a year

Table

Here is the tabulation data:

Popular Tourist destinations:

```
TD=read.csv("Tourist_Destination(Statistics).csv")
TD
```

```
##    S.No                      Tourist.Destinations Type.of.Destination
## 1     1                             Ahimsa Sthal          Pilgrimage
## 2     2                         Air Force Museum              Museum
## 3     3                         Akshardam Mandir          Pilgrimage
## 4     4                          Buddha Memorial            Memorial
## 5     5                        Chhatarpur Temple          Pilgrimage
## 6     6                             Craft Museum              Museum
## 7     7                                Delhi Zoo                 Zoo
## 8     8                         Dilli Haat - INA   Handicraft Market
## 9     9                    Dilli Haat - Pitampura   Handicraft Market
## 10   10                           Gandhi Smriti            Memorial
## 11   11                   Gurudwara Bangla Shahib          Pilgrimage
## 12   12                      Gurudwara Rakab Ganj          Pilgrimage
## 13   13                        Gurudwara Sis Ganj          Pilgrimage
## 14   14                Hazrat Nizam-ud-din Shrine          Pilgrimage
## 15   15                             Humayun Tomb            Monument
## 16   16                               India Gate            Monument
## 17   17                    Indira Gandhi Smriti             Memorial
## 18   18      Shankar's International Dolls Museum              Museum
## 19   19                           ISKCON Temple          Pilgrimage
## 20   20                             Jama Masjid          Pilgrimage
## 21   21                           Jantar Mantar            Monument
## 22   22                       Kotla Feroz Shah             Monument
## 23   23        Laxmi Narain Temple (Birla Mandir)          Pilgrimage
## 24   24                             Lodhi Tomb             Monument
## 25   25                           Mughal Garden               Garden
## 26   26           National Gallery of Modern Art              Museum
## 27   27                         National Museum              Museum
## 28   28        National Museum of Natural History              Museum
## 29   29                      National Rail Museum              Museum
```

```
## 30   30             National Science Centre Museum              Museum
## 31   31                                Nehru Museum              Museum
## 32   32                            Nehru Planetarium         Planetarium
## 33   33                                Palika Bazaar  Underground Market
## 34   34                              Pragati Maidan   Exhibition Ground
## 35   35              Purana Qila & Old Fort Museum            Monument
## 36   36                                Qutab Minar            Monument
## 37   37                     Rahim-Khane-Khanam Tomb            Monument
## 38   38                                   Raj Ghat            Memorial
## 39   39                                   Red Fort            Monument
## 40   40                               Safdarjung Tomb            Monument
## 41   41                              Sanskriti Museum              Museum
## 42   42                            Sultan Ghari's Tomb            Monument
## 43   43            The Bahai Temple (Lotus Temple)              Monument
## 44   44                  The Garden of Five Senses                Garden
## 45   45 Tughluqabad Fort & GhiyassuddinTuglag Tomb              Monument
## 46   46                               Yog Maya Mandir          Pilgrimage
```

Number of tourists in a year:

```
TT=read.csv("Total_Tourist(Statistics).csv")
TT
```

```
##              Month Total.Domestic.Tourists Total.Foreign.Tourists
## 1       July\x9209                 1261854                  44350
## 2     August\x9209                 1165403                  44068
## 3  September\x9209                 1298121                  46592
## 4    October\x9209                 1201617                 119352
## 5   November\x9209                 1119356                 110998
## 6   December\x9209                 1175783                 104327
## 7    January\x9210                 1142638                  66877
## 8   February\x9210                  747344                  60924
## 9      March\x9210                  761639                  58546
## 10     April\x9210                 1049967                  86882
## 11       May\x9210                 1087991                  80558
## 12      June\x9210                 1144971                  36482
## 13           Total                13156684                 859956
```

Total revenue from tourism in various years:

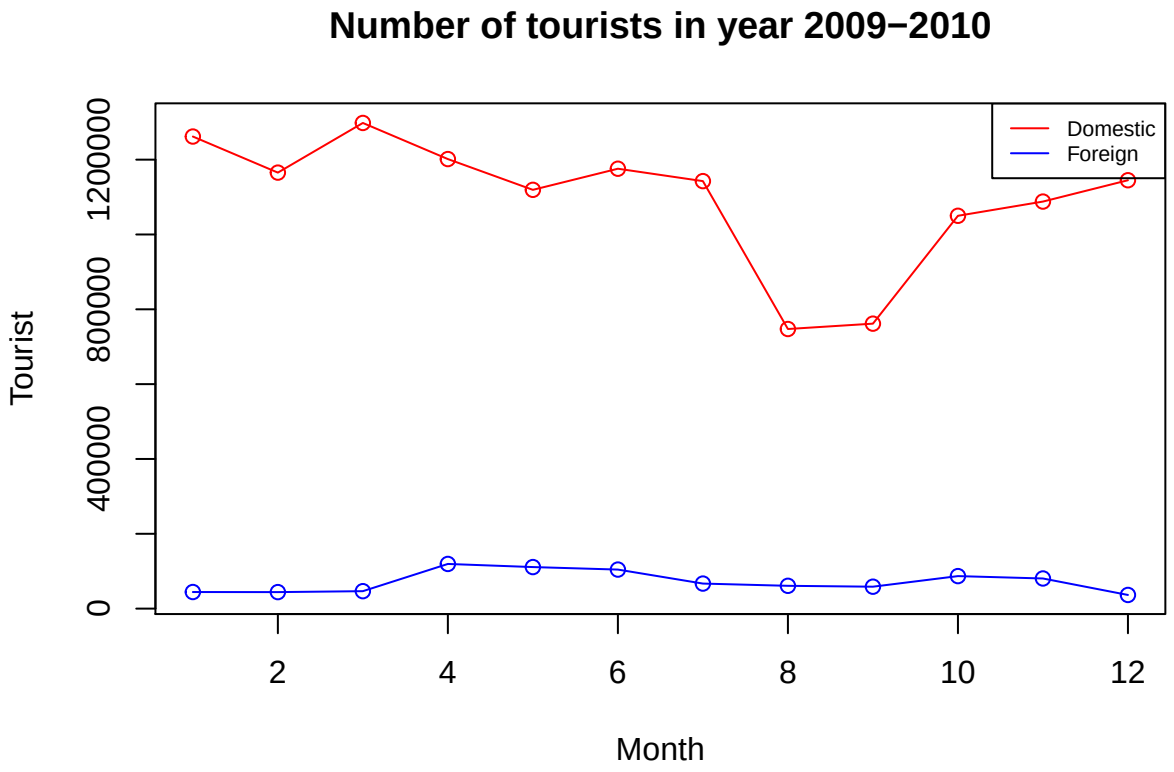
```
TR=read.csv("Tourism_Revenue(Statistics).csv")
TR
```

```
##    Month X2012  X2013  X2014  X2015  X2016
## 1    Jan  8623  10785  11664  12100  13671
## 2    Feb  8502  10255  11510  11642  13661
## 3    Mar  7843   9545  10479  11133  12985
## 4    Apr  6745   7226   9179  10091  11495
## 5    May  5562   6627   7936   9505  10260
## 6    Jun  6485   7149   8366   9564  10677
## 7    Jul  8389   8620  10284  11982  14285
## 8    Aug  7260   8351  10385  11411  12553
## 9    Sep  6652   7811   9057  10415  11642
## 10   Oct  8154   8645  10041  10549  12100
## 11   Nov  9723  10663  11431  12649  14259
## 12   Dec 10549  11994  12988  14152  16558
## 13 Total 94487 107671 123320 135193 154146
```

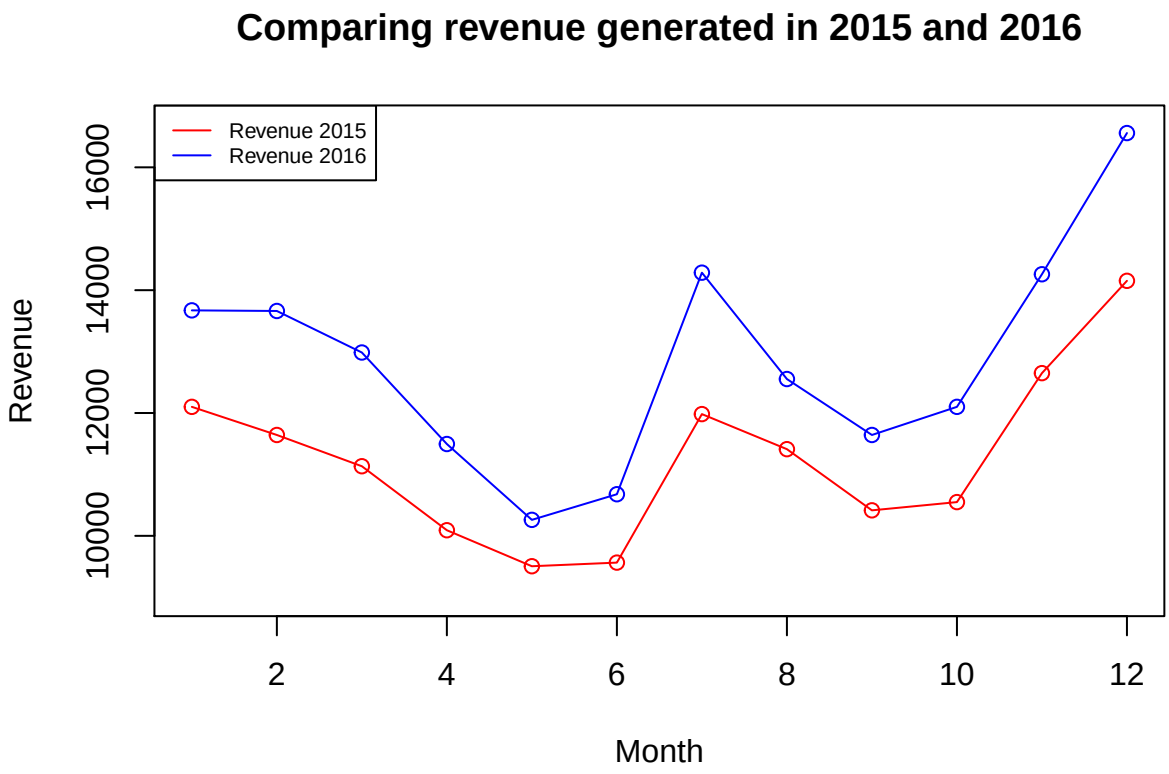
Visualization

TD= Tourist destinations; TT= Total number of tourist in a year; TR= Total revenue from tourism in a year

```
v=TT$Total.Domestic.Tourists[1:12]
t=TT$Total.Foreign.Tourists[1:12]
plot(v,type = "o", col="red",xlab ="Month",ylab="Tourist",ylim = c(36000,1300000),main="Number of touris
lines(t,type = "o", col="blue")
legend("topright", c("Domestic","Foreign"),cex = 0.65,col=c("red","blue"),lty=1)
```




```
v=TR$X2016[1:12]
t=TR$X2015[1:12]
plot(t,type = "o", col="red",xlab ="Month",ylab="Revenue",ylim=c(9000,16700),
     main="Comparing revenue generated in 2015 and 2016")
lines(v, type = "o", col = "blue")
legend("topleft", c("Revenue 2015","Revenue 2016"),cex = 0.65,col=c("red","blue"),lty=1)
```



Analysis

We are analyzing on Number of local vs foreign tourists, Tourist destination and relation between Total revenue earned over the past years.

```
summary(TT)
```

```
##    Month              Total.Domestic.Tourists Total.Foreign.Tourists
##  April\x9210    :1   Min.    :  747344        Min.    : 36482
##  August\x9209   :1   1st Qu.: 1087991        1st Qu.: 46592
##  December\x9209:1   Median : 1144971        Median : 66877
##  February\x9210:1   Mean    : 2024105        Mean    :132301
##  January\x9210  :1   3rd Qu.: 1201617        3rd Qu.:104327
##  July\x9209     :1   Max.    :13156684        Max.    :859956
##  (Other)        :7
```

```
summary(TR)
```

```
##      Month       X2012           X2013           X2014           X2015
##  Apr    :1   Min.    : 5562   Min.    :  6627   Min.    :  7936   Min.    :  9505
##  Aug    :1   1st Qu.: 6745   1st Qu.:  7811   1st Qu.:  9179   1st Qu.: 10415
##  Dec    :1   Median : 8154   Median :  8645   Median : 10385   Median : 11411
##  Feb    :1   Mean   :14536   Mean   : 16565   Mean   : 18972   Mean   : 20799
##  Jan    :1   3rd Qu.: 8623   3rd Qu.: 10663   3rd Qu.: 11510   3rd Qu.: 12100
##  Jul    :1   Max.    :94487   Max.    :107671   Max.    :123320   Max.    :135193
##  (Other):7
```

```
##      X2016
##  Min.   : 10260
##  1st Qu.: 11642
##  Median : 12985
##  Mean   : 23715
##  3rd Qu.: 14259
##  Max.   :154146
##
```

```
data=TR[1:11,2:6]
# Correlation between Total revenue earned over the past years
cor(data)
```

```
##           X2012     X2013     X2014     X2015     X2016
## X2012 1.0000000 0.9139915 0.9150278 0.9123328 0.9245829
## X2013 0.9139915 1.0000000 0.9632958 0.8875763 0.8716369
## X2014 0.9150278 0.9632958 1.0000000 0.9245612 0.9161341
## X2015 0.9123328 0.8875763 0.9245612 1.0000000 0.9721120
## X2016 0.9245829 0.8716369 0.9161341 0.9721120 1.0000000
```

Summary

From the above report we can summarize that:

- **Tourist destinations number of attractions:**

1. There are in total 46 places approved by Delhi government for the domestic as well as foreign tourists to visit.

- **Number of tourists in year 2009-2010:**

1. The number of tourists are increasing yearly.
2. We can see that the number of tourists increased significantly in winter session.
3. There were in total 1,31,56,684 (more than 131 lakhs) domestic tourist and 8,59,956 (more than 8 lakhs) international tourist in Delhi.

- **Total revenue from tourism in a year:**

1. The revenue earned is increasing year-wise.
2. As from cor plot, The revenue earned also depends strongly on the previous year earned revenue and the number of tourists visited.

