PROBABILITY AND STATISTICS

PROJECT

Names: - Faizan-Ul-Hassan

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Roll No: - 19I-1976

19I-0472

Section: - CS-F

Submitted To: - Ma’am Sehrish Hassan

Part 1

https://covid.gov.pk/

https://www.worldometers.info/coronavirus/country/pakistan/

Entries	**Figures**	**Last 24 hours**
Total (confirmed) cases	924,667	1,843
Total deaths	20,930 (02%)	80
Recovered cases	848,685 (98%)	4,047
Total tests	13,316,39	47,183
Active cases	57,336 (June 1)	
Critical cases	3,767	0

As we can see from the table above that the statistics are update as per June 1st, 2020. The total no of tests performed are 13,316,397 according to the official website by the government of Pakistan. The no of confirmed cases reported from all over the country are numbered as 924,667 whereas the total death toll reached so far is 20,930. Talking about the death rate, it is 2.26% collectively. The recovery rate has been 91.78% as per the statistics. Moreover the amount of critical cases is far better than before due to strict lockdown as well as implementation of smart lockdown.

Part 2

WEEKS	PROVINCES						
	PUN	SINDH	KPK	BAL	GILGIT	AJK	ISB
26 feb-03 mar 2020	-	2	-	-	1	-	2
04-10 mar	-	12	-	1	1	-	-
11-17 mar	26	158	17	14	1	-	6
18-24 mar	270	235	61	95	78	1	10

25-31 mar	412	269	175	48	103	5	36
01-07 April	1322	310	276	48	28	13	38
08-14 April	915	532	333	36	22	27	48
15-21 April	1383	1545	505	255	49	5	54
22-28 April	1499	2238	793	420	47	14	103
29 April-05 may	2593	2898	1339	580	56	11	189
06-12 may	4805	4,421	1522	663	89	12	274
13-19 may	3460	5,337	1533	727	81	45	379
20-26 may	4433	5560	1705	651	82	81	741
27 may-02 June	8371	7,579	2638	1317	141	70	1309
03-09 June	13971	10,217	3630	2178	195	160	2775
10-16 June	14779	16,565	4580	1406	190	259	3279
17-23 June	11297	14,788	4281	1197	173	189	2241
24-30 June	6726	11,984	3210	842	152	201	1429
01-07 July	7337	12,986	2083	443	106	326	738
08-14 July	4446	10,147	2,320	320	113	269	665
15-21 July	2771	6,331	1,522	230	170	249	386
22-28 July	1636	5,294	1,201	185	164	118	262
29 July-04 Aug	1119	2,618	600	126	176	50	159
05-11 Aug	1144	2,540	535	176	164	52	174
12-18 Aug	1027	2,187	542	414	182	55	116
19-25 Aug	724	1,933	430	294	180	53	134
26 Aug-01 Sep	455	939	434	235	177	37	120
02-08 Sep	468	1354	446	258	146	38	114
09-15 Sep	557	1622	429	533	229	101	204
16-22 Sep	656	1,846	278	917	245	125	262
23-29 Sep	776	2,358	358	650	236	132	335
30 Sep-06 Oct	770	2096	365	182	106	214	355
07-13 Oct	866	1865	286	138	81	286	590
14-20 Oct	922	1592	352	140	126	366	783
21-26 Oct	1146	1,766	340	122	100	285	872
27 Oct-02 Nov	1812	2660	630	138	102	481	1062
03-09 Nov	2,435	4060	1094	175	85	500	1867
10-16 Nov	3,718	5,694	1,772	297	83	708	2334
17-23 Nov	4,091	8,123	2,317	397	97	665	3111
24-30 Nov	4,440	9,699	2,438	341	100	730	2851

