

POVERTY DATA ANALYSIS

Probability & Statistics Assignment

Semester II

BSc.FY Data Science

PARTICIPANTS:

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Poverty in India

As India is one of the fastest-growing economies in the world, poverty is on the decline in the country, with close to 18 Indians escaping extreme poverty every minute, as per the World Poverty Clock. India has 86.8 million people living in extreme poverty which makes up ~6% of its total population. According to United Nations Development Programme Administrator Achim Steiner, India lifted 271 million people out of poverty in a 10-year time period from 2005/06 to 2015/16. Inside India, both income-based poverty definition and consumption-based poverty statistics are in use.

The World Bank has been revising its definition and benchmarks to measure poverty since 1990-1991, with a \$0.2 per day income on purchasing power parity basis as the definition in use from 2005 to 2013. Some semi-economic and non-economic indices have also been proposed to measure poverty in India.

Each state in India has its own poverty threshold to determine how many people are below its poverty line and to reflect regional economic conditions. These differences in definitions yield a complex and conflicting picture about poverty in India, both internally and when compared to other developing countries of the world.

Sample Data

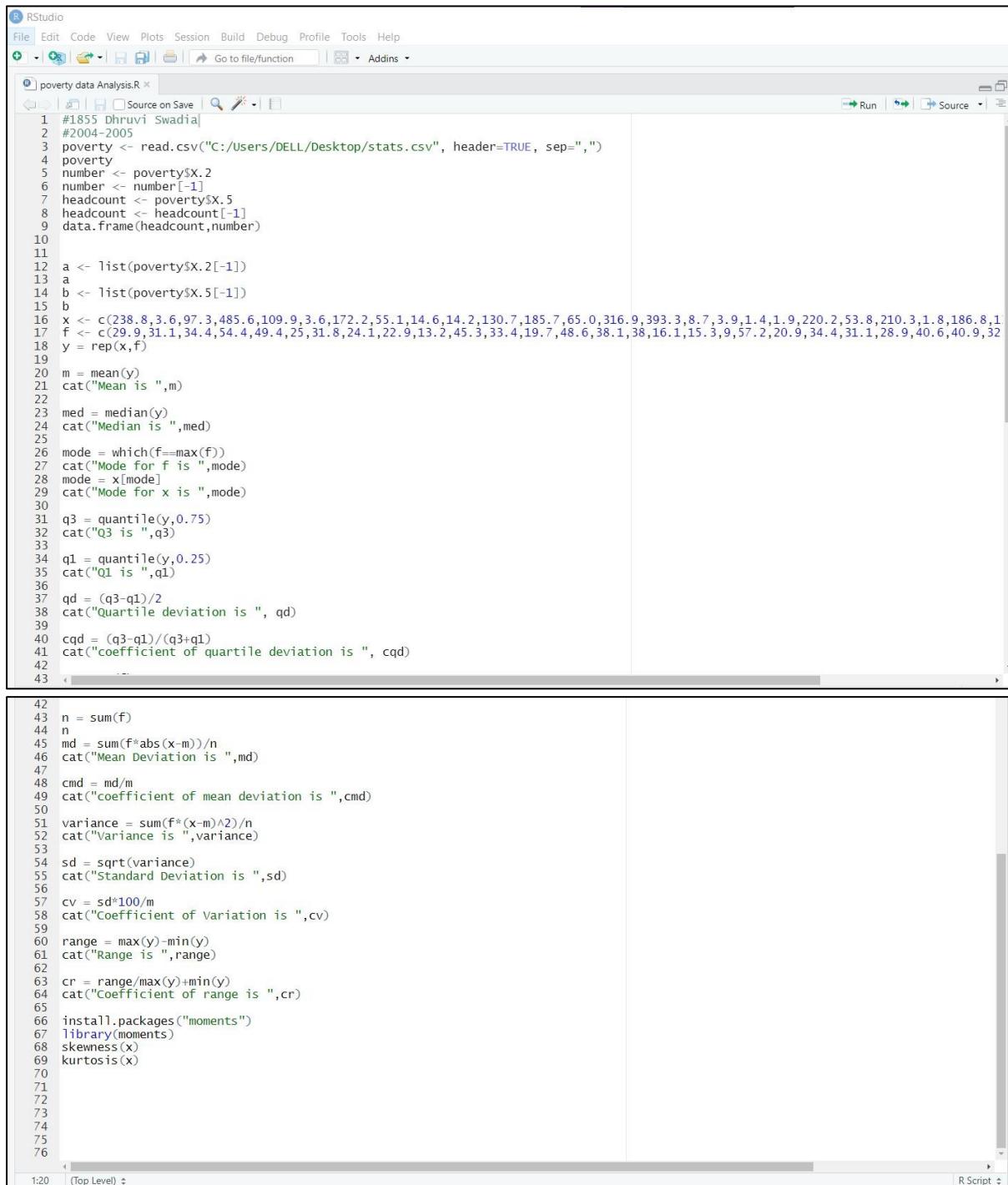
Here is the chart that indicates the headcount ratio and the number of people below poverty line(in Lakhs):

A	B	C	D	E	F	G	H
1	Poverty Estimates (Combined)						
2		Head Count Ratio(%)			Number Below Poverty Line (Lakhs)		
3	State	2004-05	2009-10	2011-12	2004-05	2009-10	2011-12
4	1 Andhra Pradesh	29.9	21.1	9.2	238.8	176.6	78.8
5	2 Arunachal Pradesh	31.1	25.9	34.7	3.6	3.5	4.9
6	3 Assam	34.4	37.9	32	97.3	116.4	101.3
7	4 Bihar	54.4	53.5	33.7	485.6	543.5	358.2
8	5 Chhattisgarh	49.4	48.7	39.9	109.9	121.9	104.1
9	6 Goa	25	14.2	9.9	3.6	23.3	17.0
10	7 Gujarat	31.8	8.7	5.1	172.2	1.3	0.8
11	8 Haryana	24.1	23	16.6	55.1	136.2	102.2
12	9 Himachal Pradesh	22.9	20.1	11.2	14.6	50.0	28.8
13	10 Jammu & Kashmir	13.2	9.5	8.1	14.2	6.4	5.6
14	11 Jharkhand	45.3	9.4	10.3	130.7	11.5	13.3
15	12 Karnataka	33.4	39.1	37	185.7	125.2	124.3
16	13 Kerala	19.7	23.6	20.9	65.0	142.3	129.8
17	14 Madhya Pradesh	48.6	12	7.1	316.9	39.6	23.9
18	15 Maharashtra	38.1	36.7	31.6	393.3	261.8	234.1
19	16 Manipur	38	24.5	17.4	8.7	270.8	197.9
20	17 Meghalaya	16.1	47.1	36.9	3.9	12.5	10.2
21	18 Mizoram	15.3	17.1	11.9	1.4	4.9	3.6
22	19 Nagaland	9	21.1	20.4	1.9	2.3	2.3
23	20 Orissa	57.2	20.9	18.9	220.2	4.1	3.8
24	21 Punjab	20.9	37	32.6	53.8	153.2	138.5
25	22 Rajasthan	34.4	1.2	8.3	210.3	0.1	23.2
26	23 Sikkim	31.1	15.9	14.7	1.8	43.5	102.9
27	24 Tamil Nadu	28.9	24.8	8.2	186.8	167.0	0.5
28	25 Tripura	40.6	13.1	11.3	13.7	0.8	82.6
29	26 Uttar Pradesh	40.9	17.1	14	735.5	121.8	5.2
30	27 Uttarakhand	32.7	17.4	29.4	29.7	6.3	598.2
31	28 West Bengal	34.3	37.7	11.3	289.1	737.9	11.6
32	29 A & N Islands		18	20		17.9	185.0
33	30 Chandigarh		26.7	9.7		240.3	1.2
34	31 Dadra & Nagar Haveli		0.4	1		0.0	0.0
35	32 Daman & Diu		9.2	21.8		1.0	2.3
36	33 Delhi	13.1	39.1	39.3	20.4	1.3	1.4
37	34 Lakshadweep		33.3	9.9		0.8	0.3
38	35 Puducherry	14.1	6.8	2.8	1.5	0.0	0.0
39	36 India	37.2	29.8	21.9	4,076.1	3,546.8	2,697.8

Data Analysis

Based on this Data Different Tools in R were used to Analyze and eventually plot it.

1) 2004-2005



```

RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
File -> poverty data Analysis.R
Source on Save Go to file/function Addins
poverty data Analysis.R
1 #1855 Dhruvi Swadia
2 #2004-2005
3 poverty <- read.csv("C:/Users/DELL/Desktop/stats.csv", header=TRUE, sep=",")
4 poverty
5 number <- poverty$X
6 number <- number[-1]
7 headcount <- poverty$X.5
8 headcount <- headcount[-1]
9 data.frame(headcount,number)
10
11
12 a <- list(poverty$X.2[-1])
13 a
14 b <- list(poverty$X.5[-1])
15 b
16 x <- c(238.8,3.6,97.3,485.6,109.9,3.6,172.2,55.1,14.6,14.2,130.7,185.7,65.0,316.9,393.3,8.7,3.9,1.4,1.9,220.2,53.8,210.3,1.8,186.8,1
17 f <- c(29.9,31.1,34.4,54.4,49.4,25,31.8,24.1,22.9,13.2,45.3,33.4,19.7,48.6,38.1,38,16.1,15.3,9,57.2,20.9,34.4,31.1,28.9,40.6,40.9,32
18 y = rep(x,f)
19
20 m = mean(y)
21 cat("Mean is ",m)
22
23 med = median(y)
24 cat("Median is ",med)
25
26 mode = which(f==max(f))
27 cat("Mode for f is ",mode)
28 mode = x[mode]
29 cat("Mode for x is ",mode)
30
31 q3 = quantile(y,0.75)
32 cat("Q3 is ",q3)
33
34 q1 = quantile(y,0.25)
35 cat("Q1 is ",q1)
36
37 qd = (q3-q1)/2
38 cat("Quartile deviation is ", qd)
39
40 cq = (q3-q1)/(q3+q1)
41 cat("Coefficient of quartile deviation is ", cq)
42
43 n = sum(f)
44
45 md = sum(f*abs(x-m))/n
46 cat("Mean Deviation is ",md)
47
48 cmd = md/m
49 cat("Coefficient of mean deviation is ",cmd)
50
51 variance = sum(f*(x-m)^2)/n
52 cat("Variance is ",variance)
53
54 sd = sqrt(variance)
55 cat("Standard Deviation is ",sd)
56
57 cv = sd*100/m
58 cat("Coefficient of Variation is ",cv)
59
60 range = max(y)-min(y)
61 cat("Range is ",range)
62
63 cr = range/max(y)+min(y)
64 cat("Coefficient of range is ",cr)
65
66 install.packages("moments")
67 library(moments)
68 skewness(x)
69 kurtosis(x)
70
71
72
73
74
75
76
1:20 (Top Level) R Script

```

OUTPUT:

RStudio

```

File Edit Code View Plots Session Build Debug Profile Tools Help
○ - Go to file/function | Addins -
Source
Console Terminal Jobs
~/.R
> #1855 Dhruvi Swadia
> #2004-2005
> poverty <- read.csv("C:/Users/DELL/Desktop/stats.csv", header=TRUE, sep=",")
> poverty
#> Poverty.Estimates..Combined.
#>   NA State Headcount Ratio (%) Number Below Poverty Line (Lakhs)
#> 1  NA 1993-94 2004-05 2009-10 2011-12 2004-05
#> 2  NA Andhra Pradesh 44.6 29.9 21.1 9.2 238.8
#> 3  1 Arunachal Pradesh 54.8 31.1 25.9 34.7 3.6
#> 4  2 Assam 31.8 34.4 24.9 32 6.3
#> 5  3 Bihar 60.5 54.4 53.5 33.7 485.6
#> 6  4 Chhattisgarh 50.9 49.4 48.7 39.9 109.9
#> 7  5 Goa 20.8 25 14.2 9.9 3.6
#> 8  6 Gujarat 37.8 31.8 8.7 5.1 172.2
#> 9  7 Haryana 35.9 24.1 23 16.6 55.1
#> 10 8 Himachal Pradesh 34.6 22.9 20.1 11.2 11.6
#> 11 9 Jammu & Kashmir 26.5 13.7 9.5 8.1 14.2
#> 12 10 Jharkhand 60.7 45.3 9.4 10.3 130.7
#> 13 11 Karnataka 49.5 33.4 39.1 37 185.7
#> 14 12 Kerala 31.3 19.7 23.6 20.9 65
#> 15 13 Madhya Pradesh 44.6 48.6 12 7.1 316.9
#> 16 14 Maharashtra 47.8 38.1 36.7 31.6 393.3
#> 17 15 Maharashtra 65.1 38 24.5 14 8.7
#> 18 16 Maharashtra 35.2 16.1 11.1 36.9 1.9
#> 19 17 Mizoram 11.8 15.3 17.1 11.9 1.4
#> 20 18 Nagaland 20.4 9 21.1 20.4 1.9
#> 21 19 Odisha 59.1 57.2 20.9 18.9 220.2
#> 22 20 Punjab 22.4 20.9 37 32.6 53.8
#> 23 21 Rajasthan 38.3 34.4 1.2 8.3 210.3
#> 24 22 Sikkim 31.1 31.1 13.9 14.7 1.8
#> 25 23 Tamil Nadu 44.6 28.9 24.8 8.2 186.8
#> 26 24 Tripura 32.9 40.6 13.1 11.3 13.7
#> 27 25 Uttar Pradesh 48.4 40.9 17.1 14 735.5
#> 28 26 Uttarakhand 32 32.7 17.4 29.4 29.7
#> 29 27 West Bengal 39.4 34.3 37.7 11.3 289.1
#> 30 28 A & N Islands 18 20
#> 31 29 Jammu & Kashmir 26.7 9.7
#> 32 30 Dadra & Nagar Haveli 0.4 1
#> 33 31 Daman & Diu 9.2 21.8
#> 34 32 Delhi 15.7 13.1 39.1 39.3 20.4
#> 35 33 Lakshadweep 33.3 9.9
#> 36 34 Puducherry 30.9 14.1 6.8 2.8 1.5
#> 37 35 India 45.3 37.2 29.8 21.9 4,076.10
#> 38 36

```

RStudio

```

File Edit Code View Plots Session Build Debug Profile Tools Help
○ - Go to file/function | Addins -
Source
Console Terminal Jobs
~/.R
> x.6 x.7
#> 1 2009-10 2011-12
#> 2 176.6 78.8
#> 3 3.5 4.9
#> 4 116.4 101.3
#> 5 543.5 358.2
#> 6 121.9 104.1
#> 7 23.3 17
#> 8 1.3 0
#> 9 136.2 102.2
#> 10 50 28.8
#> 11 6.4 5.6
#> 12 11.5 13.3
#> 13 126.2 124.3
#> 14 142.3 129.8
#> 15 16 6
#> 16 261.8 234.1
#> 17 270.8 197.9
#> 18 12.5 10.2
#> 19 4.9 3.6
#> 20 2.3 2.3
#> 21 4.1 3.8
#> 22 133.2 123.2
#> 23 0.1 23.2
#> 24 43.5 102.9
#> 25 167 0.5
#> 26 0.8 82.6
#> 27 121.8 5.2
#> 28 6.3 58.7
#> 29 737.9 11.6
#> 30 17.9 185
#> 31 240.3 1.2
#> 32 0 0
#> 33 1 2.3
#> 34 1.3 1.4
#> 35 0.8 0.2
#> 36 0 0
#> 37 3,546.80 2,697.80
#> number <- poverty$x.2
#> number <- number[-1]
#> headcount <- poverty$x.5
#> headcount <- headcount[-1]

```

```

RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
Go to file/function Addins

Source
Console Terminal Jobs
~/d>
> headcount <- headcount[-1]
> data.frame(headcount, number)
headcount number
1 2004-05 2004-05
2 238.8 29
3 3.6 31.1
4 97.3 34.4
5 485.6 54.4
6 109.9 49.4
7 3.6 25
8 172.2 31.8
9 55.1 24.1
10 14.6 22.9
11 14.2 13.2
12 130.3 45.3
13 185.7 33.4
14 65 19.7
15 316.9 48.6
16 393.3 38.1
17 8.7 38
18 3.9 16.1
19 1.4 15.3
20 1.9 9
21 220.2 57.2
22 53.8 20.9
23 210.3 34.4
24 1.8 31.1
25 186.8 28.9
26 13.7 40.6
27 735.5 40.9
28 29.7 32.7
29 289.1 34.3
30
31
32
33
34 20.4 13.1
35
36 1.5 14.1
37 4,076.10 37.2
>
> a <- list(poverty$x.2[-1])
3

```



```

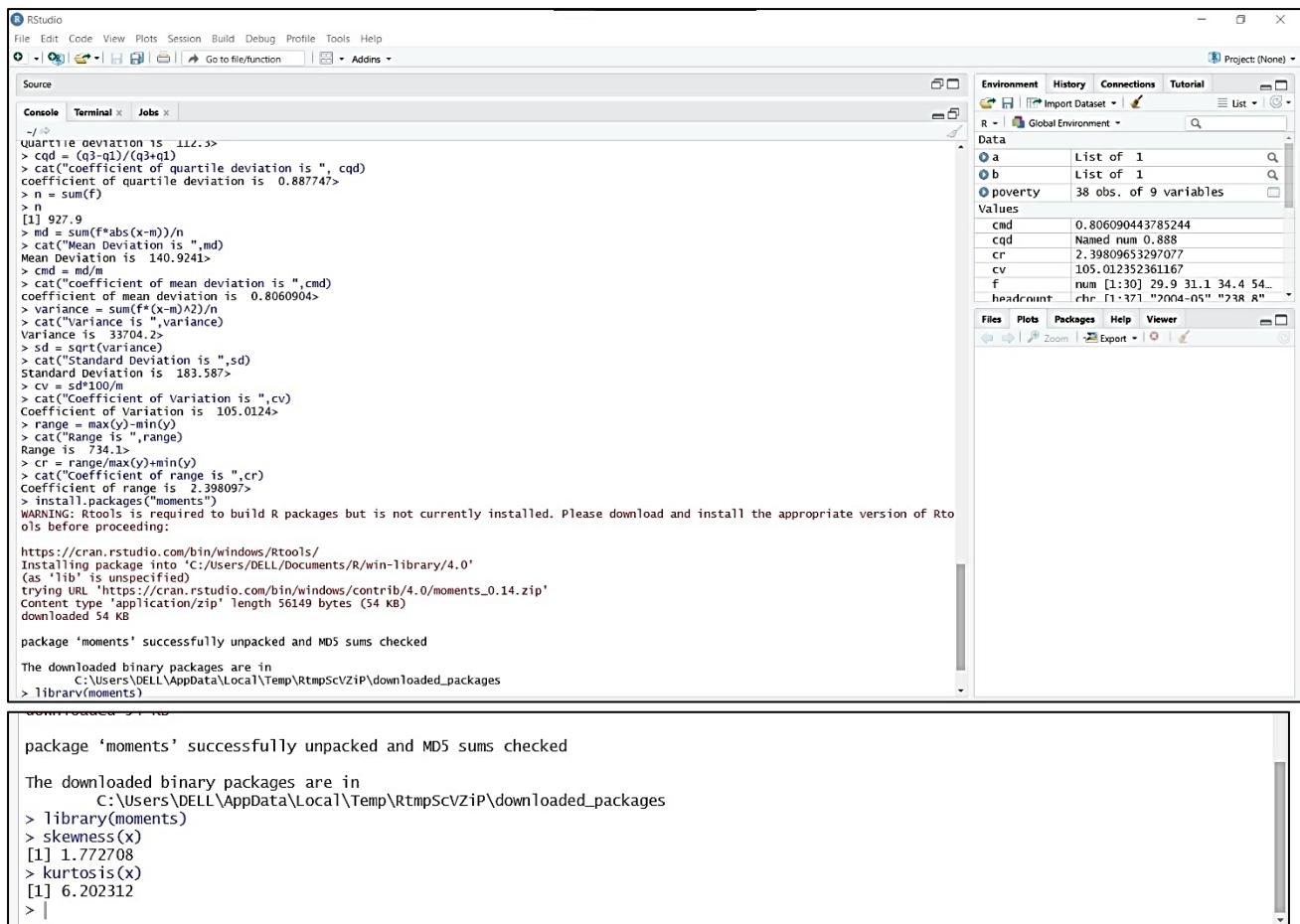
RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
Go to file/function Addins

Source
Console Terminal Jobs
~/d>
> a <- list(poverty$x.2[-1])
> a
[[1]]
[1] "2004-05" "29.9"  "31.1"  "34.4"  "54.4"  "49.4"  "25"   "31.8"  "24.1"  "22.9"  "13.2"  "45.3"
[13] "33.4"    "19.7"  "48.6"  "38.1"  "38"    "16.1"  "15.3"  "9"     "57.2"  "20.9"  "34.4"  "31.1"
[25] "28.9"    "40.6"  "40.9"  "32.7"  "34.3"  ""      ""     "13.1"  ""     "14.1" 
[37] "37.2"    ""

> b <- list(poverty$x.5[-1])
> b
[[1]]
[1] "2004-05" "238.8" "3.6"   "97.3"  "485.6" "109.9" "3.6"   "172.2" "55.1"  "14.6"  "14.2" 
[12] "130.3"   "185.7" "65"    "316.9" "393.3" "8.7"   "3.9"   "1.4"   "220.2" "53.8" 
[23] "210.3"   "1.8"   "186.8" "735.5" "29.7"  "289.1" "1.4"   "1.9"   "20.9"  "34.4" 
[34] "20.4"    "1.5"   "4,076.10"

> x <- c(238.8,3.6,97.3,485.6,109.9,3.6,172.2,55.1,14.6,14.2,130.7,185.7,65.0,316.9,393.3,8.7,3.9,1.4,1.9,220.2,53.8,210.3,1.8,186.8,13.7,735.5,29.7,289.1,20.4,1.5)
> f <- c(29.9,31.1,34.4,54.4,49.4,25,31.8,24.1,22.9,13.2,45.3,33.4,19.7,48.6,38.1,38,16.1,15.3,9,57.2,20.9,34.4,31.1,28.9,40.6,40.9,32.7,3
4.3,13.1,14.1)
> y <- rep(x,f)
> m = mean(y)
> cat("Mean is ",m)
Mean is 174.8242>
> med = median(y)
Median is 130.7>
> mode = which(f==max(f))
> cat("Mode for f is ",mode)
Mode for f is 20.4 mode = x[mode]
> cat("Mode for x is ",mode)
Mode for x is 220.2>
> q1 = quantile(y,0.25)
> cat("Q1 is ",q1)
Q1 is 14.2>
> qd = (q3-q1)/2
> cat("Quartile deviation is ", qd)
Quartile deviation is 112.3>
> qod = (q3-q1)/(q3+q1)

```



The screenshot shows the RStudio interface with the following details:

- Console Tab:** Displays R code and its output. The code calculates quartile deviation, mean deviation, variance, standard deviation, coefficient of variation, range, and skewness/kurtosis. It also attempts to install the 'moments' package from CRAN.
- Environment Tab:** Shows objects 'a', 'b', and 'poverty' in the Global Environment. 'a' is a list of 1 named numeric value (0.888). 'b' is a list of 1 named numeric value (2.39809653297077). 'poverty' is a data frame with 38 observations and 9 variables, including 'cmd', 'cqd', 'cr', 'cv', 'f', and 'headcount'.
- Data Tab:** Shows the structure of the 'poverty' data frame.
- Plots Tab:** Currently empty.
- Packages Tab:** Shows available packages: 'Rtools' (version 3.6.3), 'moments' (version 0.14), and 'gridExtra' (version 2.3).
- Help Tab:** Shows help documentation for 'moments'.
- Viewer Tab:** Shows the contents of the 'moments' package.

```

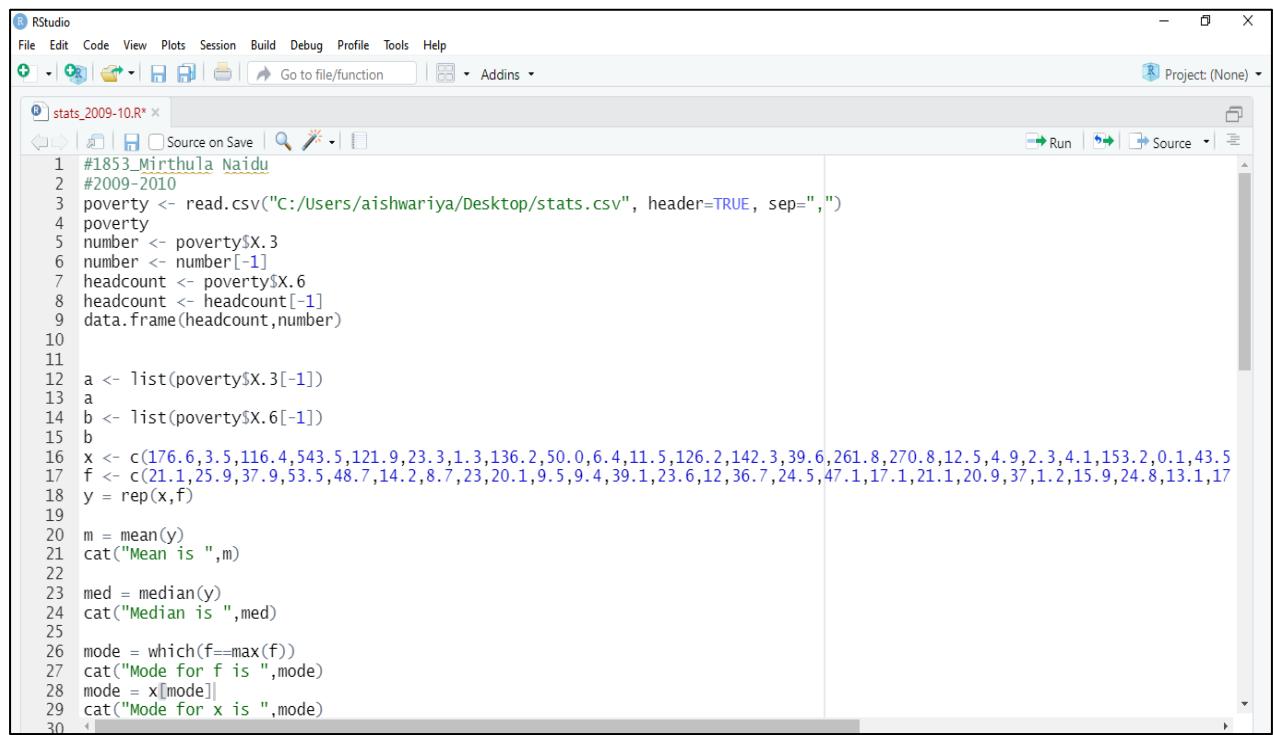
~/>
quartile deviation is 112.3>
> cqd = (q3-q1)/(q3+q1)
> cat("coefficient of quartile deviation is ", cqd)
coefficient of quartile deviation is  0.887747>
> n = sum(f)
>
[1] 927.9
> md = sum(f*abs(x-m))/n
> cat("Mean Deviation is ",md)
Mean Deviation is 140.9241>
> cmd = md/m
> cat("coefficient of mean deviation is ",cmd)
coefficient of mean deviation is  0.8060904>
> variance = sum(f*(x-m)^2)/n
> cat("Variance is ",variance)
Variance is 33704.2>
> sd = sqrt(variance)
> cat("Standard Deviation is ",sd)
Standard Deviation is 183.587>
> cv = sd*100/m
> cat("Coefficient of Variation is ",cv)
Coefficient of Variation is 105.0124>
> range = max(y)-min(y)
> cat("Range is ",range)
Range is 734.>
> cr = range/max(y)+min(y)
> cat("Coefficient of range is ",cr)
Coefficient of range is 2.398097>
> install.packages("moments")
WARNING: Rtools is required to build R packages but is not currently installed. Please download and install the appropriate version of Rtools before proceeding:
https://cran.rstudio.com/bin/windows/Rtools/
Installing package into 'C:/Users/DELL/Documents/R/win-library/4.0'
(as 'lib' is unspecified)
trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.0/moments_0.14.zip'
Content type 'application/zip' length 56149 bytes (54 KB)
downloaded 54 KB

package 'moments' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
  C:/Users/DELL/AppData/Local/Temp/RtmpScVZiP/downloaded_packages
> library(moments)
> skewness(x)
[1] 1.772708
> kurtosis(x)
[1] 6.202312
> |

```

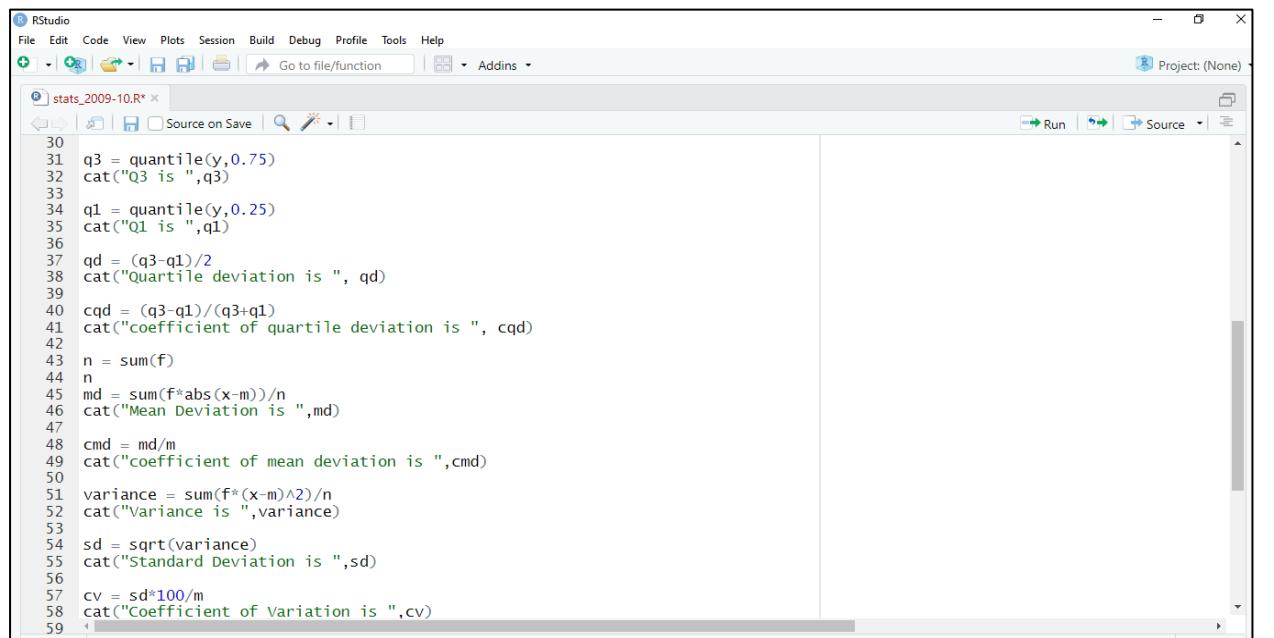
2) 2009-2010



```

RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
+ - Run Source Addins
stats_2009-10.R* | Go to file/function | Addins
Source on Save | Run | Source | Addins | Project: (None)
1 #1853_Mirthula Naidu
2 #2009-2010
3 poverty <- read.csv("C:/Users/aishwariya/Desktop/stats.csv", header=TRUE, sep=",")
4 poverty
5 number <- poverty$X.3
6 number <- number[-1]
7 headcount <- poverty$X.6
8 headcount <- headcount[-1]
9 data.frame(headcount,number)
10
11
12 a <- list(poverty$X.3[-1])
13 a
14 b <- list(poverty$X.6[-1])
15 b
16 x <- c(176.6,3.5,116.4,543.5,121.9,23.3,1.3,136.2,50.0,6.4,11.5,126.2,142.3,39.6,261.8,270.8,12.5,4.9,2.3,4.1,153.2,0.1,43.5
17 f <- c(21.1,25.9,37.9,53.5,48.7,14.2,8.7,23,20.1,9.5,9.4,39.1,23.6,12,36.7,24.5,47.1,17.1,21.1,20.9,37,1.2,15.9,24.8,13.1,17
18 y = rep(x,f)
19
20 m = mean(y)
21 cat("Mean is ",m)
22
23 med = median(y)
24 cat("Median is ",med)
25
26 mode = which(f==max(f))
27 cat("Mode for f is ",mode)
28 mode = x[mode]
29 cat("Mode for x is ",mode)
30

```



```

RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
+ - Run Source Addins
stats_2009-10.R* | Go to file/function | Addins
Source on Save | Run | Source | Addins | Project: (None)
30
31 q3 = quantile(y,0.75)
32 cat("Q3 is ",q3)
33
34 q1 = quantile(y,0.25)
35 cat("Q1 is ",q1)
36
37 qd = (q3-q1)/2
38 cat("Quartile deviation is ", qd)
39
40 cqd = (q3-q1)/(q3+q1)
41 cat("coefficient of quartile deviation is ", cqcd)
42
43 n = sum(f)
44 n
45 md = sum(f*abs(x-m))/n
46 cat("Mean Deviation is ",md)
47
48 cmd = md/m
49 cat("coefficient of mean deviation is ",cmd)
50
51 variance = sum(f*(x-m)^2)/n
52 cat("Variance is ",variance)
53
54 sd = sqrt(variance)
55 cat("Standard Deviation is ",sd)
56
57 cv = sd*100/m
58 cat("Coefficient of Variation is ",cv)
59

```

The screenshot shows the RStudio interface with an R script file named "stats_2009-10.R". The code performs various statistical calculations including mean, variance, standard deviation, coefficient of variation, range, and moments. It also installs and loads the "moments" package.

```
File Edit Code View Plots Session Build Debug Profile Tools Help
+ - X
Project: (None)
stats_2009-10.R*
Source on Save | Go to file/function | Addins -
48 cmd = m/n
49 cat("coefficient of mean deviation is ",cmd)
50
51 variance = sum(f*(x-m)^2)/n
52 cat("Variance is ",variance)
53
54 sd = sqrt(variance)
55 cat("Standard Deviation is ",sd)
56
57 cv = sd*100/m
58 cat("Coefficient of Variation is ",cv)
59
60 range = max(y)-min(y)
61 cat("Range is ",range)
62
63 cr = range/max(y)+min(y)
64 cat("Coefficient of range is ",cr)
65
66 install.packages("moments")
67 library(moments)
68 skewness(x)
69 kurtosis(x)
70
71
72
73
74
75
76
```

OUTPUT:

		X	X.1	X.2	X.3	X.4
		State	Headcount 1993-94	Ratio (%) 2004-05	2009-10	2011-12
1	NA	Andhra Pradesh	44.6	29.9	21.1	9.2
2	NA	Arunachal Pradesh	54.5	31.1	25.9	34.7
3	1	Assam	51.8	34.4	37.9	32
4	2	Bihar	60.5	54.4	53.5	33.7
5	3	Chhattisgarh	50.9	49.4	48.7	39.9
6	4	Goa	20.8	25	14.2	9.9
7	5	Gujarat	37.8	31.8	8.7	5.1
8	6	Haryana	35.9	24.1	23	16.6
9	7	Himachal Pradesh	34.6	22.9	20.1	11.2
10	8	Jammu & Kashmir	26.3	13.2	9.5	8.1
11	9	Jharkhand	60.7	45.3	9.4	10.3
12	10	Karnataka	49.5	33.4	39.1	37
13	11	Kerala	31.3	19.7	23.6	20.9
14	12	Madhya Pradesh	44.6	48.6	12	7.1
15	13	Maharashtra	47.8	38.1	36.7	31.6
16	14	Manipur	65.1	38	24.5	17.4
17	15	Meghalaya	35.2	16.1	47.1	36.9
18	16	Mizoram	11.8	15.3	17.1	11.9
19	17	Nagaland	20.4	9	21.1	20.4
20	18	Orissa	59.1	57.2	20.9	18.9
21	19	Punjab	22.4	20.9	37	32.6
22	20	Rajasthan	38.3	34.4	1.2	8.3
23	21	Sikkim	31.8	31.1	15.9	14.7
24	22	Tamil Nadu	44.6	28.9	24.8	8.2
25	23	Tripura	32.9	40.6	13.1	11.3
26	24	Uttar Pradesh	48.4	40.9	17.1	14
27	25	Uttarkhand	32	32.7	17.4	29.4
28	26	West Bengal	39.4	34.3	37.7	11.3
29	27	A & N Islands			18	20
30	28	Chandigarh			26.7	9.7
31	29	Dadra & Nagar Haveli			0.4	1
32	30	Daman & Diu			9.2	21.8
33	31	Delhi	15.7	13.1	39.1	39.3
34	32	Lakshadweep			33.3	9.9
35	33	Puducherry	30.9	14.1	6.8	2.8
36	34	India	45.3	37.2	29.8	21.9
37	35					
38	36					
39	NA					
40	NA					
41	NA					
42	NA					
43	NA					
44	NA					
45	NA					
46	NA					
47	NA					
48	NA					
49	NA					
50	NA					
51	NA					
52	NA					
			X.5	X.6	X.7	
1	Number Below Poverty Line (Lakhs)		2004-05	2009-10	2011-12	
2						

			X.5	X.6	X.7	
1	Number Below Poverty Line (Lakhs)		2004-05	2009-10	2011-12	
2						

RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
+ - _ Go to file/function Addins Project: (None)

Console Terminal Jobs
C:/Users/aishwariya/Downloads/

	X.5	X.6	X.7
1	Number Below Poverty Line (Lakhs)		
2	2004-05	2009-10	2011-12
3	238.8	176.6	78.8
4	3.6	3.5	4.9
5	97.3	116.4	101.3
6	485.6	543.5	358.2
7	109.9	121.9	104.1
8	3.6	23.3	17.0
9	172.2	1.3	0.8
10	55.1	136.2	102.2
11	14.6	50.0	28.8
12	14.2	6.4	5.6
13	130.7	11.5	13.3
14	185.7	126.2	124.3
15	65.0	142.3	129.8
16	316.9	39.6	23.9
17	393.3	261.8	234.1
18	8.7	270.8	197.9
19	3.9	12.5	10.2
20	1.4	4.9	3.6
21	1.9	2.3	2.3
22	220.2	4.1	3.8
23	53.8	153.2	138.5
24	210.3	0.1	23.2
25	1.8	43.5	102.9
26	186.8	167.0	0.5
27	13.7	0.8	82.6
28	735.5	121.8	5.2
29	29.7	6.3	598.2
30	220.1	557.0	11.6

RStudio

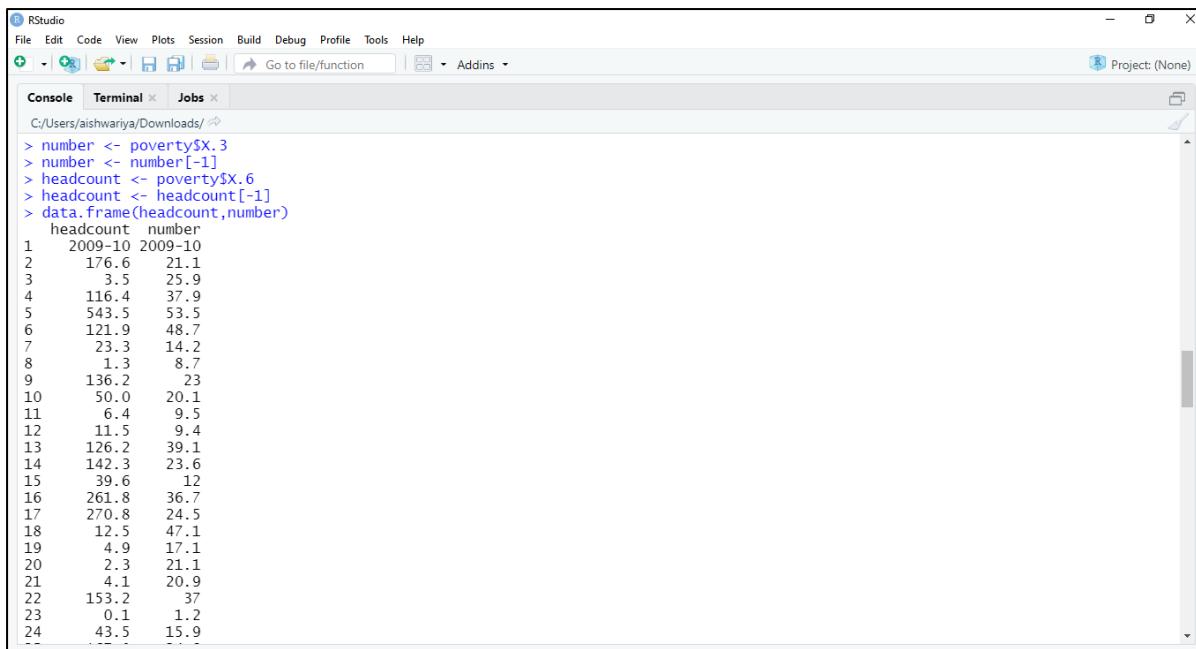
File Edit Code View Plots Session Build Debug Profile Tools Help

Go to file/function Addins

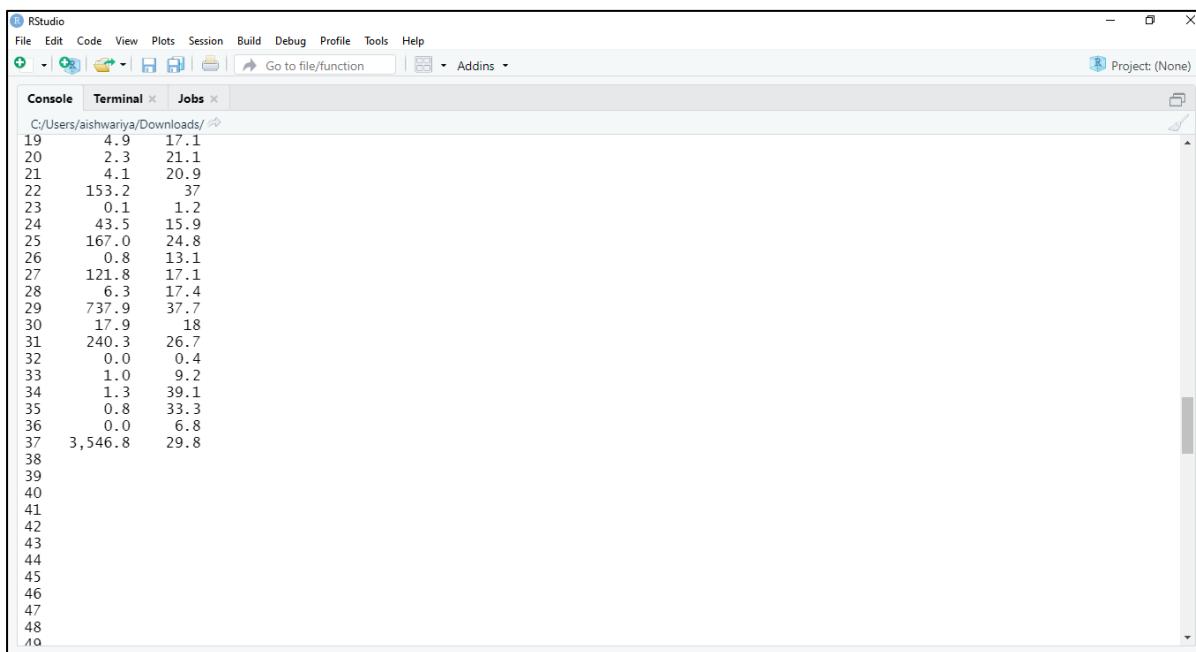
Console Terminal Jobs

C:/Users/aishwariya/Downloads/

```
24          210.3    0.1   23.2
25            1.8    43.5  102.9
26          186.8   167.0     0.5
27            13.7     0.8   82.6
28          735.5   121.8     5.2
29            29.7     6.3   598.2
30          289.1   737.9    11.6
31            17.9   185.0
32          240.3    1.2
33            0.0    0.0
34            1.0    2.3
35          20.4    1.3    1.4
36            0.8    0.3
37            1.5    0.0
38        4,076.1 3,546.8  2,697.8
39
40
41
42
43
44
45
46
47
48
49
50
51
52
> number <- poverty$X_3
> number <- number[-1]
```



```
RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
+ - Go to file/function Addins
Console Terminal Jobs
C:/Users/aishwariya/Downloads/ ↴
> number <- poverty$X_3
> number <- number[-1]
> headcount <- poverty$x_.6
> headcount <- headcount[-1]
> data.frame(headcount,number)
   headcount    number
1  2009-10  2009-10
2    176.6    21.1
3     3.5    25.9
4    116.4    37.9
5    543.5    53.5
6    121.9    48.7
7    23.3    14.2
8     1.3     8.7
9   136.2     23
10   50.0    20.1
11    6.4     9.5
12   11.5     9.4
13   126.2    39.1
14   142.3    23.6
15    39.6     12
16   261.8    36.7
17   270.8    24.5
18    12.5    47.1
19     4.9    17.1
20     2.3    21.1
21     4.1    20.9
22   153.2     37
23     0.1    1.2
24   43.5    15.9
25   167.0    24.8
26     0.8    13.1
27   121.8    17.1
28     6.3    17.4
29   737.9    37.7
30     17.9    18
31   240.3    26.7
32     0.0     0.4
33     1.0     9.2
34     1.3    39.1
35     0.8    33.3
36     0.0     6.8
37 3,546.8    29.8
38
39
40
41
42
43
44
45
46
47
48
49
```



```
RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
+ - Go to file/function Addins
Console Terminal Jobs
C:/Users/aishwariya/Downloads/ ↴
19     4.9    17.1
20     2.3    21.1
21     4.1    20.9
22   153.2     37
23     0.1    1.2
24   43.5    15.9
25   167.0    24.8
26     0.8    13.1
27   121.8    17.1
28     6.3    17.4
29   737.9    37.7
30     17.9    18
31   240.3    26.7
32     0.0     0.4
33     1.0     9.2
34     1.3    39.1
35     0.8    33.3
36     0.0     6.8
37 3,546.8    29.8
38
39
40
41
42
43
44
45
46
47
48
49
```

```

RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
+ - Go to file/function Addins
Console Terminal Jobs
C:/Users/aishwariya/Downloads/ >
>
> a <- list(poverty$X.3[-1])
> a
[[1]]
[1] "2009-10" "21.1"    "25.9"    "37.9"    "53.5"    "48.7"    "14.2"    "8.7"     "23"      "20.1"    "9.5"     "9.4"
[13] "39.1"    "23.6"    "12"      "36.7"    "24.5"    "47.1"    "17.1"    "21.1"    "20.9"    "37"      "1.2"     "15.9"
[25] "24.8"    "13.1"    "17.1"    "17.4"    "37.7"    "18"      "26.7"    "0.4"     "9.2"     "39.1"    "33.3"    "6.8"
[37] "29.8"    ""        ""        ""        ""        ""        ""        ""        ""        ""        ""        ""        ""
[49] ""        ""        ""

> b <- list(poverty$X.6[-1])
> b
[[1]]
[1] "2009-10" "176.6"   "3.5"     "116.4"   "543.5"   "121.9"   "23.3"   "1.3"     "136.2"   "50.0"    "6.4"     "11.5"
[13] "126.2"   "142.3"   "39.6"   "261.8"   "270.8"   "12.5"   "4.9"     "2.3"     "4.1"     "153.2"   "0.1"     "43.5"
[25] "167.0"   "0.8"     "121.8"   "6.3"     "737.9"   "17.9"   "240.3"   "0.0"     "1.0"     "1.3"     "0.8"     "0.0"
[37] "3,546.8" ""        ""        ""        ""        ""        ""        ""        ""        ""        ""        ""
[49] ""        ""        ""

> x <- c(176.6,3.5,116.4,543.5,121.9,23.3,1.3,136.2,50.0,6.4,11.5,126.2,142.3,39.6,261.8,270.8,12.5,4.9,2.3,4.1,153.2,0.1,43.5,16
7.0,0.8,121.8,6.3,737.9,17.9,240.3,0.0,1.0,3.0,0.8,0.0)
> f <- c(21.1,25.9,37.9,53.5,48.7,14.2,8.7,23,20.1,9.5,9.4,39.1,23.6,12,36.7,24.5,47.1,17.1,21.1,20.9,37,1.2,15.9,24.8,13.1,17.1,1
7.4,37.7,18,26.7,0.4,9.2,39.1,33.3,6.8)
> y = rep(x,f)
>
> m = mean(y)
> cat("Mean is ",m)
Mean is 149.4491>
> med = median(y)
> cat("Median is ",med)