8. Population and Education Data

Private schools in Delhi—which use either English or Hindi as the language of instruction—are affiliated to one of three administering bodies, the Council for the Indian School Certificate Examinations (CISCE), the Central Board for Secondary Education (CBSE) or the National Institute of Open Schooling (NIOS). In 2004–05, approximately 15.29 lakh (1.529 million) students were enrolled in primary schools, 8.22 lakh (0.822 million) in middle schools and 6.69 lakh (0.669 million) in secondary schools across Delhi. Female students represented 49 % of the total enrollment. The same year, the Delhi government spent between 1.58 % and 1.95 % of its gross state domestic product on education.[9]

This report is based on 2 parameters of **Delhi**:

- Population of Delhi
- Literate persons in Delhi

Table

Here is the tabulation data:

Population of Delhi:

In this table we can see that how much males and females, according to their age groups live in rural and urban part of Delhi.

```
ppl=read.csv("Population_Statistics.csv", stringsAsFactors = FALSE)
ppl
```

```
##    AgeGroup Male_R Female_R Male_U Female_U
## 1       0-4  21481    17644 712855   629220
## 2   005-009  23698    18896 805789   687589
## 3     10-14  25479    20404 869967   732297
## 4     15-19  24916    19451 900202   722806
## 5     20-24  23805    20602 927606   792047
## 6     25-29  20584    18666 857612   771464
## 7     30-34  17431    16402 740024   660842
## 8     35-39  16738    14910 681717   605879
## 9     40-44  14180    11782 576678   494557
## 10    45-49  10981     8695 484246   407291
## 11    50-54   7917     6430 368305   304817
## 12    55-59   5372     4927 263813   234780
## 13    60-64   5700     5924 232403   227992
## 14    65-69   3125     2998 136273   130056
## 15    70-74   2171     2147  92776    92156
## 16    75-79    980     1067  49466    49180
## 17      80+   1482     1540  52379    57630
```

Literate persons in Delhi:

In this table we can see that how much literate males and females, live in different sub-divisions of Delhi.

```
lit=read.csv("Literate(Statistics).csv")
lit
```

```
##           Place Literate.Male. Literate.Female.
## 1  NCT of Delhi        7194856          5542911
## 2    North West        1541952          1165903
## 3         North         381615           299902
```

```
## 4    North East         912481          699107
## 5          East         748382          604616
## 6     New Delhi          65678           48501
## 7       Central         240518          201842
## 8          West         109399          867246
## 9    South West        1025261          762428
## 10        South        1185036          893366
```

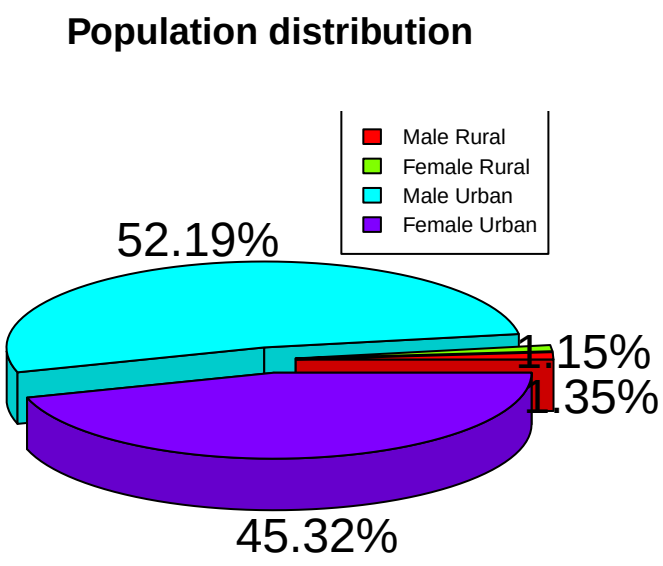
Visualization

Distribution of Population in Delhi:

From the below pie chart we can analyse the following things:

- Most of the Delhi population lives in urban part which combines to 97.51 % of the total population.
- Whereas the rural part comprises of only 2.49 % of the total Delhi population.

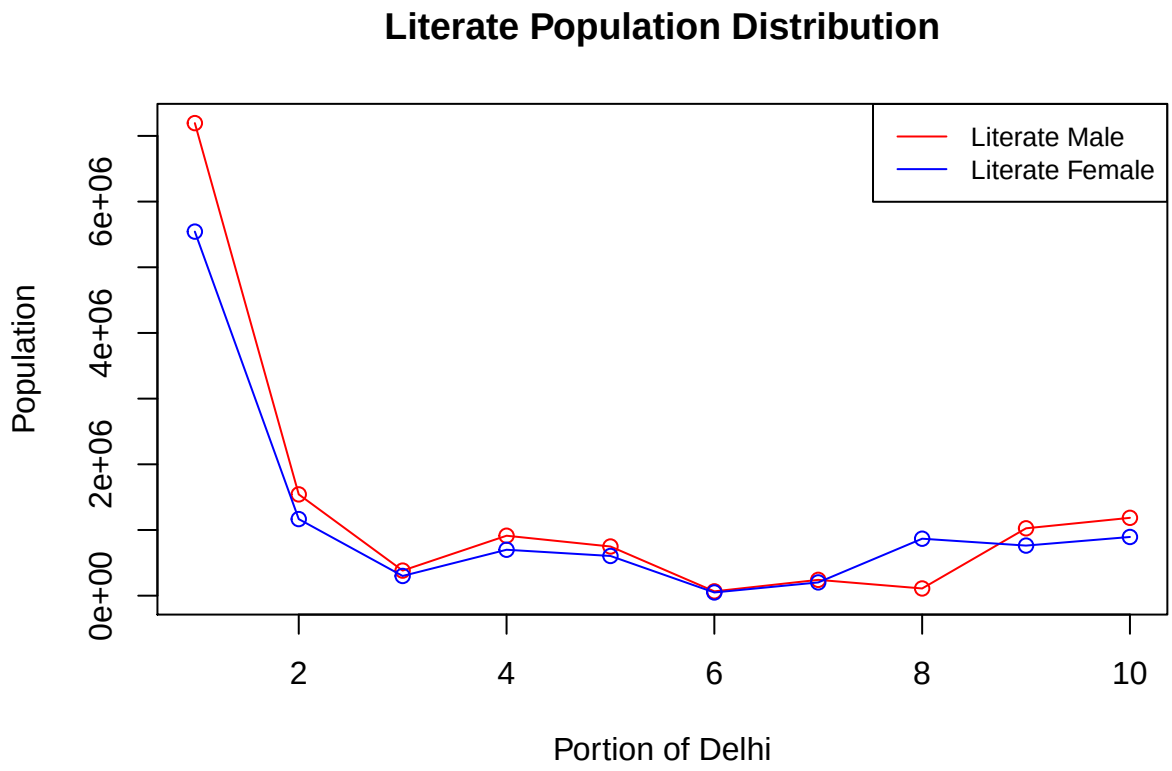
```
a1=c(sum(ppl$Male_R),sum(ppl$Female_R),sum(ppl$Male_U),sum(ppl$Female_U))
piepercent<- round(100*a1/sum(a1),2)
lbls1=paste(piepercent,"%",sep="")
pie3D(a1,labels=lbls1,explode=0.1,main="Population distribution",
col=rainbow(length(a1)))
legend("topright", c("Male Rural","Female Rural",
"Male Urban","Female Urban"),cex = 0.7,fill = rainbow(length(piepercent)))
```



Literate persons in Delhi:

The graph shows that how in 10 different parts of Delhi the distribution of literate males and females in the society.

```
M=lit$Literate.Male.
F=lit$Literate.Female.
plot(M,type = "o", col = "red", xlab = "Portion of Delhi",
ylab = "Population",ylim=c(0,7200000),main = "Literate Population Distribution")
lines(F, type = "o", col = "blue")
legend("topright", c("Literate Male","Literate Female"),cex = 0.85,col=c("red","blue"),lty=1)
```



Analysis

We are analyzing the number of literate persons(Male-Female), population(Female Rural-Female Urban) of the district by using the linear regression. Linear regression is used to compare the two variables together that how their graph is plotted, their slope (+ve or -ve) or the intercept on the axis.

```
#summary(ppl)
# Scatter plot of population of literate
#plot(ppl)
#summary(lit)
lm(lit$Literate.Male. ~ lit$Literate.Female.)
```

```
##
## Call:
## lm(formula = lit$Literate.Male. ~ lit$Literate.Female.)
##
```

```
## Coefficients:
##          (Intercept)  lit$Literate.Female.
##           -111430.05                  1.31
```

```
lm(ppl$Female_R ~ ppl$Female_U)
```

```
##
## Call:
## lm(formula = ppl$Female_R ~ ppl$Female_U)
##
## Coefficients:
##  (Intercept)  ppl$Female_U
##   -699.99319       0.02689
```

Summary

From the above report we can summarize that:

- Most of the literate population lives in NCT region of Delhi i.e. Male - 71,94,856 (more than 71 lakhs) and Female - 55,42,911 (more than 55 lakhs).
- Most of the the population lives in urban region of Delhi (i.e. 97.51 % of total population of Delhi).
- Literate male and female are dependent on each other in increasing graph pattern.
- Form the above linear regression, female urban is very less dependent on female rural.

9. Industries

An **industry** is a place where there is production of goods or related services within an economy. The major source of revenue of a group or company is the indicator of its relevant industry. When a large group has multiple sources of revenue generation, it is considered to be working in different industries. Manufacturing industry became a key sector of production and labor in European and North American countries during the Industrial Revolution, upsetting previous mercantile and feudal economies. This came through many successive rapid advances in technology, such as the production of steel and coal.[10]

This report is based on 2 parameters of **Delhi**:

- **Number of Industries**
- **Type of industries:** According to Labour, Raw materials and Ownership

Table

Here is the tabulation data for the years 2014 - 2016:

Number and types of factories:

```
nf=read.csv("Number_Factories(Statistics).csv")
nf
```

```
##                            Types.of.Factories X2014 X2015 X2016
## 1                                Food Products   330   333   340
## 2                            Beverages, Tobacco    46    44    44
## 3                             Textiles products  2033  2012  2013
## 4                                Wood products   265   266   269
## 5                         Paper & Paper products   765   771   776
## 6                                      Leather   298   298   300
## 7                     Rubber, Plastic, Petroleum   666   666   662
## 8                              Chemical products   295   291   290
## 9                  Non-metallic Mineral products    82    82    82
## 10                  Basic Metal & Alloy Industry   525   523   519
## 11                               Metal products  1913  1890  1890
## 12            Electricity, Gas and Stream Water   104   104   109
## 13                               Wholesale Trade    73    95    91
## 14 Public Administration and Defence Services     9     9     9
## 15                             Sanitary Services    17    17    18
## 16                               Repair Services   540   550   556
## 17                           Miscellaneous group  1007  1003  1000
```

Number of workers in each type of factory:

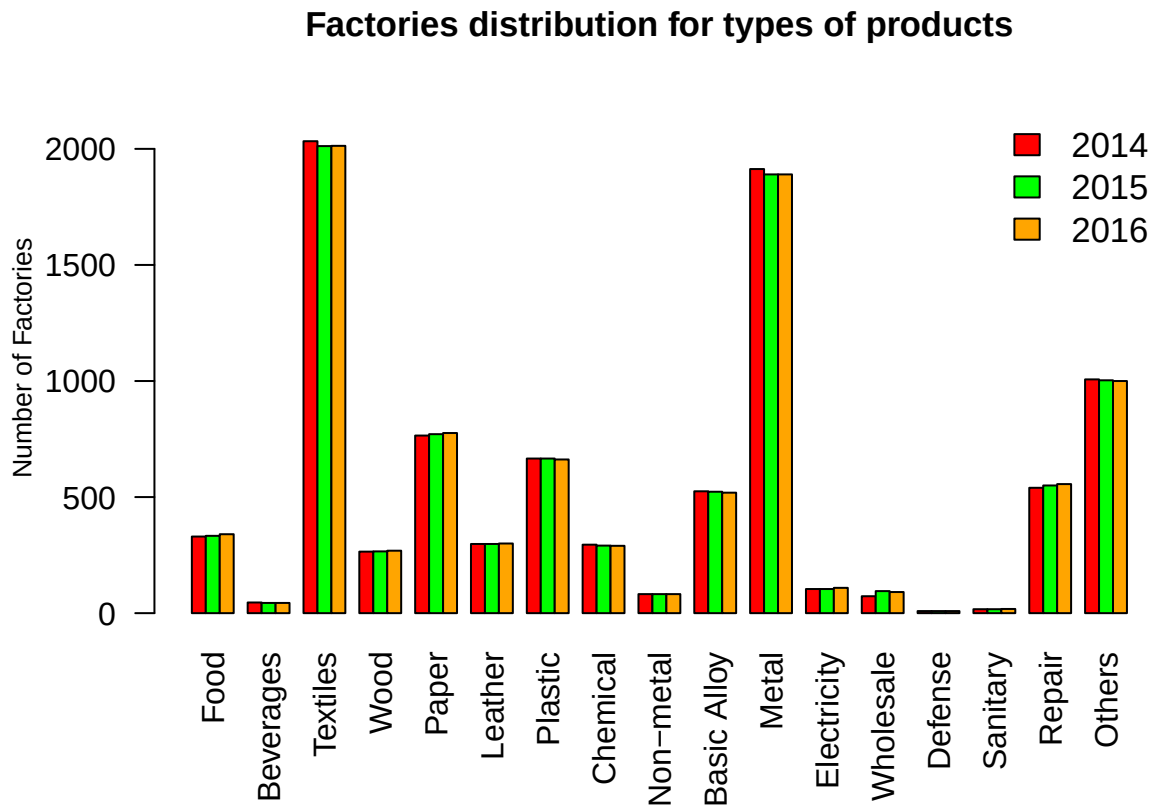
```
workers=read.csv("Workers(Statistics).csv")
workers
```

```
##                            Types.of.Factories  X2014  X2015  X2016
## 1                                Food Products  20316  20500  21316
## 2                            Beverages, Tobacco   3214   3074   3134
## 3                             Textiles products 141263 139803 140408
## 4                                Wood products  10317  10356  10541
## 5                         Paper & Paper products  29816  30050  29997
## 6                                      Leather  12872  12872  13054
## 7                     Rubber, Plastic, Petroleum  15365  15365  14952
## 8                              Chemical products  11793  11633  11548
## 9                  Non-metallic Mineral products   2426   2426   2426
```

```
## 10               Basic Metal & Alloy Industry   8614   8581   8373
## 11                             Metal products  76427  75508  75215
## 12          Electricity, Gas and Stream Water   5935   5935   6065
## 13                             Wholesale Trade    657    855    650
## 14 Public Administration and Defence Services   7655   7655   7655
## 15                           Sanitary Services    391    391    102
## 16                             Repair Services  30502  31067  31431
## 17                          Miscellaneous group  39364  39207  39966
```