01-07 Dec	4613	11,862	2,708	314	88	457	2655
08-14 Dec	3,947	10,750	2,709	270	47	360	1984
15-21 Dec	4388	8,522	2,663	179	38	265	1371
22-28 Dec	4143	6,609	2,296	149	22	220	974
29 Dec-04 Jan 2021	4724	7,359	1983	155	17	148	1005
05-11 Jan	4,623	8,433	1919	175	12	118	945
12-18 Jan	4300	8,645	2177	193	5	153	837
19-25 Jan	4,401	5,524	1915	132	5	201	715
26 Jan-01 Feb	3503	5,673	1,679	76	7	195	601
02-08 Feb	3127	3,707	1,206	47	9	188	587
09-15 Feb	3349	2,582	1260	69	23	294	728
16-22 Feb	3,652	2,429	1,261	47	10	346	815
23 Feb- 01 Mar	4335	1,967	1,469	73	5	402	893
02-08 Mar	5965	1,544	1522	55	3	346	1460
09-15 Mar	9,577	1,626	2,212	112	2	463	2519
16-22 Mar	12744	1,882	4,140	144	13	703	4181
23-29 Mar	16725	1,694	5525	188	42	757	4528
30 Mar-05 April	17875	1,768	6,989	320	45	980	5007
06-12 April	17227	2,548	7,242	542	69	1158	4772
13-19 April	20770	3,992	7,034	603	61	1054	3626
20-26 April	19902	5,806	7,352	803	81	918	3195
27 April-03 May	15061	7,249	5,929	861	58	738	2688
04-10 May	12322	6,917	4,389	870	71	587	1890
11-17 May	7,924	6,475	2245	397	27	302	989
18-22 May	5,196	8,205	2,189	586	54	453	761

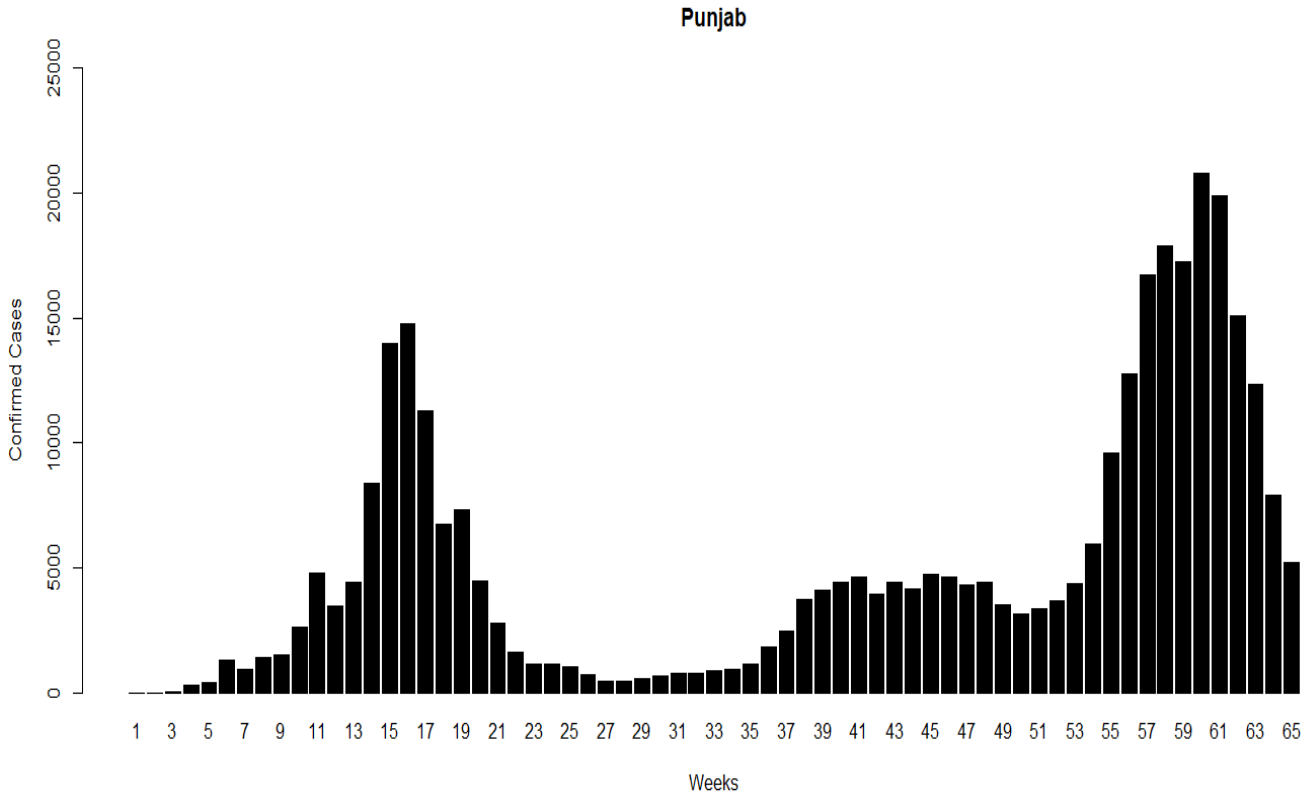
Observing the above table, we see that the no of confirmed cases in Punjab is more than any other provinces whereas the least no of cases were reported in Gilgit baltistan. According to the updated statistics, the death rate in KPK is 3.08, which is the highest in Pakistan and capital territory is at the lowest having a death rate of 0.93% only. Talking about the other 5 locations, the death rate is having a variation between 1 and 3%.