```

```

RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
+ - Go to file/function Addins
Console Terminal Jobs
C:/Users/aishwariya/Downloads/ >
>
> med = median(y)
> cat("Median is ",med)
Median is 121.8>
> mode = which(f==max(f))
> cat("Mode for f is ",mode)
Mode for f is 4> mode = x[mode]
> cat("Mode for x is ",mode)
Mode for x is 543.5>
> q3 = quantile(y,0.75)
> cat("Q3 is ",q3)
Q3 is 167>
> q1 = quantile(y,0.25)
> cat("Q1 is ",q1)
Q1 is 6.3>
> qd = (q3-q1)/2
> cat("Quartile deviation is ", qd)
Quartile deviation is 80.35>
> cqd = (q3-q1)/(q3+q1)
> cat("Coefficient of quartile deviation is ", cqd)
Coefficient of quartile deviation is 0.9272937>
> n = sum(f)
>
> [1] 811.8
> md = sum(f*abs(x-m))/n
> cat("Mean Deviation is ",md)
Mean Deviation is 133.2063>
> cmd = md/m
> cat("Coefficient of mean deviation is ",cmd)
Coefficient of mean deviation is 0.8913154>
> variance = sum(f*(x-m)^2)/n

```

The screenshot shows the RStudio interface with the 'Console' tab selected. The console window displays the following R script and its execution results:

```
> variance = sum(f*(x-m)^2)/n
> cat("Variance is ",variance)
Variance is 36329.93
> sd = sqrt(variance)
> cat("Standard Deviation is ",sd)
Standard Deviation is 190.6041
> CV = sd*100/m
> cat("Coefficient of Variation is ",CV)
Coefficient of Variation is 127.5378
> range = max(y)-min(y)
> cat("Range is ",range)
Range is 737.9
> cr = range/max(y)+min(y)
> cat("Coefficient of range is ",cr)
Coefficient of range is 1
> install.packages("moments")
Installing package into 'C:/Users/aishwariya/Documents/R/win-library/4.0'
(as 'lib' is unspecified)
trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.0/moments_0.14.zip'
Content type 'application/zip' length 56149 bytes (54 KB)
downloaded 54 KB

package 'moments' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
  C:\Users\{aishwariya}\AppData\Local\Temp\Rtmp6XYM7X\downloaded_packages
> library(moments)
Warning message:
package 'moments' was built under R version 4.0.3
> skewness(x)
```

The screenshot shows the RStudio interface with the 'Console' tab selected. The console window displays the results of the skewness calculation:

```
package 'moments' successfully unpacked and MD5 sums checked

The downloaded binary packages are in
  C:\Users\{aishwariya}\AppData\Local\Temp\Rtmp6XYM7X\downloaded_packages
> library(moments)
Warning message:
package 'moments' was built under R version 4.0.3
> skewness(x)
[1] 2.491082
> kurtosis(x)
[1] 9.57048
> |
```

3) 2011-2012

```
#RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
+ - Project: (None) ▾
PovertyData2011-12.R* Untitled1 ×
Source on Save Run Source ▾
1 #1806_Aishani Anavkar
2 #2011-12
3 poverty = read.csv("C:/users/Aishani Anavkar/Desktop/Data Science Sem 2/stats_poverty_data.csv")
4 poverty
5 number = poverty$x.5
6 number = number[-1]
7 headcount = poverty$x.3
8 headcount = headcount[-1]
9 data.frame(headcount,number)
10
11
12 a <- list(poverty$x.5[-1])
13 a
14 b <- list(poverty$x.3[-1])
15 b
16 x <- c(78.8,4.9,101.3,358.2,104.1,17.0,0.8,102.2,28.8,5.6,13.3,124.3,129.8,23.9,234.1,197.9,10.2,3.6,2.3,3.8
17 f <- c(9.2,34.7,32.3,7.39.9,9.9,5.1,16.6,11.2,8.1,10.3,37,20.9,7.1,31.6,17.4,36.9,11.9,20.4,18.9,32.6,8.3,1
18 y = rep(x,f)
19
```

```
① PovertyData2011-12.R* x ② Untitled1 x
Source on Save | Run | Source | ▾
```

```
20 m = mean(y)
21 cat("Mean is ",m)
22 med = median(y)
23 cat("Median is ",med)
24 mode = which(f==max(f))
25 cat("Mode for f is ",mode)
26 mode = x[mode]
27 cat("Mode for x is ",mode)
28 q3 = quantile(y,0.75)
29 cat("Q3 is ",q3)
30 q1 = quantile(y,0.25)
31 cat("Q1 is ",q1)
32 qd = (q3-q1)/2
33 cat("Quartile deviation is ", qd)
34 cqd = (q3-q1)/(q3+q1)
35 cat("coefficient of quartile deviation is ", cqcd)
36 n = sum(f)
37 n
38 md = sum(f*abs(x-m))/n
39 cat("Mean Deviation is ",md)
```

The screenshot shows the RStudio interface with two tabs open: 'PovertyData2011-12.R*' and 'Untitled1.R'. The 'Untitled1.R' tab is active, displaying the following R code:

```
40 cmd = md/m
41 cat("coefficient of mean deviation is ",cmd)
42 variance = sum(f*(x-m)^2)/n
43 cat("Variance is ",variance)
44 sd = sqrt(variance)
45 cat("Standard Deviation is ",sd)
46 cv = sd*100/m
47 cat("Coefficient of Variation is ",cv)
48 range = max(y)-min(y)
49 cat("Range is ",range)
50 cr = range/max(y)+min(y)
51 cat("Coefficient of range is ",cr)
52 install.packages("moments")
53 library("moments")
54 skewness(x)
55 kurtosis(x)
56
57
58
59
```

OUTPUT:

The screenshot shows the RStudio interface. The top menu bar includes File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, and Help. Below the menu is a toolbar with various icons. The main area has tabs for Source, Console, Terminal, and Jobs. The Console tab is active, displaying R code and its output:

```
> #1806_Aishani Anavkar
> #2011-12
> poverty = read.csv("C:/users/Aishani Anavkar/Desktop/Data Science Sem
2/stats_poverty_data.csv")
> poverty
```

The output shows a data frame with columns: State, Headcount.Ratio..., x.1, x.2, and x.3. The rows list Indian states and their corresponding values. The Global Environment pane on the right lists objects like ub, up, v, variance, w, x, y, and z, each with their type and value.

The screenshot shows the RStudio interface with the following data frame:

	State	X.4	X.5	
18	Meghalaya	35.2	16.1	47.1
19	Mizoram	11.8	15.3	17.1
20	Nagaland	20.4	9	21.1
21	Orissa	59.1	57.2	20.9
22	Punjab	22.4	20.9	37
23	Rajasthan	38.3	34.4	1.2
24	Sikkim	31.8	31.1	15.9
25	Tamil Nadu	44.6	28.9	24.8
26	Tripura	32.9	40.6	13.1
27	Uttar Pradesh	48.4	40.9	17.1
28	Uttarakhand		32	32.7
29	West Bengal		39.4	34.3
30	A & N Islands			18
31	Chandigarh			20
32	Dadra & Nagar Haveli			26.7
33	Daman & Diu			9.7
34	Delhi	15.7	13.1	0.4
35	Lakshadweep			1
36	Puducherry	30.9	14.1	9.2
37	India	45.3	37.2	21.8
38	Number.Below.Poverty.Line..Lakhs.	X.4	X.5	
1		2004-05	2009-10	2011-12

Source

Console Terminal Jobs

```

2           238.8   176.6   78.8
3             3.6     3.5    4.9
4            97.3   116.4  101.3
5           485.6   543.5  358.2
6           109.9   121.9  104.1
7             3.6    23.3   17.0
8          172.2     1.3    0.8
9            55.1   136.2  102.2
10          14.6    50.0   28.8
11          14.2     6.4    5.6
12          130.7    11.5   13.3
13          185.7   126.2  124.3
14            65.0   142.3  129.8
15          316.9    39.6   23.9
16          393.3   261.8  234.1
17            8.7   270.8  197.9
18            3.9   12.5   10.2
19            1.4     4.9    3.6
20            1.9     2.3    2.3
21          220.2     4.1    3.8
22            53.8   153.2  138.5
23          210.3     0.1   23.2
24            1.8    43.5  102.9

```

Environment History Connections Tutorial

Import Dataset List

Global Environment

ub num [1:7] 10 20 30 40 50...
up num [1:8] 10 20 30 40 50...
v num [1:12] 7.7 10.6 9.7 ...
variance 278.961955152431
w num [1:12] 13.2 8.3 6.8 ...
x num [1:12] 2.2 1.9 1.7 1...
y num [1:12] 2.6 2.4 2.5 2...
z num [1:12] 32.6 26.2 23 ...

Files Plots Packages Help Viewer

Source

Console Terminal Jobs

```

25          186.8   167.0   0.5
26            13.7     0.8   82.6
27          735.5   121.8   5.2
28            29.7     6.3  598.2
29          289.1   737.9  11.6
30            17.9   185.0
31            240.3    1.2
32            0.0     0.0
33            1.0     2.3
34          20.4     1.3    1.4
35            0.8     0.3
36            1.5     0.0    0.0
37          4,076.1 3,546.8 2,697.8
38
> number = poverty$X.5
> number = number[-1]
> headcount = poverty$X.3
> headcount = headcount[-1]
> data.frame(headcount,number)
  headcount number
1         9.2    78.8
2        34.7     4.9
3         32     101.3

```

Environment History Connections Tutorial

Import Dataset List

Global Environment

ub num [1:7] 10 20 30 40 50...
up num [1:8] 10 20 30 40 50...
v num [1:12] 7.7 10.6 9.7 ...
variance 278.961955152431
w num [1:12] 13.2 8.3 6.8 ...
x num [1:12] 2.2 1.9 1.7 1...
y num [1:12] 2.6 2.4 2.5 2...
z num [1:12] 32.6 26.2 23 ...