Visualization

```
data=structure(list(A=c(330,333,340),B= c(46,44,44),C= c(2033,2012,2013),
D= c(265,266,269),E=c(765,771,776),F=c(298,298,300),G=c(666,666,662),H=c(295,291,290)
,I=c(82,82,82),J=c(525,523,519),K=c(1913,1890,1890),L=c(104,104,109)
,M=c(73,95,91),N=c(9,9,9),O=c(17,17,18),P=c(540,550,556)
,Q=c(1007,1003,1000)),
.Names = c("Food", "Beverages", "Textiles",
"Wood","Paper","Leather","Plastic","Chemical"
,"Non-metal","Basic Alloy","Metal","Electricity",
"Wholesale","Defense","Sanitary","Repair",
"Others"),las=1,class = "data.frame",row.names = c(NA, 3))
attach(data)
#print(data)
colours <- c("red","green", "orange")
barplot(as.matrix(data), main="Factories distribution for types of products",ylab = "Number of Factories
 cex.lab = 0.8, cex.main = 1.1, beside=TRUE, col=colours,las=2)
legend("topright", c("2014","2015","2016"), cex=1.1, bty="n", fill=colours)
```



Analysis

We are analyzing the amount of factories available and the workers working in each factories.

```
summary(nf)
```

```
##                          Types.of.Factories     X2014            X2015
##  Basic Metal & Alloy Industry     : 1       Min.   :   9.0   Min.   :   9.0
##  Beverages, Tobacco               : 1       1st Qu.:  82.0   1st Qu.:  95.0
##  Chemical products                : 1       Median : 298.0   Median : 298.0
##  Electricity, Gas and Stream Water: 1       Mean   : 527.5   Mean   : 526.7
##  Food Products                    : 1       3rd Qu.: 666.0   3rd Qu.: 666.0
##  Leather                          : 1       Max.   :2033.0   Max.   :2012.0
##  (Other)                          :11
##      X2016
##  Min.   :   9.0
##  1st Qu.:  91.0
##  Median : 300.0
##  Mean   : 527.5
##  3rd Qu.: 662.0
##  Max.   :2013.0
##
```

```
summary(workers)
```

```
##                          Types.of.Factories     X2014            X2015
```

```
##  Basic Metal & Alloy Industry     : 1       Min.   :   391   Min.   :   391
##  Beverages, Tobacco               : 1       1st Qu.:  5935   1st Qu.:  5935
##  Chemical products                : 1       Median : 11793   Median : 11633
##  Electricity, Gas and Stream Water: 1       Mean   : 24525   Mean   : 24428
##  Food Products                    : 1       3rd Qu.: 29816   3rd Qu.: 30050
##  Leather                          : 1       Max.   :141263   Max.   :139803
##  (Other)                          :11
##      X2016
##  Min.   :   102
##  1st Qu.:  6065
##  Median : 11548
##  Mean   : 24520
##  3rd Qu.: 29997
##  Max.   :140408
##
```

Summary

From the above report we can summarize that:

- Highest number of factories in Delhi are for textiles products and have decreased over the years from 2033 in year 2014 to 2013 in year 2016.
- There are very few Public Administration and Defense Services factories (i.e. 9 only) in Delhi and these are not being developed i.e stagnant over the years.
- There is a majority a workers working in factories to manufacture Textiles products i.e. 1,40,408 (more than one lakh forty thousand) in year 2016.
- There is a significant decrements in the number of workers in Sanitary services over the years.
- The second most place for the workers in Delhi is the Metal products factory.

10. Education

Education is the process of facilitating learning, or the acquisition of knowledge, skills, values, beliefs, and habits. Educational methods include storytelling, discussion, teaching, training, and directed research. Education frequently takes place under the guidance of educators, however learners may also educate themselves. Education can take place in formal or informal settings and any experience that has a formative effect on the way one thinks, feels, or acts may be considered educational. The methodology of teaching is called pedagogy.

Formal education is commonly divided formally into such stages as preschool or kindergarten, primary school, secondary school and then college, university, or apprenticeship.

This report is based on 4 parameters of **Delhi**:

- Number of: Schools, Colleges and Higher education institutes, Universities
- Students studying (Male/Female)
- Teachers
- Number of Agriculture universities/colleges

Table

Here is the tabulation data:

Number of Schools:

```
sch=read.csv("Schools(Statistics).csv")
sch
```

```
##           Institutions X2011.2012 X2012.2013 X2013.2014 X2014.2015 X2015.2016
## 1 Sr. Secondary School       1427       1504       1627       1674       1684
## 2     Secondary School        463        458        389        385        393
## 3       Middle Schools        600        564        728        933        940
## 4      Primary Schools       2581       2580       2657       2766       2742
## 5  Pre Primary Schools         51         49         52         40         37
##   X2016.2017
## 1       1704
## 2        400
## 3        933
## 4       2700
## 5         35
```

Number of School Students:

B-Boys; G-Girls

```
ss=read.csv("Students_School(Statistics).csv")
ss
```

```
##                     Class X2013.2014 X2014.2015 X2015.2016 X2016.2017
## 1    Pre Primary School(B)      99379     108775     114960     118208
## 2    Pre Primary School(G)      91722      99247     100715     103889
## 3        Primary School(B)     980954    1002103    1007287     990510
## 4        Primary School(G)     850725     873419     879687     870612
## 5         Middle School(B)     600410     596407     595565     602052
## 6         Middle School(G)     516570     519146     524471     525327
## 7      Secondary School(B)     350331     350191     370533     391554
## 8      Secondary School(G)     294300     301952     321148     349377
## 9  Sr. Secondary School(B)     317184     294802     267448     252761
```

```
## 10 Sr. Secondary School(G)     284119     266975     249022     239044
```

Number of School teacher:

M-Male; F-Female

```
d=read.csv("Teachers_School(Statistics).csv")
d
```

```
##                      Class X2013.2014 X2014.2015 X2015.2016 X2016.2017
## 1    Pre Primary School(M)          0          0          0          0
## 2    Pre Primary School(F)        187        162        131        116
## 3        Primary School(M)       7330       7284       7573       7567
## 4        Primary School(F)      20982      22262      21873      21400
## 5         Middle School(M)       1471       1733       1719       1765
## 6         Middle School(F)       7845      10008      10596      11026
## 7      Secondary School(M)       2744       2389       2615       2465
## 8      Secondary School(F)       7038       6981       7677       7144
## 9  Sr. Secondary School(M)      26140      25120      26635      26626
## 10 Sr. Secondary School(F)      63835      63541      67274      71062
```

Number of College Students and Teachers:

B-Boys; MT-Man Teacher

G-Girls; WT-Woman Teacher

```
c=read.csv("Students_Teacher_College(Statistics).csv")
c
```

```
##                                    Institutions X2013.2014 X2014.2015
## 1  Universities Colleges & Other Institutions(B)     558195     580963
## 2  Universities Colleges & Other Institutions(G)     515391     536148
## 3 Universities Colleges & Other Institutions(MT)       2474       1895
## 4 Universities Colleges & Other Institutions(WT)       1156        985
##   X2015.2016 X2016.2017
## 1     848810     727817
## 2     758769     646141
## 3       3546       3548
## 4       1701       1752
```

Number of Universities:

B-Boys; G-Girls; Co-Edn.-Co-Education

```
e=read.csv("University(Statistics).csv")
e
```

```
##                                      Institutions X2013.2014 X2014.2015
## 1                               Universities(B)          0          0
## 2                               Universities(G)          1          1
## 3                          Universities(Co-Edn.)         10         10
## 4         Institutions deemed as Universities(B)          0          0
## 5         Institutions deemed as Universities(G)          0          0
## 6   Institutions deemed as Universities(Co-Edn.)         12         12
## 7        Institutions of National Importance (B)          0          0
## 8        Institutions of National Importance (G)          0          0
## 9  Institutions of National Importance (Co-Edn.)          3          3
## 10             Colleges for General Education(B)          0          0
## 11             Colleges for General Education(G)         24         24
```

```
## 12       Colleges for General Education(Co-Edn.)         61         61
## 13        Colleges for Professional Education(B)          0          0
## 14        Colleges for Professional Education(G)          2          2
## 15   Colleges for Professional Education(Co-Edn)         95         95
##    X2015.2016 X2016.2017
## 1           0          0
## 2           1          1
## 3          11         11
## 4           0          0
## 5           0          0
## 6          12         11
## 7           0          0
## 8           0          0
## 9           3          4
## 10          0          0
## 11         24         24
## 12         60         60
## 13          0          0
## 14          2          8
## 15         98         94
```

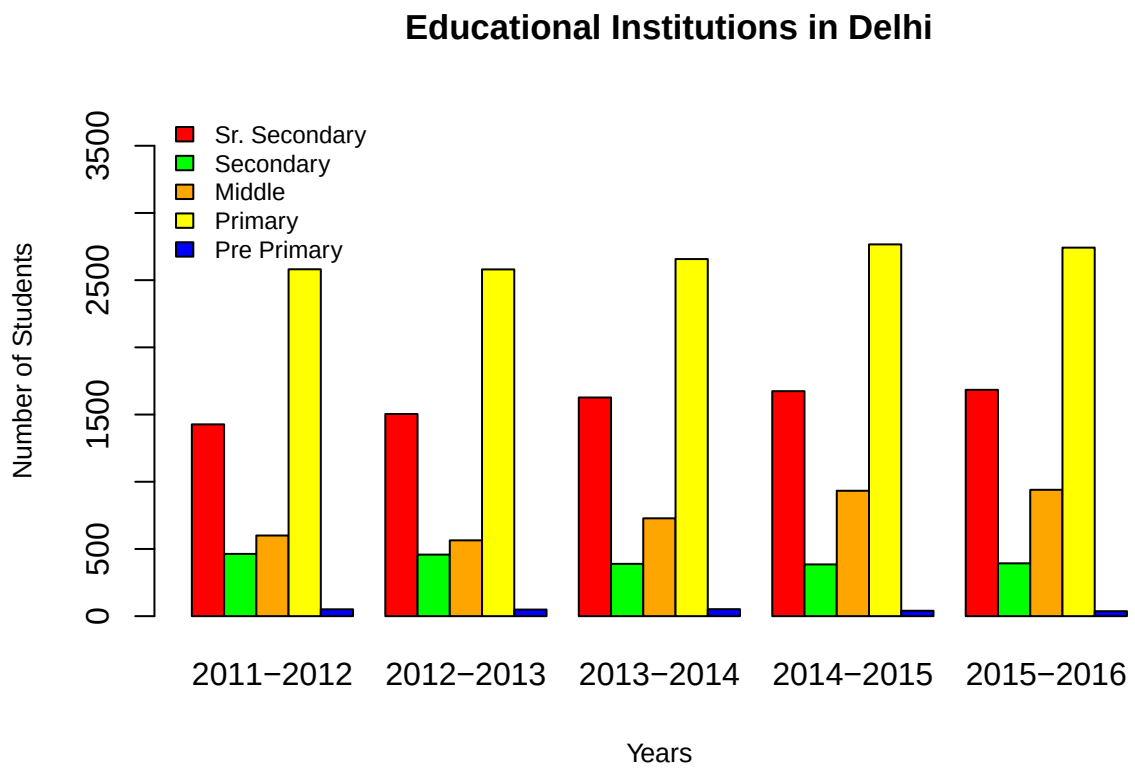
Visualization

Schools distribution in Delhi:

```
data=structure(list(A=c(1427,463,600,2581,51),B= c(1504,458,564,2580,49),C= c(1627,389,728,2657,52),
                    D= c(1674,385,933,2766,40),
                    E=c(1684,393,940,2742,37)),
.Names = c("2011-2012", "2012-2013", "2013-2014","2014-2015",
"2015-2016"),class = "data.frame",row.names = c(NA, 5))
attach(data)
print(data)
```

```
##   2011-2012 2012-2013 2013-2014 2014-2015 2015-2016
## 1      1427      1504      1627      1674      1684
## 2       463       458       389       385       393
## 3       600       564       728       933       940
## 4      2581      2580      2657      2766      2742
## 5        51        49        52        40        37
```

```
colours <- c("red","green", "orange","yellow","blue")
barplot(as.matrix(data), main="  Educational Institutions in Delhi",
xlab="Years",ylab = "Number of Students",ylim=c(0,3800),
 cex.lab = 0.8, cex.main = 1.1, beside=TRUE, col=colours)
legend("topleft", c("Sr. Secondary","Secondary","Middle","Primary","Pre Primary"), cex=0.75,
       bty="n", fill=colours)
```