Brief summaries:

Punjab:

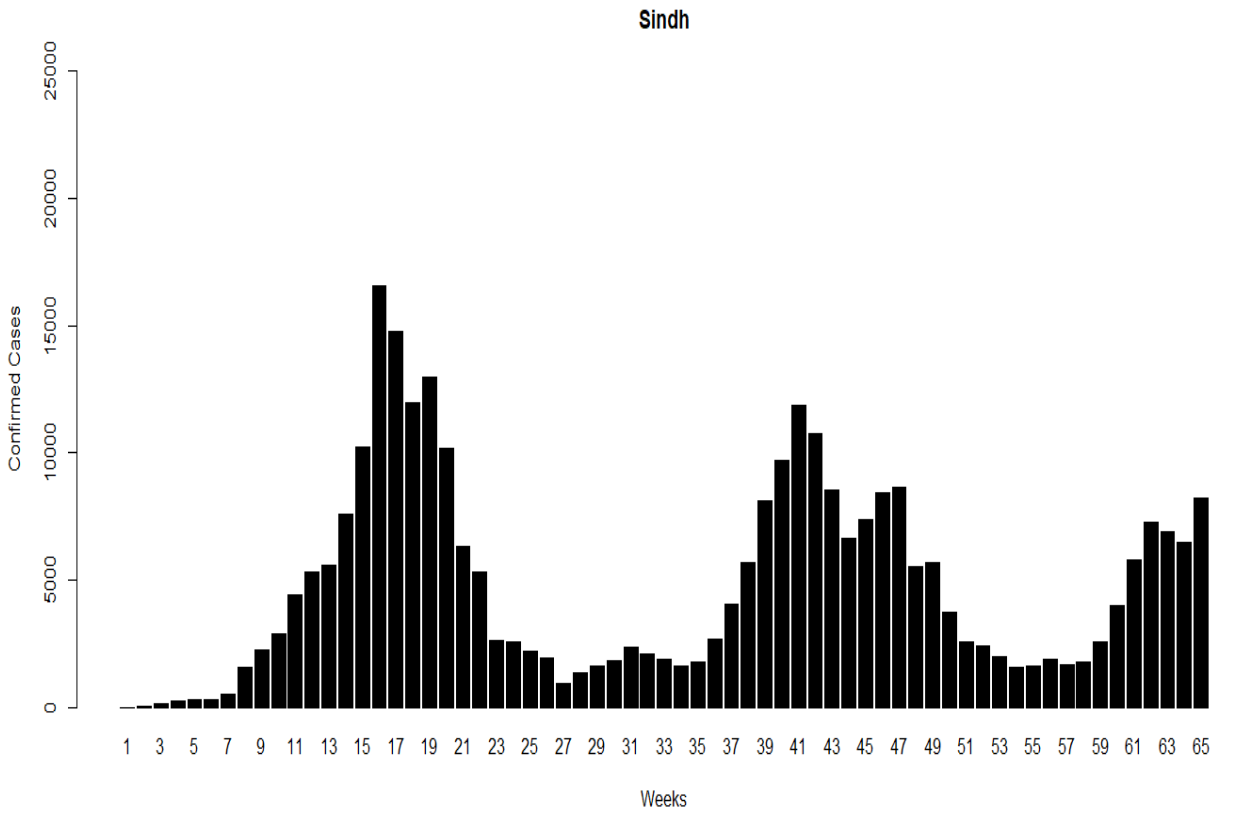
```
R Console

> punjab = c(0,0,26, 270, 412, 1322, 915, 1383, 1499, 2593, 4805, 3460, 4433, 8371, 139$
> a=max(punjab)
> a
[1] 20770
> b=min(punjab)
> b
[1] 0
> summary(punjab)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
      0    1119    3718    5138    5965   20770
> number = c(1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28$
> barplot(punjab,main="Punjab",xlab="Weeks",ylab="Confirmed Cases",names.arg=number,col$
>
```