Files Plots Packages Help Viewer

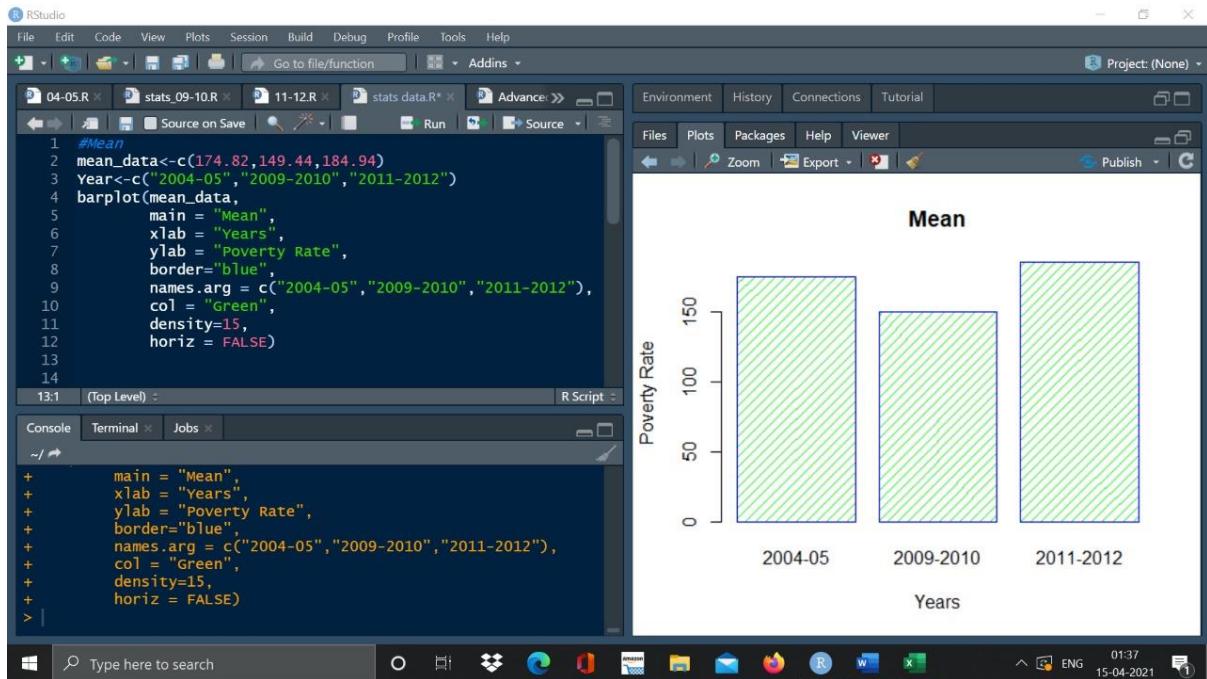
The screenshot shows the RStudio interface. The left pane displays the console output, which includes a sequence of numbers from 4 to 37, each followed by three values. The right pane shows the Global Environment viewer, listing various objects (ub, up, v, variance, w, x, y, z) with their corresponding data types and dimensions.

	ub	up	v	variance	w	x	y	z
4	num [1:7] 10 20 30 40 50...							
5		num [1:8] 10 20 30 40 50...						
6			num [1:12] 7.7 10.6 9.7 ...					
7				278.961955152431				
8					num [1:12] 13.2 8.3 6.8 ...			
9						num [1:12] 2.2 1.9 1.7 1...		
10							num [1:12] 2.6 2.4 2.5 2...	
11								num [1:12] 32.6 26.2 23 ...
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27	29.4	598.2						
28	11.3	11.6						
29	20	185.0						
30	9.7	1.2						
31	1	0.0						
32	21.8	2.3						
33	39.3	1.4						
34	9.9	0.3						
35	2.8	0.0						
36	21.9	2,697.8						
37								

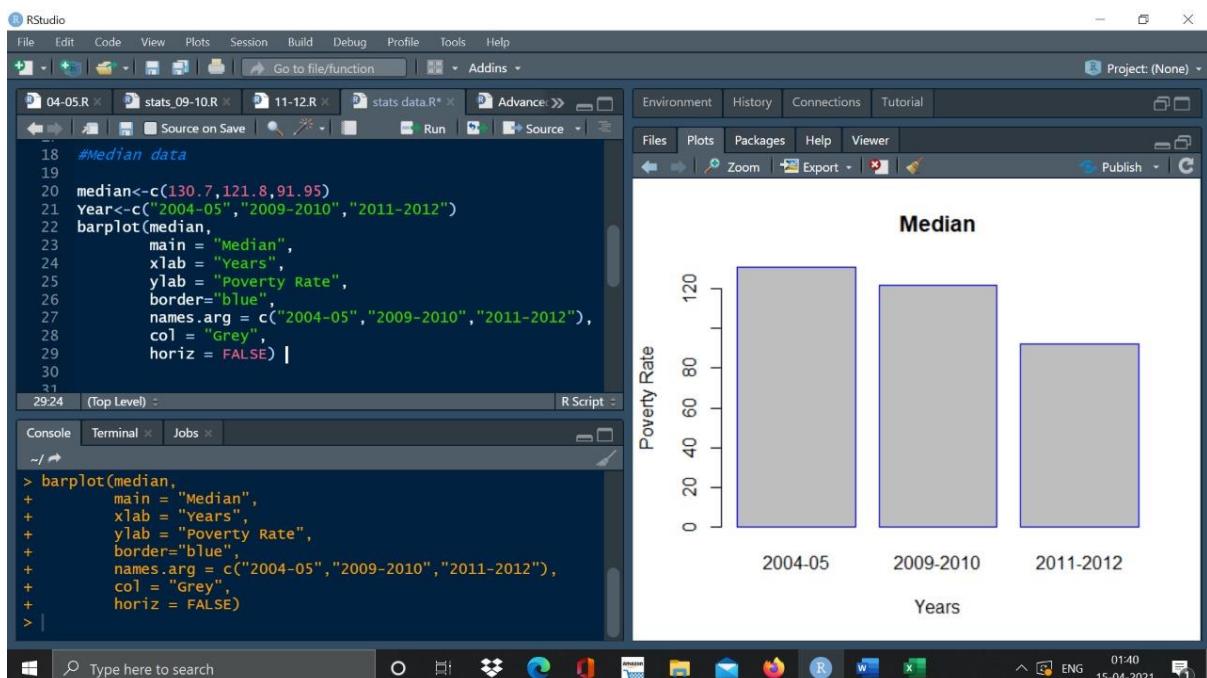
Data Visualization

Based on the code executed Above here are the graphs plotted based on the results:

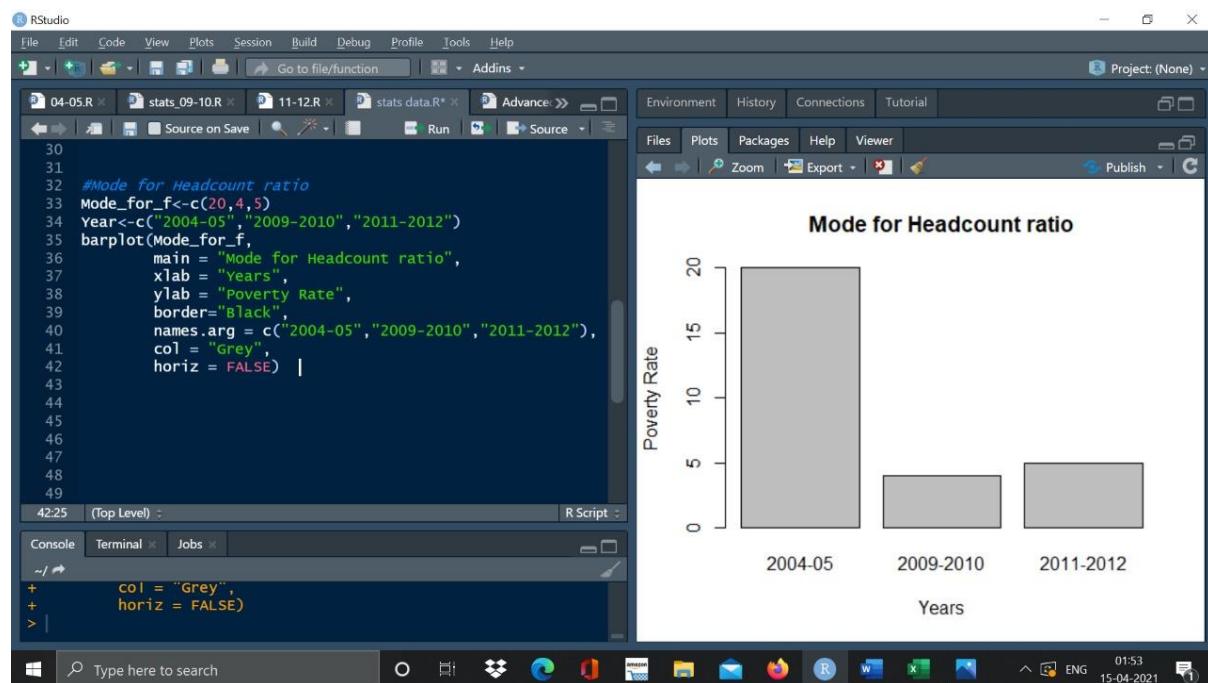
1) Mean



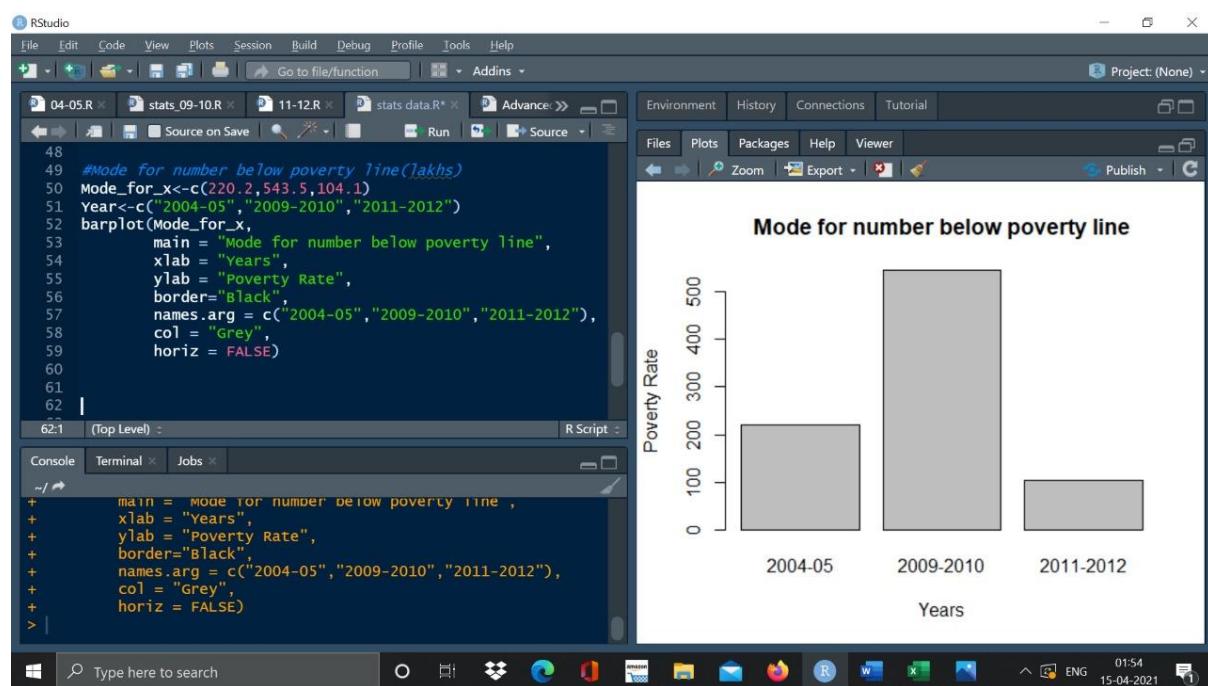
2) Median



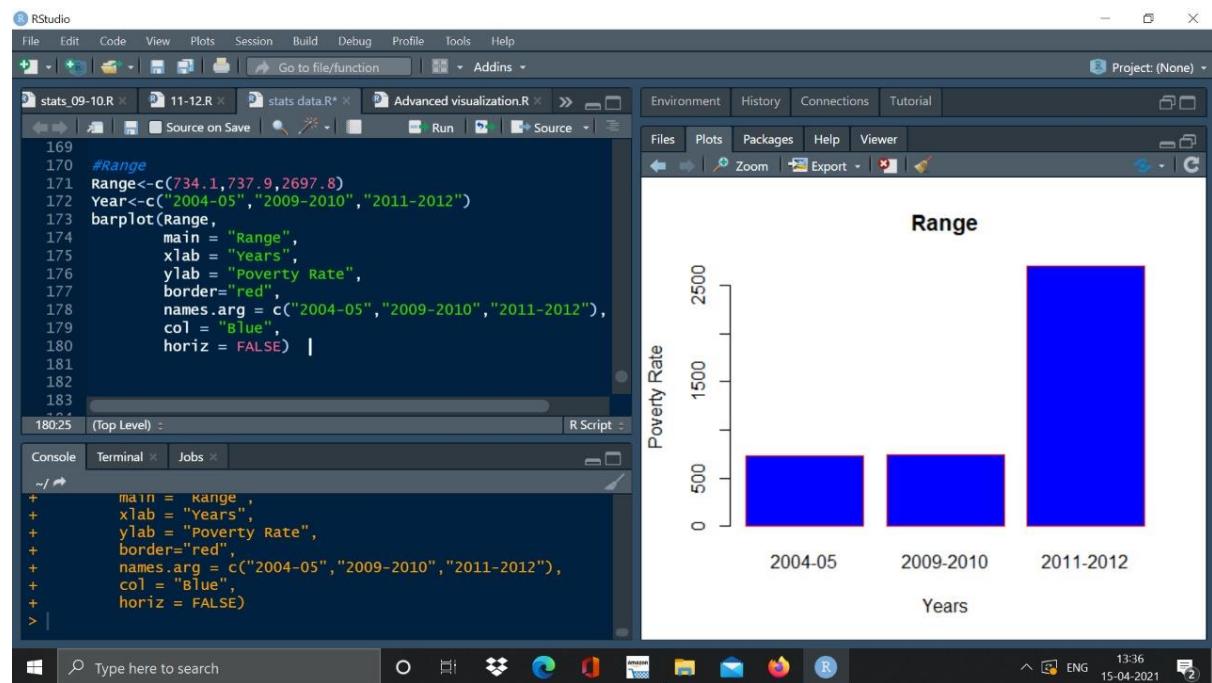
3) Mode for Headcount Ratio



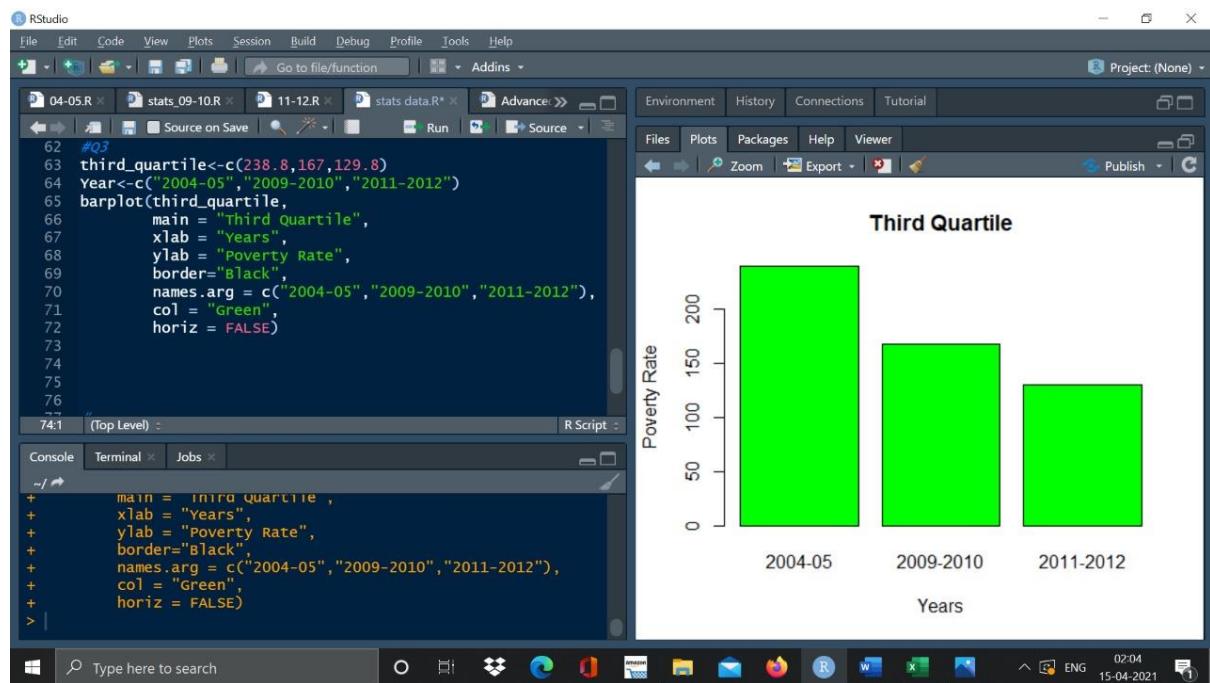
4) Mode for Poverty number



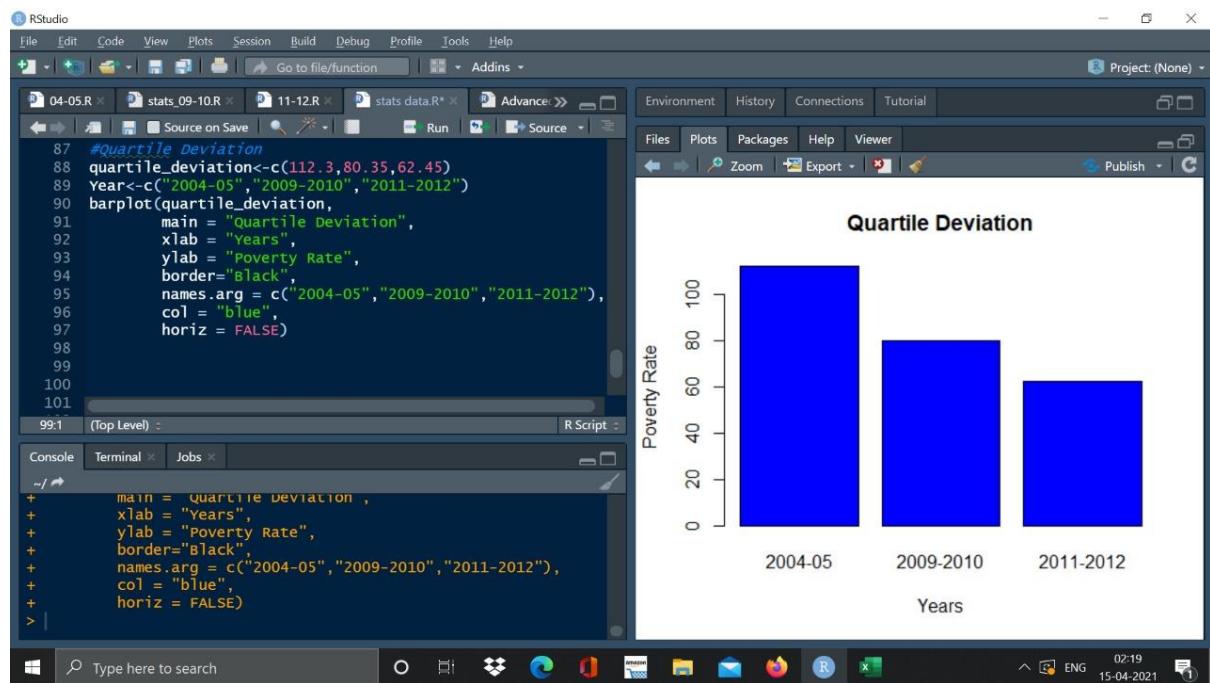
5) Range



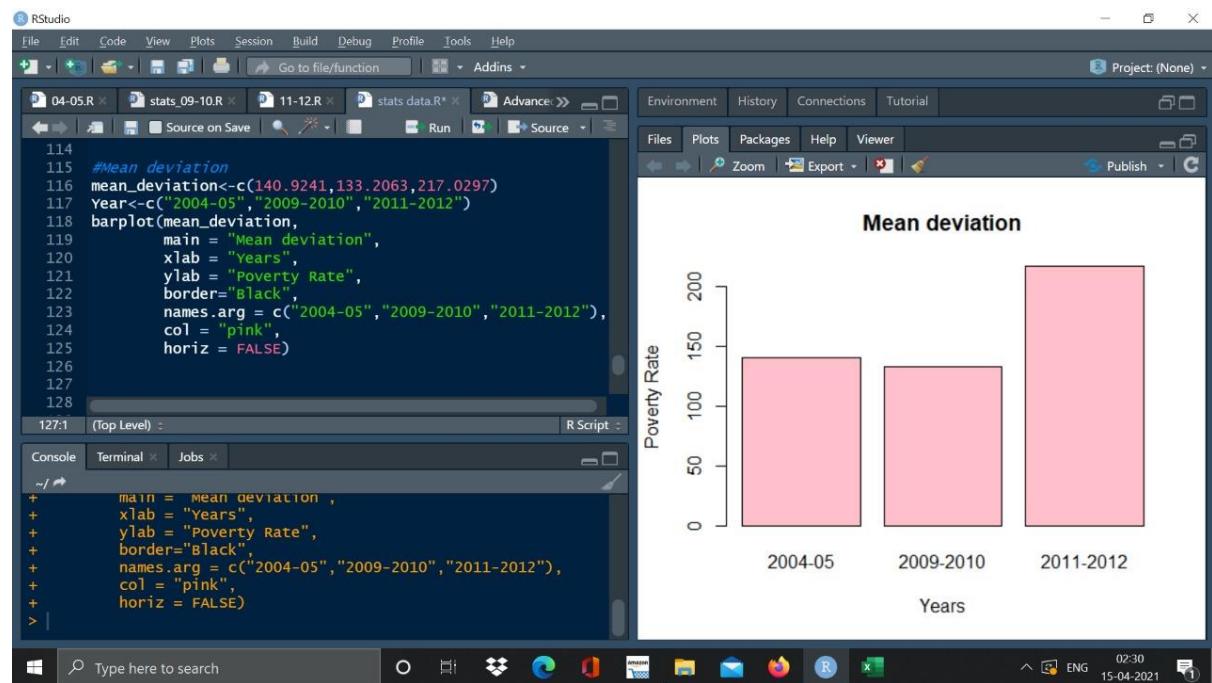
7) Quartile 3



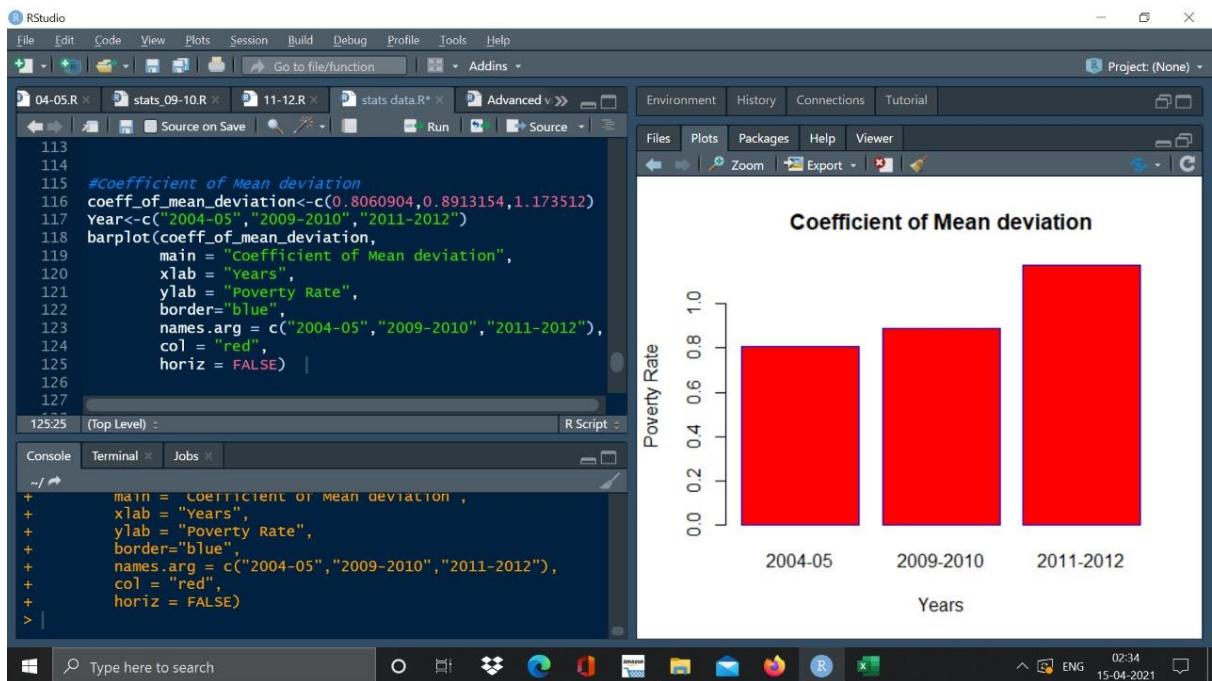
8) Quartile deviation



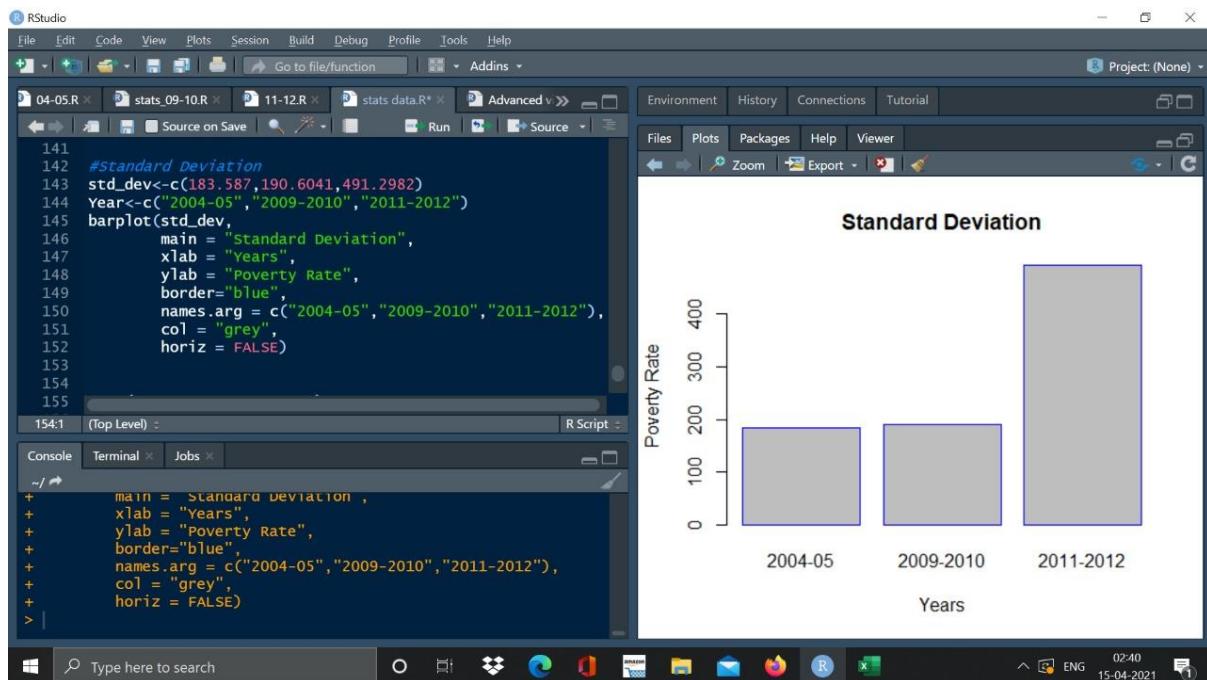
9) Mean Deviation



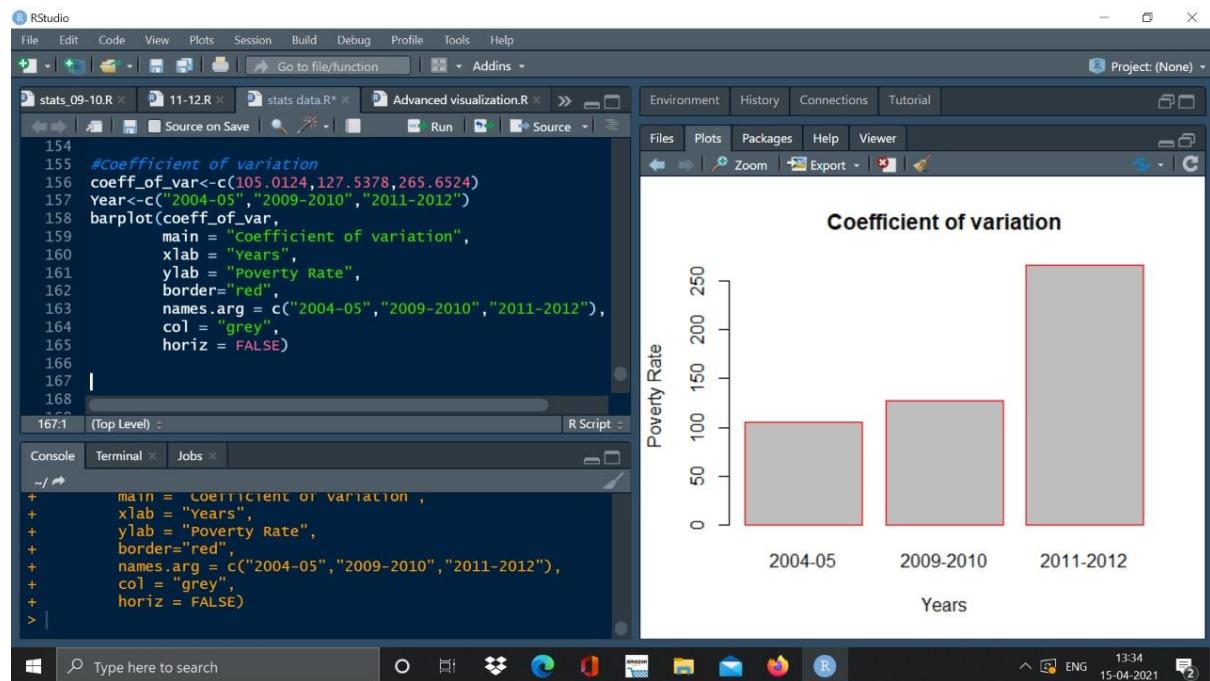
10) Coefficient of Mean deviation