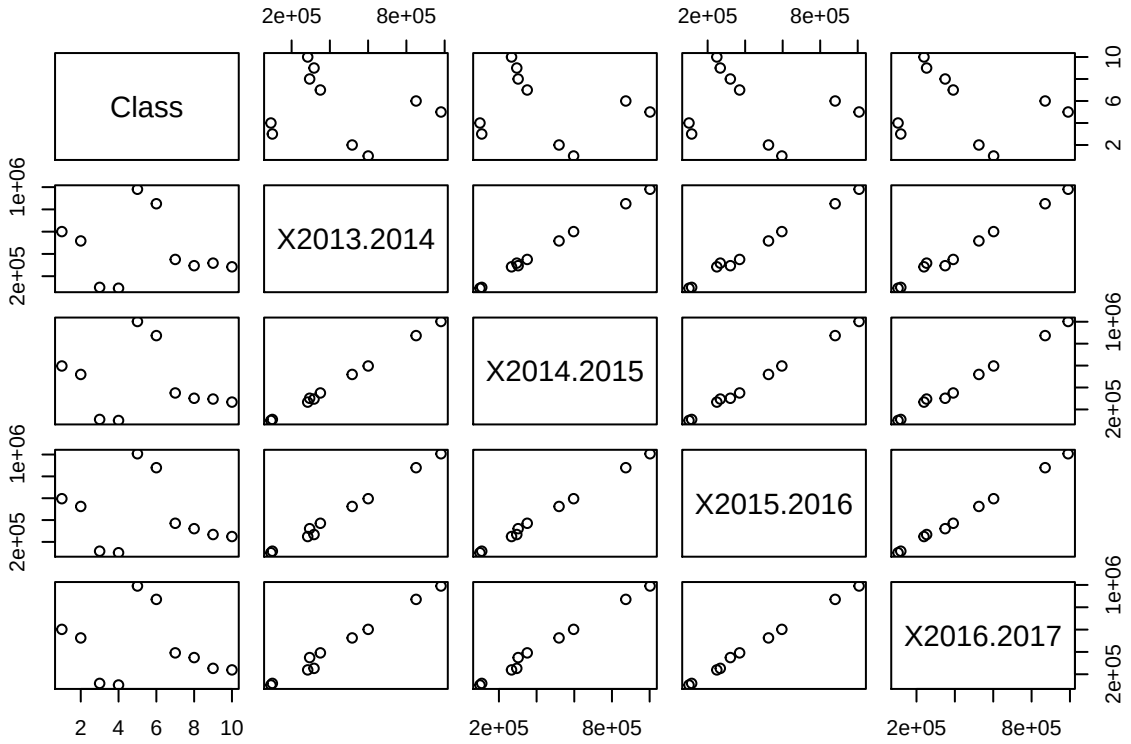
Analysis

We are analyzing strength of students in schools and universities and the amount of students available to one teacher.

```
summary(ss)
```

```
##                     Class     X2013.2014       X2014.2015       X2015.2016
##  Middle School(B)      :1   Min.   : 91722   Min.   :  99247   Min.   : 100715
##  Middle School(G)      :1   1st Qu.:286664   1st Qu.: 273932   1st Qu.: 253628
##  Pre Primary School(B):1   Median :333758   Median : 326072   Median : 345840
##  Pre Primary School(G):1   Mean   :438569   Mean   : 441302   Mean   : 443084
##  Primary School(B)     :1   3rd Qu.:579450   3rd Qu.: 577092   3rd Qu.: 577792
##  Primary School(G)     :1   Max.   :980954   Max.   :1002103   Max.   :1007287
##  (Other)               :4
##    X2016.2017
##  Min.   :103889
##  1st Qu.:242473
##  Median :370466
##  Mean   :444333
##  3rd Qu.:582871
##  Max.   :990510
##
```

```
plot(ss)
```



Summary

From the above report we can summarize that:

- Pre primary schools decreased form 51 in year 2011 to 35 in year 2016.
- Most of our students are in Primary Schools approx. more than 2500 in every considering year.
- Ratio of College Student to Professor is very high. This ratio should be reduced.
- Colleges for Professional Education(Co-Edn) are maximum in Delhi i.e. 94 in year 2016.

11. Green Coverage

A forest is a large area dominated by trees. Hundreds of more precise definitions of forest are used throughout the world, incorporating factors such as tree density, tree height, land use, legal standing and ecological function. According to the widely used Food and Agriculture Organization definition, forests covered 4 billion hectares (9.9×109 acres) (15 million square miles) or approximately 30 percent of the world's land area in 2006.

Forests are the dominant terrestrial ecosystem of Earth, and are distributed around the globe. Forests account for 75% of the gross primary production of the Earth's biosphere, and contain 80% of the Earth's plant biomass. Net primary production is estimated at 21.9 gigatonnes carbon per year for tropical forests, 8.1 for temperate forests, and 2.6 for boreal forests.

Forests at different latitudes and elevations form distinctly different ecozones: boreal forests around the poles, tropical forests around the Equator, and temperate forests at the middle latitudes. Higher elevation areas tend to support forests similar to those at higher latitudes, and amount of precipitation also affects forest composition.

Human society and forests influence each other in both positive and negative ways.[8] Forests provide ecosystem services to humans and serve as tourist attractions. Forests can also affect people's health. Human activities, including harvesting forest resources, can negatively affect forest ecosystems.[11]

This report is based on 3 parameters of **Delhi**:

- Forest cover
- Average temperature
- Pollution parameters

Table

Here is the tabulation data:

Reserved forest in Delhi:

The following data has been taken from the link [12]

```
forest=read.csv("Forest(Statistics).csv")
forest
```

```
##                 Ridge.Forest Area Proportion
## 1      Northern Ridge Forest   87       1.13
## 2       Central Ridge Forest  864      11.10
## 3 South-Central Ridge Forest  626       8.05
## 4      Southern Ridge Forest 6200      79.72
```

Temperature PERIOD: 1981-2010:

The following data has been taken from the link [13]

```
temp=read.csv("Temperature(Statistics).csv")
temp
```

```
##    Month Daily.Min. Daily.Max
## 1    Jan        7.3      20.4
## 2    Feb       10.2      24.1
## 3    Mar       15.1      29.9
## 4    Apr       21.4      37.1
## 5    May       23.0      40.3
## 6    Jun       27.7      39.9
```

```
## 7    Jul       27.0      35.9
## 8    Aug       26.2      34.4
## 9    Sep       24.7      34.7
## 10   Oct       19.5      33.4
## 11   Nov       13.6      28.5
## 12   Dec        8.8      22.8
```

Pollution parameter:

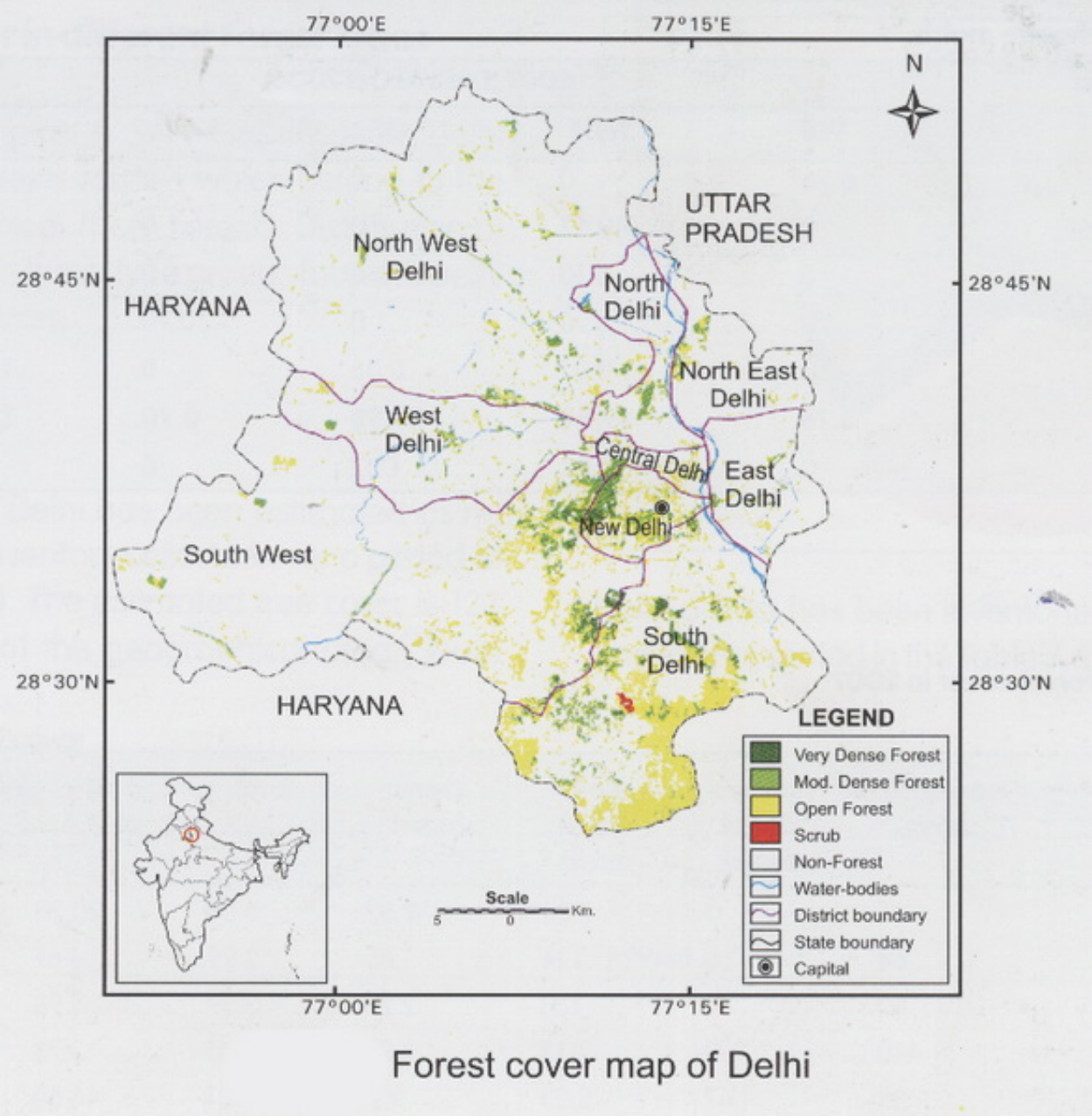
The following data has been taken from the link [14]

```
pollution=read.csv("Pollution(Statistics).csv")
pollution
```

```
##    Particles.ug.m.3. X2014 X2015 X2016 X2017
## 1           SO2(Min)     4     4     4     4
## 2           SO2(Max)     4     8    39    30
## 3           SO2(Avg)     4     4     5     7
## 4           NO2(Min)    20    29    28    21
## 5           NO2(Max)    57   207   155   143
## 6           NO2(Avg)    39   106    52    53
## 7        PM<=10(Min)   105    50   152    39
## 8        PM<=10(Max)   615   595   772   814
## 9        PM<=10(Avg)   209   189   319   252
## 10      PM<=2.5(Min)    29    27    13    19
## 11      PM<=2.5(Max)   189   236   286   232
## 12      PM<=2.5(Avg)    84    89   102   103
```

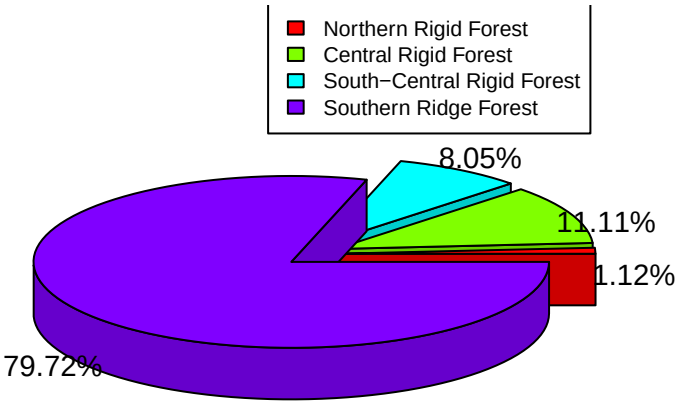
Visualization

Here is the image of Forest Cover of Delhi [15]:



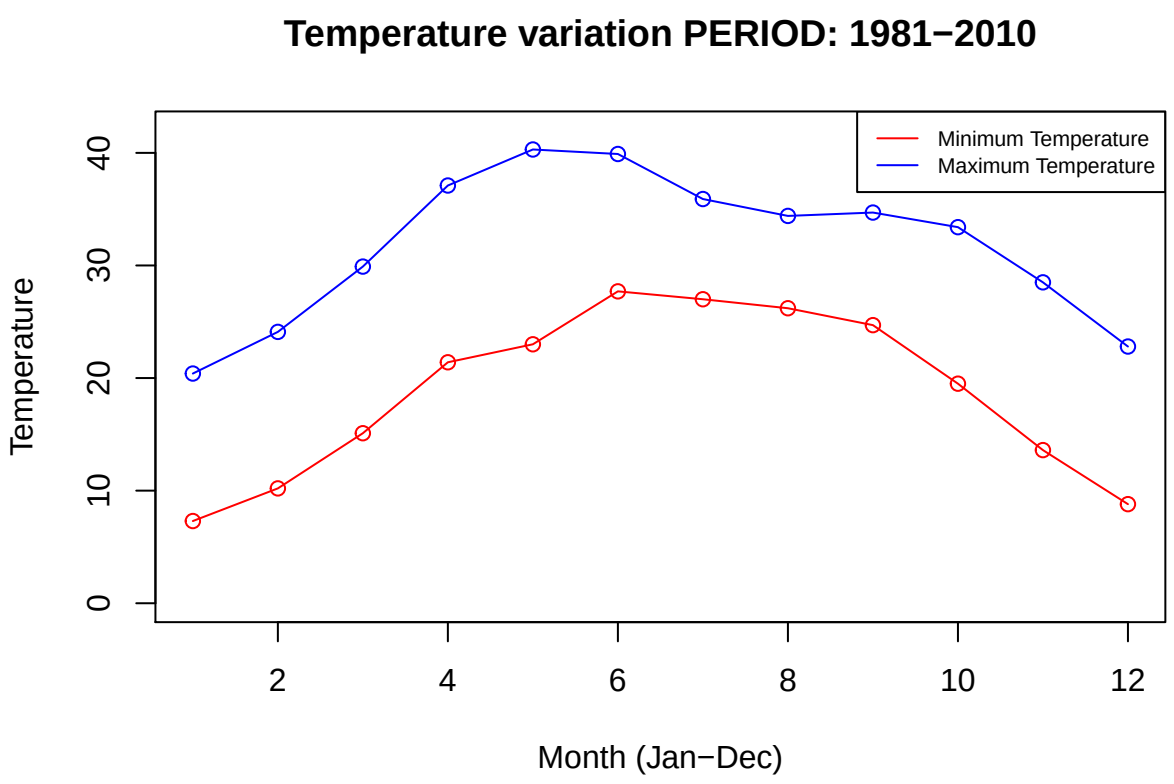
Forest Distribution:

```
library(plotrix)

a1=c(forest$Area)
piepercent<- round(100*a1/sum(a1),2)
lbls1=paste(piepercent,"%",sep="")
pie3D(a1,labels=lbls1,explode=0.1,labelcex=0.9,main="Forest area distribution",col=rainbow(length(a1)))
legend("topright", c("Northern Rigid Forest","Central Rigid Forest","South-Central Rigid Forest",
"Southern Ridge Forest"), cex = 0.63,fill = rainbow(length(piepercent)))
```