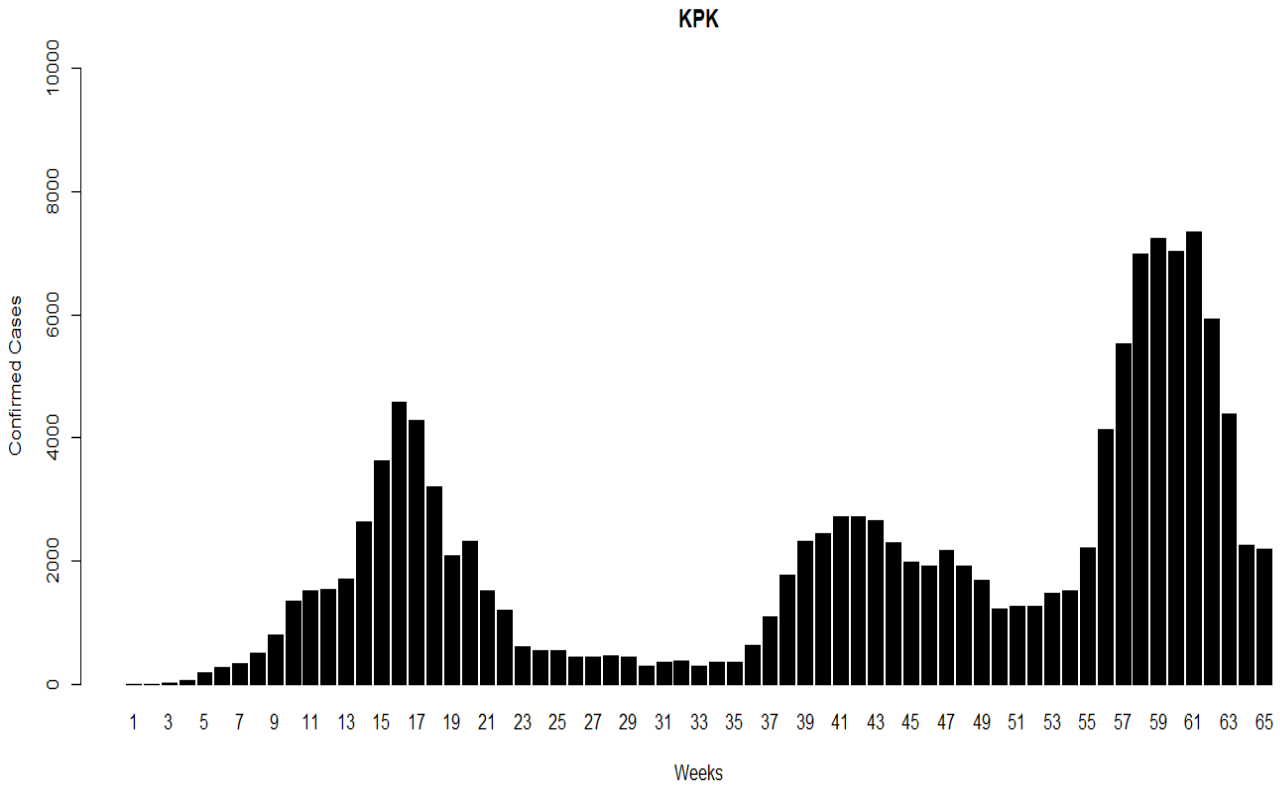
Sindh:

```
R Console
> sindh = c( 2 ,12, 158, 235, 269 ,310 ,532, 1545, 2238 ,2898 ,4421 ,5337 ,5560 ,7579 ,$
> c=max(sindh)
> c
[1] 16565
> d=min(sindh)
> d
[1] 2
> summary(sindh)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
      2    1768    2898    4740    7249   16565
> number = c(1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28$
>
> barplot(sindh,main="Sindh",xlab="Weeks",ylab="Confirmed Cases",names.arg=number,col="$
>
```