11) Standard Deviation

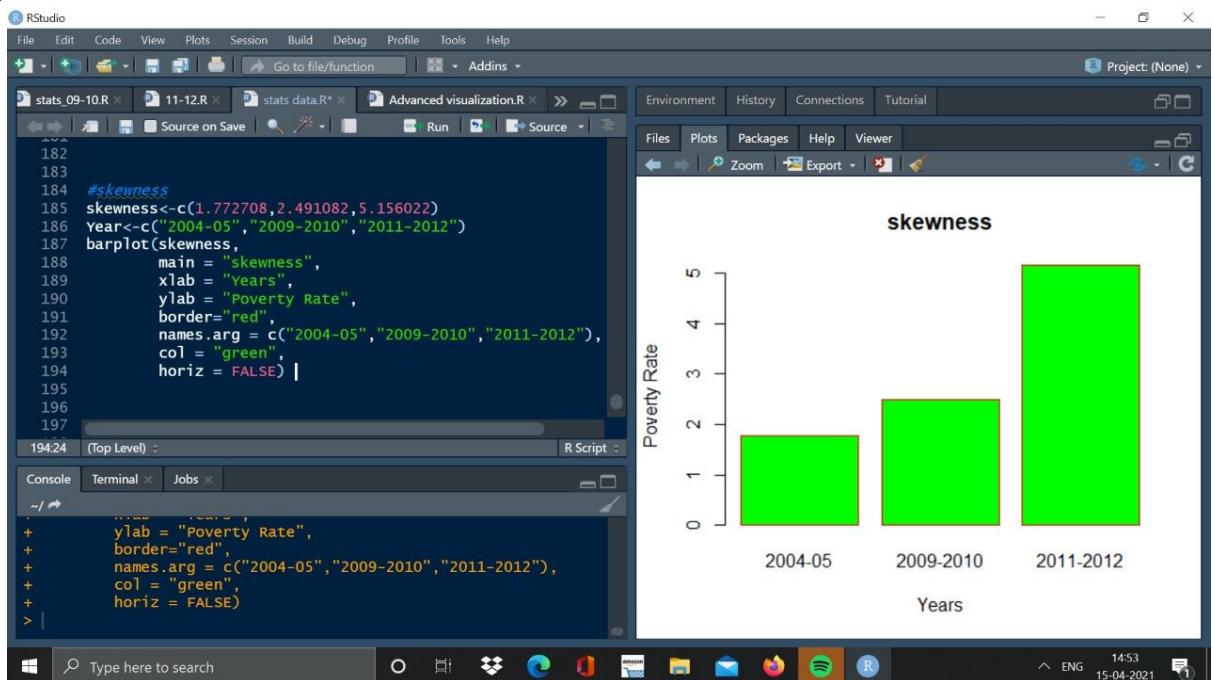


12) Coefficient of Variance

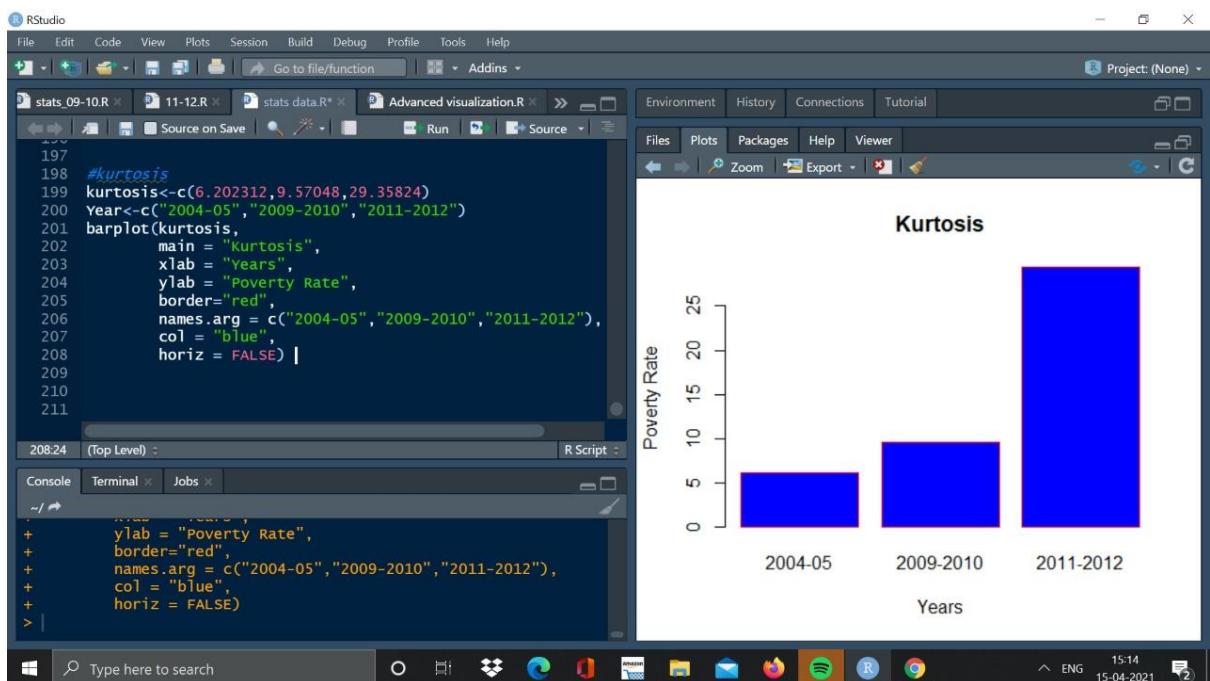


-138.12

13) Skewness



14) Kurtosis



CONCLUSION:

From the Analysis, we can conclude that the year 2011-12 showed the highest poverty rate as compared to the other two years.

The poverty in year 2011-12 increased drastically by the rate of 27.62%

There wasn't much changes in the poverty rate of year 2004-05 and 2009-2010

Hence we can say that the year 2011-12 faced more crises than the other two years