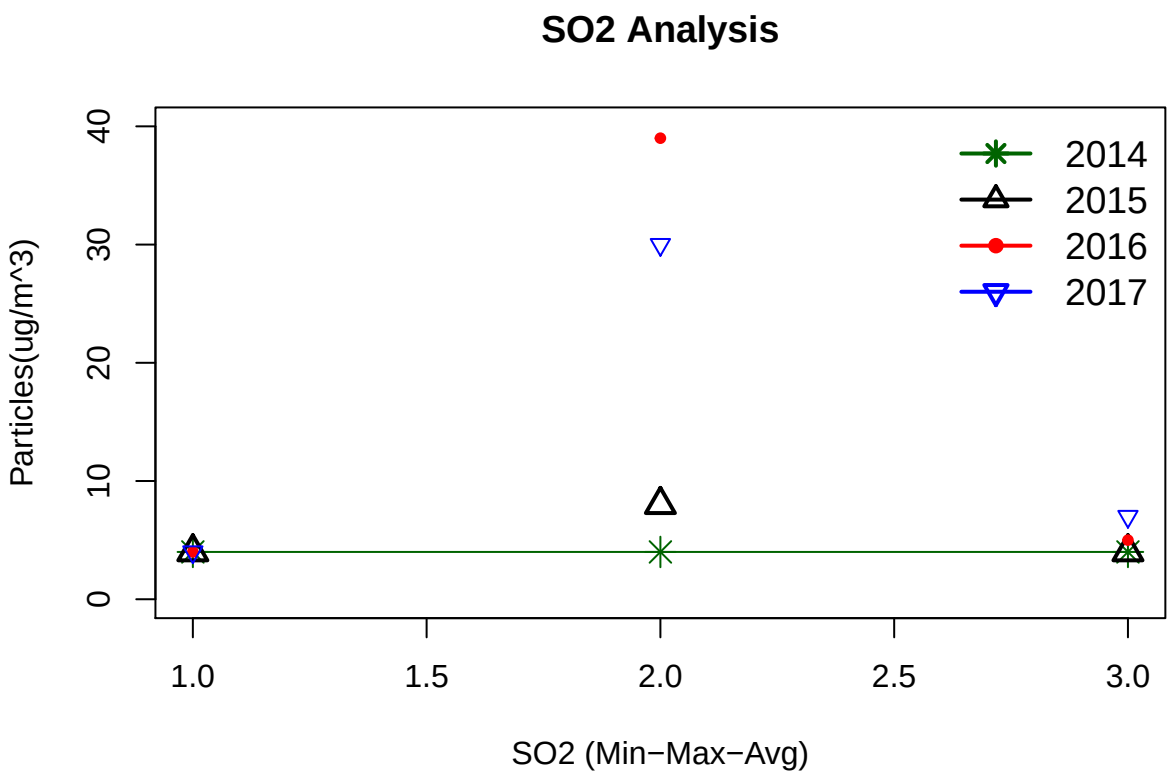
Temperature variation over past years:

```
Min=temp$Daily.Min.
Max=temp$Daily.Max
plot(Min,type = "o", col = "red", xlab = "Month (Jan-Dec)", ylab = "Temperature",ylim=c(0,42),
     main = "Temperature variation PERIOD: 1981-2010")
lines(Max, type = "o", col = "blue")
legend("topright", c("Minimum Temperature","Maximum Temperature"),cex = 0.7,col=c("red","blue"),lty=1)
```

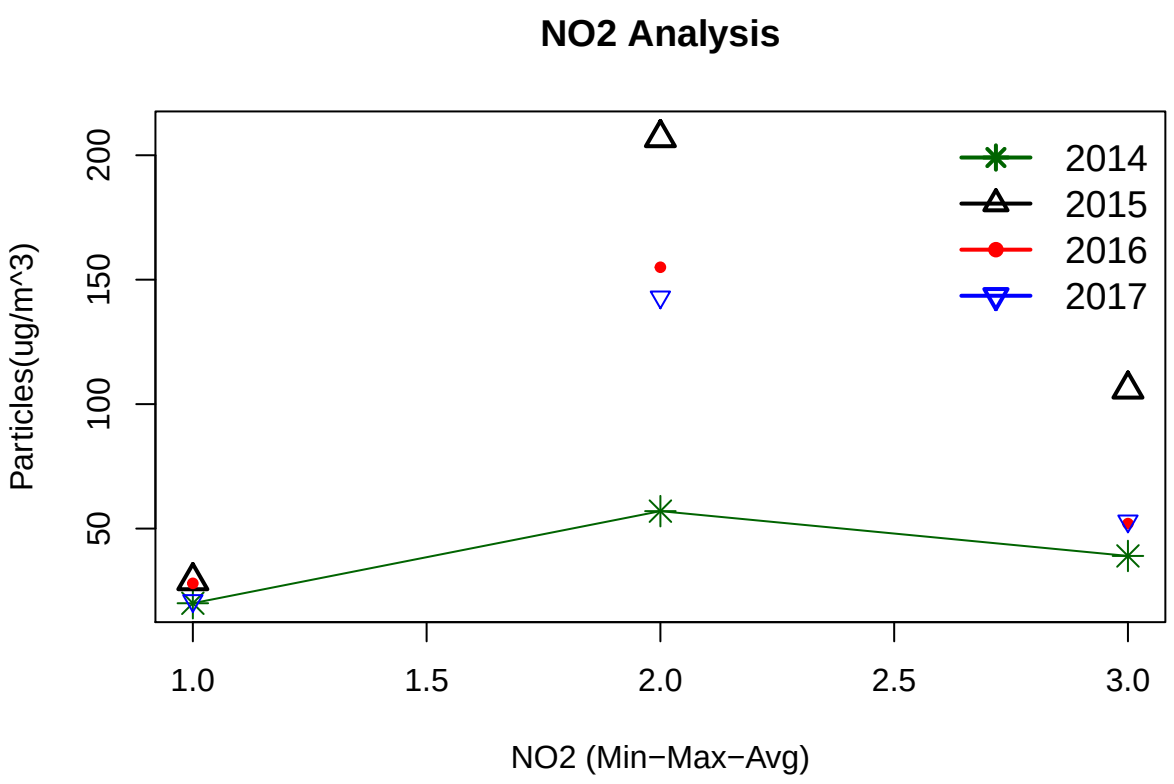


Pollution variation over past years:

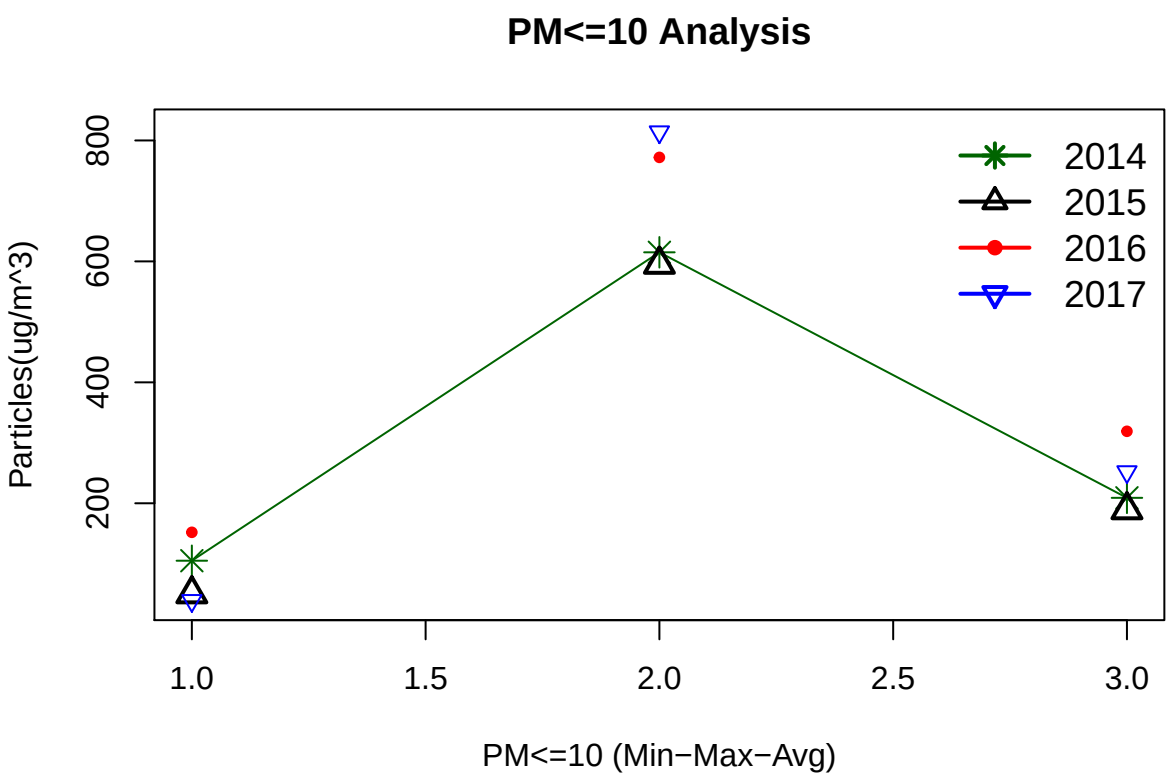
```
#par(mfrow=c(2,2))
p=pollution$X2014[1:3]
q=pollution$X2015[1:3]
r=pollution$X2016[1:3]
s=pollution$X2017[1:3]
plot(p,type="o",xlab="SO2 (Min-Max-Avg)",ylab="Particles(ug/m^3)",main="SO2 Analysis",pch=8,
ylim=c(0,40),col="darkgreen", cex=1.5)
points(q, pch = 2, cex=1.5, lwd=2)
points(r,pch=20,col="red")
points(s,pch=25,col="blue")
legend("topright", legend = c("2014","2015","2016","2017"), bty = "n",lwd = 2, cex = 1.2,
col = c("darkgreen","black","red","blue"),pch = c(8,2,20,25))
```



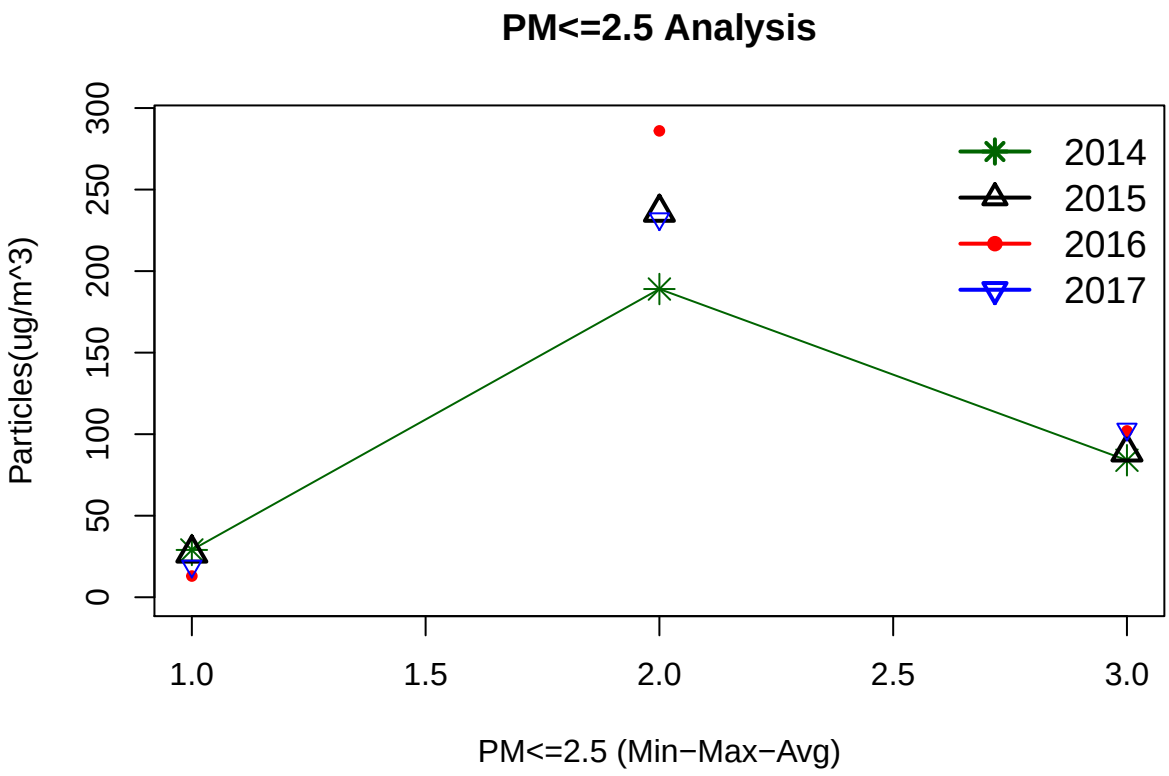

```
p=pollution$X2014[4:6]
q=pollution$X2015[4:6]
r=pollution$X2016[4:6]
s=pollution$X2017[4:6]
plot(p,type="o",xlab="NO2 (Min-Max-Avg)",ylab="Particles(ug/m^3)",main="NO2 Analysis",pch=8,
     ylim=c(20,210),col="darkgreen", cex=1.5)
points(q, pch = 2, cex=1.5, lwd=2)
points(r,pch=20,col="red")
points(s,pch=25,col="blue")
legend("topright", legend = c("2014","2015","2016","2017"), bty = "n",lwd = 2, cex = 1.2,
       col = c("darkgreen","black","red","blue"),pch = c(8,2,20,25))
```




```
p=pollution$X2014[7:9]
q=pollution$X2015[7:9]
r=pollution$X2016[7:9]
s=pollution$X2017[7:9]
plot(p,type="o",xlab="PM<=10 (Min-Max-Avg)",ylab="Particles(ug/m^3)",main="PM<=10 Analysis",pch=8,
     ylim=c(38,820),col="darkgreen", cex=1.5)
points(q, pch = 2, cex=1.5, lwd=2)
points(r,pch=20,col="red")
points(s,pch=25,col="blue")
legend("topright", legend = c("2014","2015","2016","2017"), bty = "n",lwd = 2, cex = 1.2,
       col = c("darkgreen","black","red","blue"),pch = c(8,2,20,25))
```




```
p=pollution$X2014[10:12]
q=pollution$X2015[10:12]
r=pollution$X2016[10:12]
s=pollution$X2017[10:12]
plot(p,type="o",xlab="PM<=2.5 (Min-Max-Avg)",ylab="Particles(ug/m^3)",main="PM<=2.5 Analysis",pch=8,
     ylim=c(0,290),col="darkgreen", cex=1.5)
points(q, pch = 2, cex=1.5, lwd=2)
points(r,pch=20,col="red")
points(s,pch=25,col="blue")
legend("topright", legend = c("2014","2015","2016","2017"), bty = "n",lwd = 2, cex = 1.2,
       col = c("darkgreen","black","red","blue"),pch = c(8,2,20,25))
```



##Analysis

We are analyzing relation between temperature, amount of forest cover left and pollutants level. Linear regression is used to compare the two variables together that how their graph is plotted, their slope (+ve or -ve) or the intercept on the axis.

```
summary(temp)
```

```
##      Month     Daily.Min.      Daily.Max
##  Apr    :1   Min.   : 7.30   Min.   :20.40
##  Aug    :1   1st Qu.:12.75   1st Qu.:27.40
##  Dec    :1   Median :20.45   Median :33.90
##  Feb    :1   Mean   :18.71   Mean   :31.78
##  Jan    :1   3rd Qu.:25.07   3rd Qu.:36.20
##  Jul    :1   Max.   :27.70   Max.   :40.30
##  (Other):6
```

```
lm(temp$Daily.Min.~temp$Daily.Max)
```

```
##
## Call:
## lm(formula = temp$Daily.Min. ~ temp$Daily.Max)
##
## Coefficients:
##    (Intercept)  temp$Daily.Max
##        -14.314           1.039
```

```
summary(pollution)
```

```
##    Particles.ug.m.3.     X2014           X2015           X2016
##  NO2(Avg)   :1       Min.   :  4.0   Min.   :  4.00   Min.   :  4.00
##  NO2(Max)   :1       1st Qu.: 16.0   1st Qu.: 22.25   1st Qu.: 24.25
##  NO2(Min)   :1       Median : 48.0   Median : 69.50   Median : 77.00
##  PM<=10(Avg):1       Mean   :113.2   Mean   :128.67   Mean   :160.58
##  PM<=10(Max):1       3rd Qu.:126.0   3rd Qu.:193.50   3rd Qu.:187.75
##  PM<=10(Min):1       Max.   :615.0   Max.   :595.00   Max.   :772.00
##  (Other)    :6
##      X2017
##  Min.   :  4.0
##  1st Qu.: 20.5
##  Median : 46.0
##  Mean   :143.1
##  3rd Qu.:165.2
##  Max.   :814.0
##
```

```
lm(pollution$X2014~pollution$X2017)
```

```
##
## Call:
## lm(formula = pollution$X2014 ~ pollution$X2017)
##
## Coefficients:
##     (Intercept)  pollution$X2017
##          6.3827           0.7469
```

```
lm(pollution$X2015~pollution$X2017)
```

```
##
## Call:
## lm(formula = pollution$X2015 ~ pollution$X2017)
##
## Coefficients:
##     (Intercept)  pollution$X2017
##         25.1159           0.7237
```

```
lm(pollution$X2016~pollution$X2017)
```

```
##
## Call:
## lm(formula = pollution$X2016 ~ pollution$X2017)
##
## Coefficients:
##     (Intercept)  pollution$X2017
##           24.65             0.95
```

```
data=pollution[1:12,2:5]
cor(data)
```

```
##           X2014     X2015     X2016     X2017
## X2014 1.0000000 0.9529790 0.9900017 0.9860146
## X2015 0.9529790 1.0000000 0.9672201 0.9779060
## X2016 0.9900017 0.9672201 1.0000000 0.9837749
## X2017 0.9860146 0.9779060 0.9837749 1.0000000
```

Summary

From the above report we can summarize that:

- The maximum covered forest plot is of Southern Ridge Forest which amount of 79.72 % of the total land available in Delhi.
- The amount of forest left in Northern Rigid Forest is very alarming, it is only 1.12 % of the total land available in Delhi.
- Average temperature of Delhi is increasing every year due to deforestation and other climatic changes such as global warming.
- As we can see from the correlation data there is increment in the pollutant particles, as these particles quantity depends very strongly on the previous year production.

12. Krishi Vigyan Kendra

A Krishi Vigyan Kendra (KVK) is an agricultural extension center in India. The name means "farm science center". Usually associated with a local agricultural university,these centers serve as the ultimate link between the Indian Council of Agricultural Research and farmers, and aim to apply agricultural research in a practical, localized setting. All KVKs fall under the jurisdiction of one of the 11 Agricultural Technology Application Research Institutes (ATARIs) throughout India.

On-Farm Testing: Each KVK operates a small farm to test new technologies, such as seed varieties or innovative farming methods, developed by ICAR institutes. This allows new technologies to be tested at the local level before being transferred to farmers.

Front-line Demonstration: Due to the KVK's farm and its proximity to nearby villages, it organizes programs to show the efficacy of new technologies on farmer fields.

Capacity Building: In addition to demonstrating new technologies, the KVK also hosts capacity building exercises and workshops to discuss modern farming techniques with groups of farmers.

Multi-sector Support: Offer support to various private and public initiatives through its local network and expertise. It is very common for government research institutes to leverage the network of KVKs when performing surveys with a wide range of farmers.

Advisory Services: Due to the growing use of ICT, KVKs have implemented technologies to provide farmers information, such as weather advisories or market pricing, through radio and mobile phones.

In each of these activities, the KVK focuses on crops and methods specific to the local climate and industry. Some factors which may impact this decision are: soil type, crops grown, water availability, seasonal temperatures, and allied sectors such as dairy and aquaculture. In addition to addressing local factors, KVKs are also mandated to increase adoption of practices that align with remunerative agriculture, climate smart agriculture, and dietary diversification. Some KVKs also host social activities to facilitate rapport between the institutions and the local community.[15]

This report is based on 3 parameters of **Delhi**:

- Number of farmers trained
- Different types of training
- Number of farmers covered in each training programs

Table

Here is the tabulation data:

Different types of Training:

```
prog=read.csv("Programmes(Statistics).csv")
prog
```

```
##                 Clientele Number.of.courses Male Female Total.Participants
## 1    Farmers & farm women                43  533    329                862
## 2            Rural youths                 6   91     23                114
## 3 Extension functionaries                 1    0     20                 20
## 4      Sponsored Training                 4   82     18                100
```

Number of farmers covered in each of it:

```
types=read.csv("Types(Statistics).csv")
types
```

```
##         Types.of.Training.On.Off.Campus. Male Fenale Total.Trained
## 1                        Vegetable Crops   165      0           165
## 2                                 Fruits    22      0            22
## 3  Soil Health and Fertility Management   181     41           222
## 4        Home Science/Women empowerment    10    279           289
## 5                       Plant Protection   155      9           164
## 6                           Rural Youths    91     23           114
## 7                     Extension Personnel     0     20            20
## 8          Crop production and management   99     21           120
```

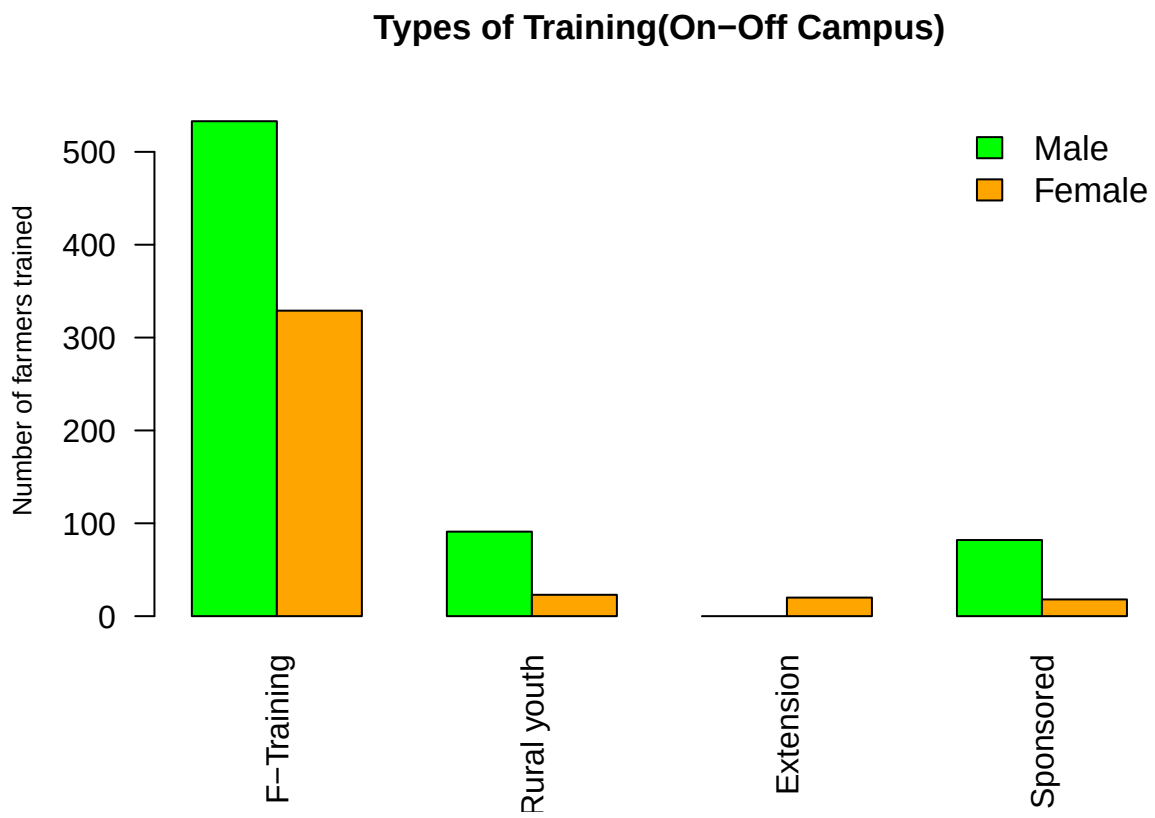
Visualization

Male vs Female in the different types of programs:

```
data=structure(list(A=c(533,329),B= c(91,23),C= c(0,20),D= c(82,18)),
.Names = c("F-Training", "Rural youth", "Extension", "Sponsored"),
class = "data.frame",row.names = c(NA, 2))
attach(data)
print(data)
```

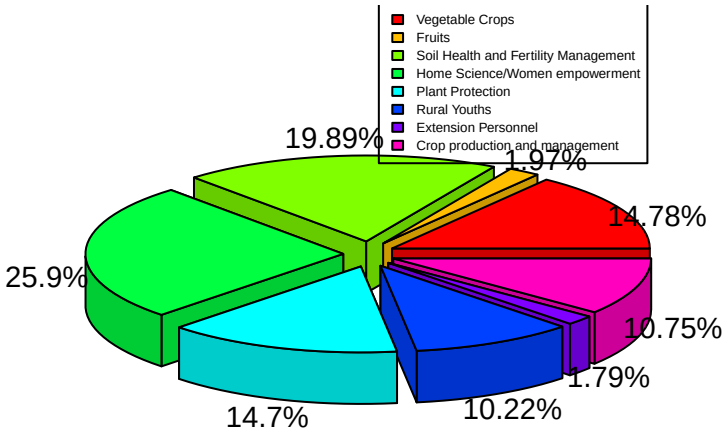
```
##   F-Training Rural youth Extension Sponsored
## 1        533          91         0        82
## 2        329          23        20        18
```

```
colours <- c("green", "orange")
barplot(as.matrix(data), main="Types of Training(On-Off Campus)",
ylab = "Number of farmers trained",
ylim=c(0,550), cex.lab = 0.8, cex.main = 1.1, beside=TRUE, col=colours,las=2)
legend("topright", c("Male","Female"), cex=1.1, bty="n", fill=colours)
```



Proportions of people present in different programs:

```
library(plotrix)

a1=c(types$Total.Trained)
piepercent<- round(100*a1/sum(a1),2)
lbls1=paste(piepercent,"%",sep="")
pie3D(a1,labels=lbls1,labelcex=0.9,explode=0.1,main="Proportion of trainee distribution",col=rainbow(le
legend("topright", c("Vegetable Crops","Fruits","Soil Health and Fertility Management",
"Home Science/Women empowerment","Plant Protection","Rural Youths","Extension Personnel","Crop producti
```



Analysis

We are analyzing the involvement of farmers in various training programs.

```
summary(types)
```

```
##                        Types.of.Training.On.Off.Campus.      Male
##   Extension Personnel                    :1               Min.   :  0.00
##   Home Science/Women empowerment         :1               1st Qu.: 19.00
##   Plant Protection                       :1               Median : 95.00
##   Rural Youths                           :1               Mean   : 90.38
##   Soil Health and Fertility Management   :1               3rd Qu.:157.50
##   Vegetable Crops                        :1               Max.   :181.00
##  (Other)                                 :2
##      Fenale       Total.Trained
##  Min.   :  0.00   Min.   : 20.0
##  1st Qu.:  6.75   1st Qu.: 91.0
##  Median : 20.50   Median :142.0
##  Mean   : 49.12   Mean   :139.5
##  3rd Qu.: 27.50   3rd Qu.:179.2
##  Max.   :279.00   Max.   :289.0
##
```

Summary

From the above report we can summarize that:

- Women involvement in the training programs is very less.
- **Farmers-farm women** training program is pretty famous for both male in female in Delhi.
- Extension functionaries is the least favorable program in Krishi Vigyan Kendra. It needs a serious improvement to attract trainee.
- Home Science/Women empowerment has the maximum number of trained trainees i.e. 289.

13. Vehicles

This report is based on number of light and heavy motor vehicles in **Delhi**.

Table

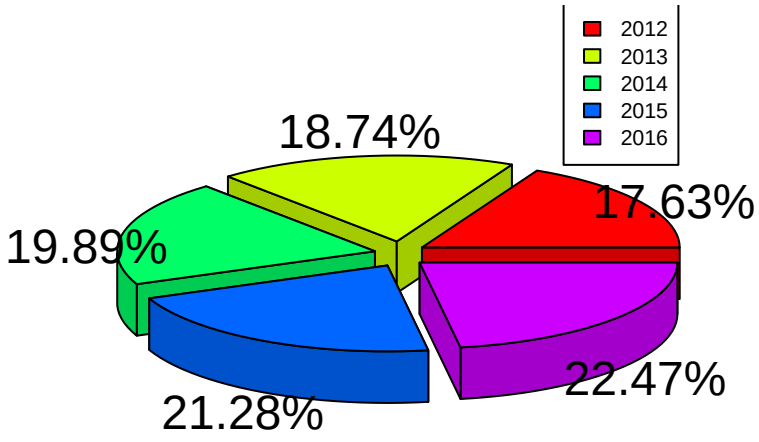
Here is the tabulation data:

```
vehicles=read.csv("Vehicles(Statistics).csv")
vehicles
```

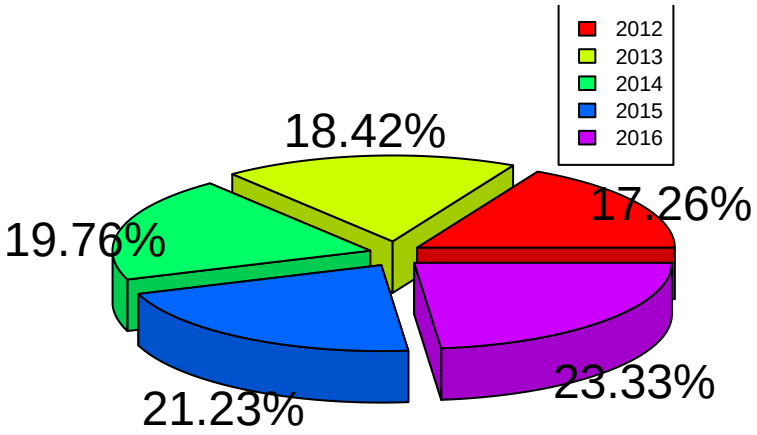
```
##         Name.of.the.Vehicle X2012.13 X2013.14 X2014.15 X2015.16 X2016.17
## 1            Cars and Jeeps  2474087  2629343  2790566  2986579  3152710
## 2 Motor Cycles and Scooters  4962507  5297697  5681265  6104070  6707891
## 3            Auto Rickshaws    86838    91840    81633   198137   174000
## 4                     Taxis    70335    78686    79606    91073   148434
## 5                    Buses*    39694    40947    32540    43723    38265
## 6       Goods Vehicles etc.   140942   154654   161821   281159   231767
## 7               E-Rickshaws        0        0        0        0    29690
```

Visualization

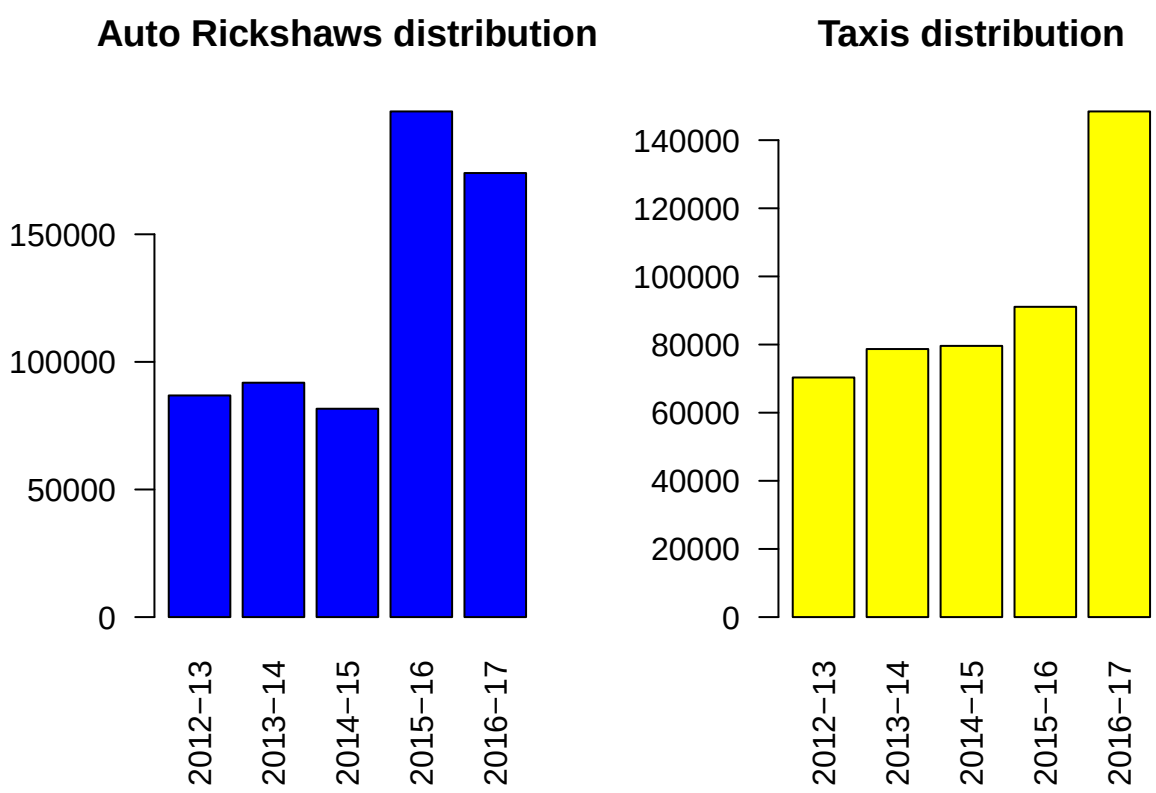
```
#Load Package--->plotrix
library(plotrix)

data1=vehicles[1,2:6]
a1=c(data1[1,1],data1[1,2],data1[1,3],data1[1,4],data1[1,5])
piepercent<- round(100*a1/sum(a1),2)
lbls1=paste(piepercent,"%",sep="")
pie3D(a1,labels=lbls1,explode=0.1,main="Car&Jeep distribution",col=rainbow(length(a1)))
legend("topright", c("2012","2013","2014","2015","2016"), cex = 0.65,fill = rainbow(length(piepercent)))
```



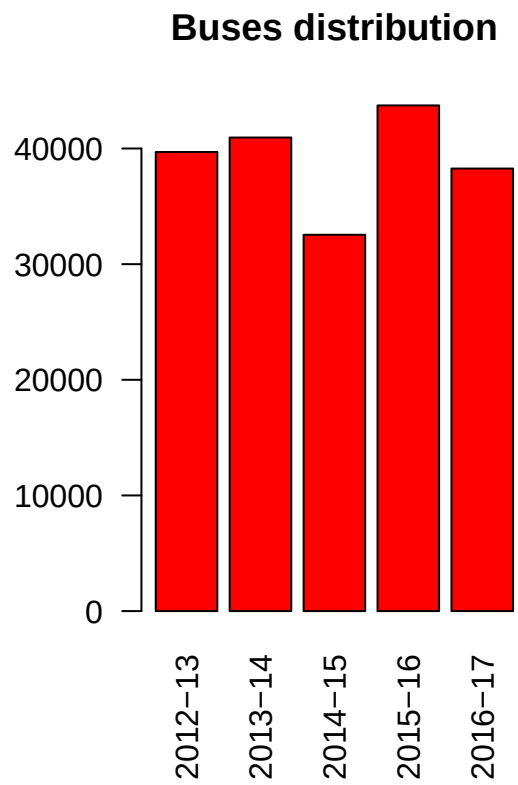

```
data2=vehicles[2,2:6]
a2=c(data2[1,1],data2[1,2],data2[1,3],data2[1,4],data2[1,5])
piepercent<- round(100*a2/sum(a2),2)
lbls1=paste(piepercent,"%",sep="")
pie3D(a2,labels=lbls1,explode=0.1,main="Two wheeler distribution",col=rainbow(length(a2)))
legend("topright", c("2012","2013","2014","2015","2016"), cex = 0.65,fill = rainbow(length(piepercent)))
```

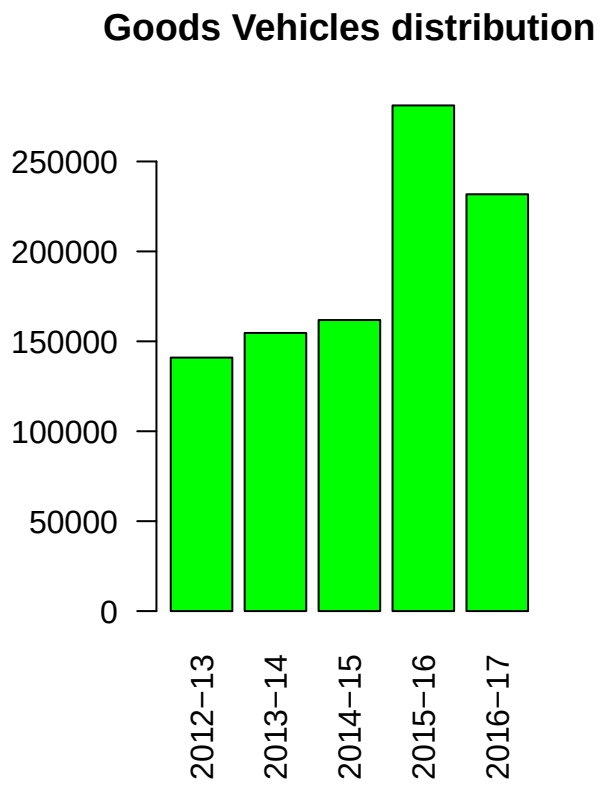



```
par(mfrow=c(1,2))
data3=vehicles[3,2:6]
H <- c(data3[1,1],data3[1,2],data3[1,3],data3[1,4],data3[1,5])
M <- c("2012-13","2013-14","2014-15","2015-16","2016-17")
barplot(H,names.arg = M,col="blue",
        main="Auto Rickshaws distribution",las=2)

data4=vehicles[4,2:6]
H <- c(data4[1,1],data4[1,2],data4[1,3],data4[1,4],data4[1,5])
M <- c("2012-13","2013-14","2014-15","2015-16","2016-17")
barplot(H,names.arg = M,col="yellow",
        main="Taxis distribution",las=2)
```




```
data5=vehicles[5,2:6]
H <- c(data5[1,1],data5[1,2],data5[1,3],data5[1,4],data5[1,5])
M <- c("2012-13","2013-14","2014-15","2015-16","2016-17")
barplot(H,names.arg = M,col="red",main="Buses distribution",las=2)

data6=vehicles[6,2:6]
H <- c(data6[1,1],data6[1,2],data6[1,3],data6[1,4],data6[1,5])
M <- c("2012-13","2013-14","2014-15","2015-16","2016-17")
barplot(H,names.arg = M,col="green",
        main="Goods Vehicles distribution",las=2)
```





Analysis

We are analyzing the number and type of vehicles in Delhi and how they are related to past years.

```
summary(vehicles)
```

```
##                 Name.of.the.Vehicle    X2012.13          X2013.14
##  Auto Rickshaws            :1        Min.   :      0   Min.   :      0
##  Buses*                    :1        1st Qu.:  55014   1st Qu.:  59816
##  Cars and Jeeps            :1        Median :  86838   Median :  91840
##  E-Rickshaws               :1        Mean   :1110629   Mean   :1184738
##  Goods Vehicles etc.       :1        3rd Qu.:1307514   3rd Qu.:1391998
##  Motor Cycles and Scooters:1         Max.   :4962507   Max.   :5297697
##  Taxis                     :1
##     X2014.15          X2015.16          X2016.17
##  Min.   :      0   Min.   :      0   Min.   :  29690
##  1st Qu.:  56073   1st Qu.:  67398   1st Qu.:  93350
##  Median :  81633   Median : 198137   Median : 174000
##  Mean   :1261062   Mean   :1386392   Mean   :1497537
##  3rd Qu.:1476194   3rd Qu.:1633869   3rd Qu.:1692238
##  Max.   :5681265   Max.   :6104070   Max.   :6707891
##
```

```
#plot(vehicles)
data=vehicles[1:7,2:6]
# Correlation of how types of vechiles are related to past years
```

```r
cor(data)
```

```
##           X2012.13  X2013.14  X2014.15  X2015.16  X2016.17
## X2012.13 1.0000000 0.9999971 0.9999750 0.9997422 0.9995287
## X2013.14 0.9999971 1.0000000 0.9999883 0.9997716 0.9995946
## X2014.15 0.9999750 0.9999883 1.0000000 0.9997832 0.9996943
## X2015.16 0.9997422 0.9997716 0.9997832 1.0000000 0.9997154
## X2016.17 0.9995287 0.9995946 0.9996943 0.9997154 1.0000000
```

Summary

From the above report we can summarize that:

- As from the correlation table, we can analyse that number of vehicles every year depends mainly on the previous year vehicle data. Since the correlated value is very close to one.
- The number of vehicles are increasing every year.
- The number of taxis has been vastly increased from year 2015-16 to 2016-17 (i.e. 1,48,434 taxis available).
- There is also E-Rickshaws available from the year 2016-17.
- The maximum number of vehicles that runs on road in Delhi are of category motor cycles and scooters.

14. Usage of Computing Devices

Telecommunication is the transmission of signs, signals, messages, words, writings, images and sounds or information of any nature by wire, radio, optical or other electromagnetic systems. Telecommunication occurs when the exchange of information between communication participants includes the use of technology. It is transmitted through a transmission media, such as over physical media, for example, over electrical cable, or via electromagnetic radiation through space such as radio or light. Such transmission paths are often divided into communication channels which afford the advantages of multiplexing. Since the Latin term communicatio is considered the social process of information exchange, the term telecommunications is often used in its plural form because it involves many different technologies.[17]

This report is based on 3 parameters of **Delhi**:

- Number of internet connections - broadband connections
- Mobile connections

Table

Here is the tabulation data:

Number of internet connections- broadband connections and mobile connections:

```
bc=read.csv("Broadband_Connections(Statistics).csv")
bc
```

```
##    Year Total Wireline Wireless Rural Urban Public Private
## 1  2008 18.70     2.42    16.28  0.00 18.70   3.18   15.52
## 2  2009 24.50     2.52    21.98  0.00 24.50   3.59   20.92
## 3  2010 31.01     2.71    28.30  0.34 30.67   3.94   27.07
## 4  2011 41.66     2.84    38.82  1.10 40.56   4.19   37.47
## 5  2012 45.40     2.91    42.49  1.78 43.63   4.45   40.95
## 6  2013 43.39     2.96    40.43  2.13 41.25   4.19   39.20
## 7  2014 45.69     3.10    42.58  2.37 43.32   3.91   41.78
## 8  2015 49.33     3.14    46.19  2.22 47.11   3.96   45.37
## 9  2016 50.42     3.17    47.24  2.26 48.16   3.93   46.48
## 10 2017 56.57     3.22    53.35  2.54 54.03   3.93   52.65
```

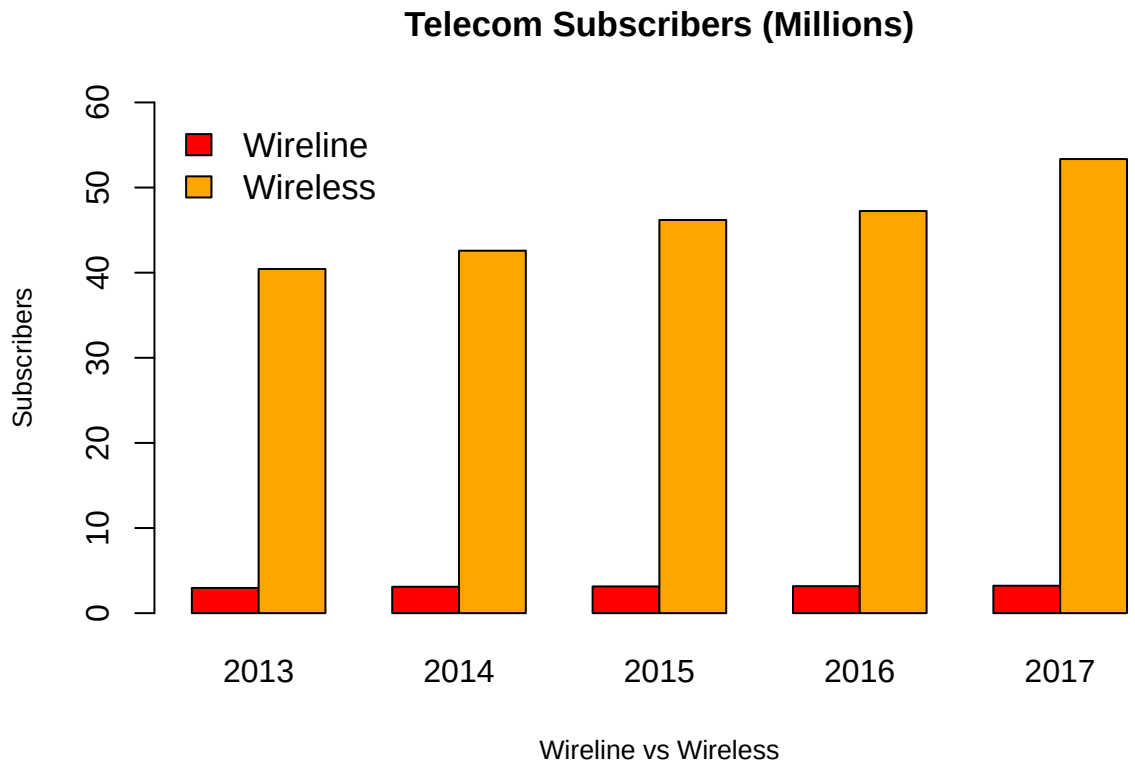
Visualization

Comparing broadband vs mobile network:

```
data=structure(list(A=c(2.96,40.43),B= c(3.10,42.58),C= c(3.14,46.19),D= c(3.17,47.24),E= c(3.22,53.35))
.Names = c("2013", "2014", "2015", "2016","2017"), class = "data.frame",row.names = c(NA, 2))
attach(data)
```

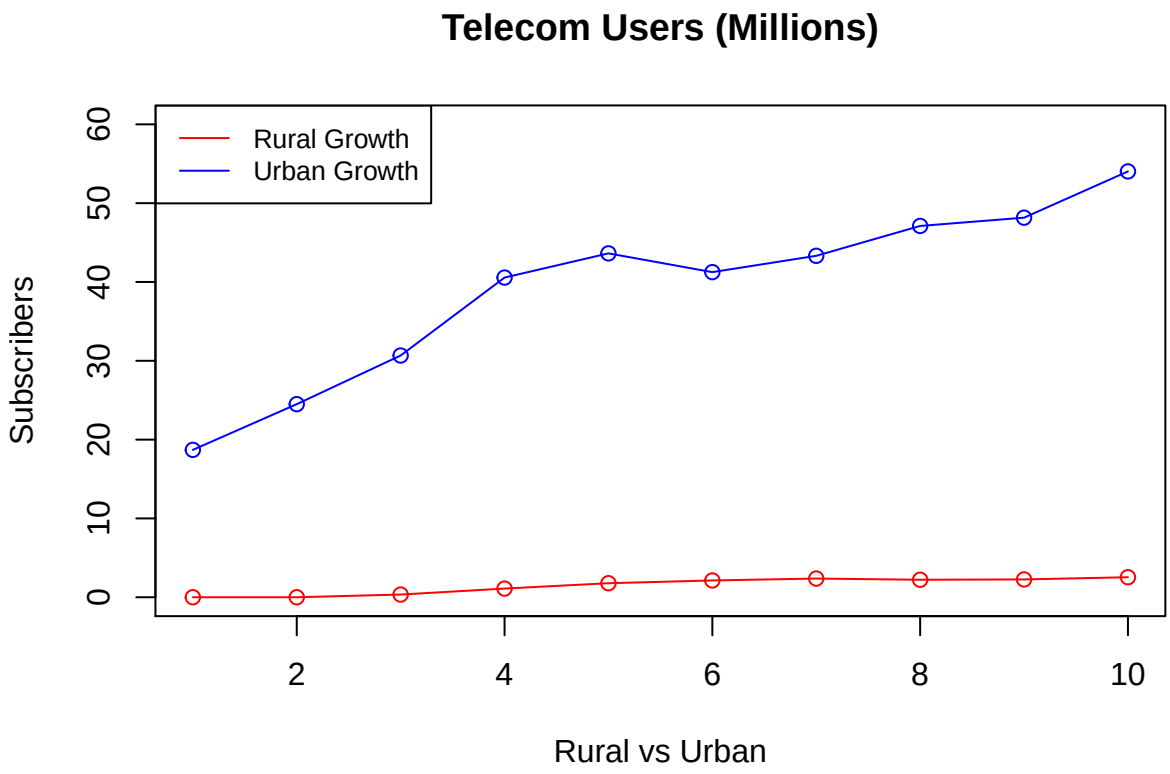
```
## The following objects are masked from data (pos = 7):
##
##     2013, 2014, 2015, 2016, 2017
```

```
colours <- c("red", "orange")
barplot(as.matrix(data), main="Telecom Subscribers (Millions)",
xlab="Wireline vs Wireless",ylab = "Subscribers",ylim=c(0,60), cex.lab = 0.8, cex.main = 1.1,

beside=TRUE, col=colours)
legend("topleft", c("Wireline","Wireless"), cex=1.1, bty="n", fill=colours)
```



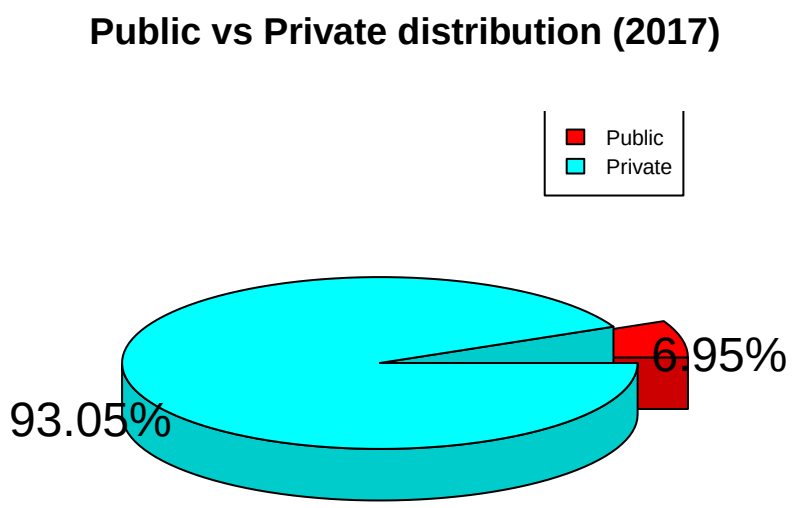
Comparing the rural and urban growth in telecom sector:

```
R=bc$Rural
U=bc$Urban
plot(R,type = "o", col = "red", xlab = "Rural vs Urban", ylab = "Subscribers",ylim=c(0,60),main = "Tele
lines(U, type = "o", col = "blue")
legend("topleft", c("Rural Growth","Urban Growth"),cex = 0.85,col=c("red","blue"),lty=1)
```



Public vs private network usage in 2017:

```
library(plotrix)

a1=c(3.93,52.65)
piepercent<- round(100*a1/sum(a1),2)
lbls1=paste(piepercent,"%",sep="")
pie3D(a1,labels=lbls1,explode=0.1,main="Public vs Private distribution (2017)",cex=1.5,col=rainbow(leng
legend("topright", c("Public","Private"), cex = 0.7,fill = rainbow(length(piepercent)))
```



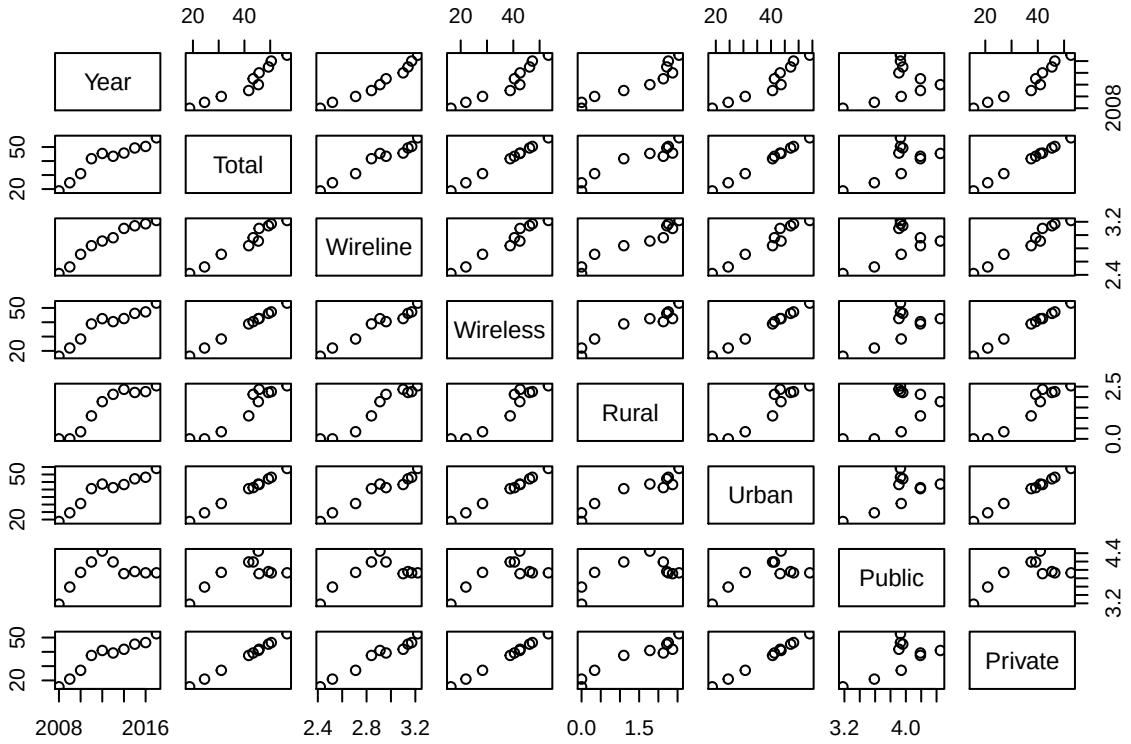
Analysis

We are analyzing the linear regression between wired and wireless connection, amount of rural and urban connections and the private and public owned connections. Scatter plot is used here to observe the pattern of all the variables in a single plot.

```
summary(bc)
```

```
##       Year          Total          Wireline       Wireless         Rural
##  Min.   :2008   Min.   :18.70   Min.   :2.420   Min.   :16.28   Min.   :0.000
##  1st Qu.:2010   1st Qu.:33.67   1st Qu.:2.743   1st Qu.:30.93   1st Qu.:0.530
##  Median :2012   Median :44.40   Median :2.935   Median :41.46   Median :1.955
##  Mean   :2012   Mean   :40.67   Mean   :2.899   Mean   :37.77   Mean   :1.474
##  3rd Qu.:2015   3rd Qu.:48.42   3rd Qu.:3.130   3rd Qu.:45.29   3rd Qu.:2.250
##  Max.   :2017   Max.   :56.57   Max.   :3.220   Max.   :53.35   Max.   :2.540
##      Urban           Public         Private
##  Min.   :18.70   Min.   :3.180   Min.   :15.52
##  1st Qu.:33.14   1st Qu.:3.915   1st Qu.:29.67
##  Median :42.28   Median :3.935   Median :40.08
##  Mean   :39.19   Mean   :3.927   Mean   :36.74
##  3rd Qu.:46.24   3rd Qu.:4.133   3rd Qu.:44.47
##  Max.   :54.03   Max.   :4.450   Max.   :52.65
```

```
plot(bc)
```



Linear regression is used to compare the two variables together that how their graph is plotted, their slope (+ve or -ve) or the intercept on the axis.

```
lm(bc$Wireline~bc$Wireless)
```

```
##
## Call:
## lm(formula = bc$Wireline ~ bc$Wireless)
##
## Coefficients:
## (Intercept)  bc$Wireless
##     2.03471      0.02289
```

```
lm(bc$Rural~bc$Urban)
```

```
##
## Call:
## lm(formula = bc$Rural ~ bc$Urban)
##
## Coefficients:
## (Intercept)     bc$Urban
##    -1.90868      0.08631
```

```
lm(bc$Public~bc$Private)
```

```
##
## Call:
## lm(formula = bc$Public ~ bc$Private)
##
```

```
## Coefficients:
## (Intercept)   bc$Private
##     3.21978      0.01925
```

```
sprintf("Let's see the correlation between Rural and Urban telecom subscribers")
```

```
## [1] "Let's see the correlation between Rural and Urban telecom subscribers"
```

```
data=bc[1:10,5:6]
# Correlation data between rural and urban network connections
cor(data)
```

```
##           Rural     Urban
## Rural 1.0000000 0.9393671
## Urban 0.9393671 1.0000000
```

Summary

From the above report we can summarize that:

- People in Delhi believe more in private network facilities which accounts to 93.05 % of the total telecom users and the remaining 6.95 % are public distributors.
- Progress of wired network subscribers is stagnant over the past years whereas the wireless network has spread like forest fire from 16.28 million in year 2008 to 53.35 million in year 2017.
- From the above correlation data, we can see that rural and urban subscribers are closely related to each other.
- For the telecom subscribers the growth for the rural part is stagnant whereas the urban growth is increasing very fast over the years.

Reference

1. GDDP reference–>http://economictimes.indiatimes.com/
2. Fair Price Shops–>https://www.urbanpro.com/
3. Courts data tables–>http://delhi.gov.in/
4. Electricity in Delhi–>https://en.wikipedia.org/
5. Healthcare–>https://en.wikipedia.org/
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15. Forest cover image of Delhi–>http://fsi.nic.in/
16. Krishi Vigyan Kendra–>https://en.wikipedia.org/
17. Using of telecom services–>https://en.wikipedia.org/