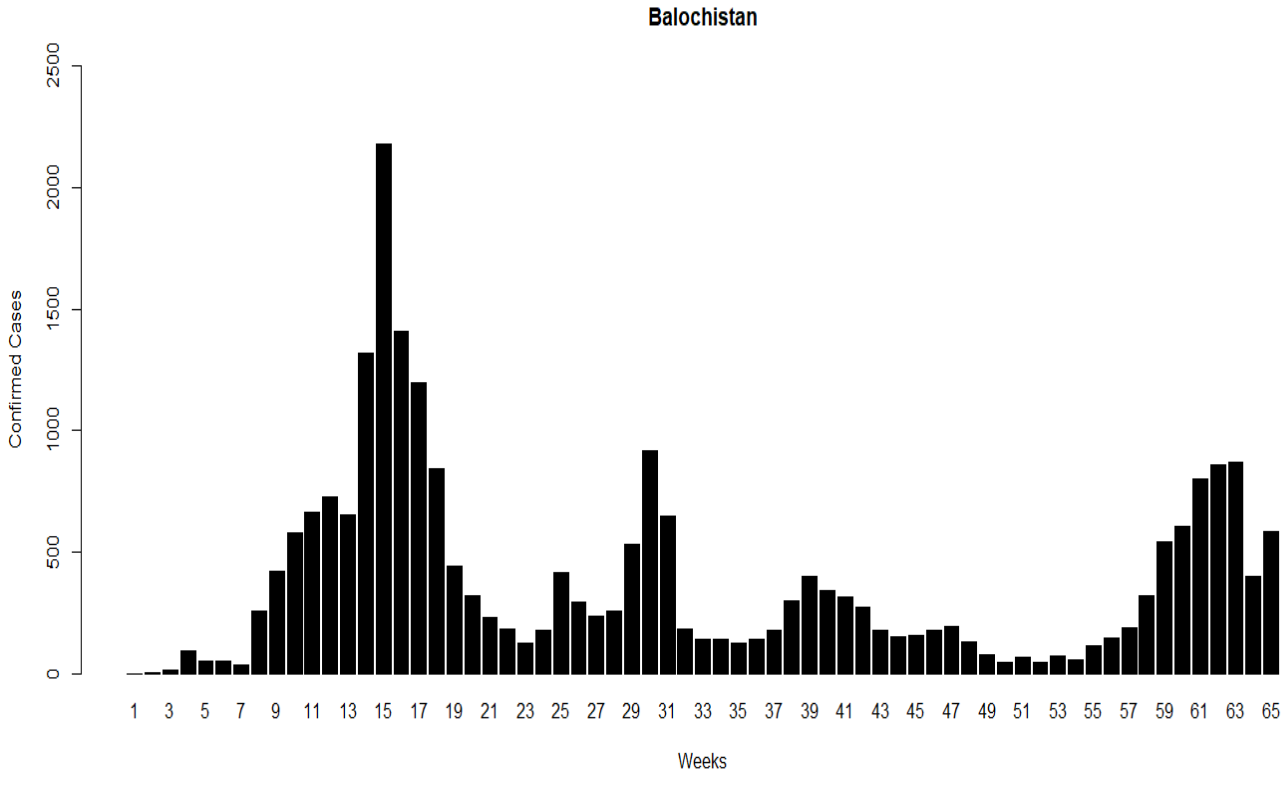
KPK:

```
R Console
> KPK = c(0,0,17,61,175,276,333,505,793,1339,1522,1533,1705,2638,3630,4580,4281,3210,20$
> e=max(KPK)
> e
[1] 7352
> f=min(KPK)
> f
[1] 0
> summary(KPK)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
      0     446    1522    1991    2438    7352
> number = c(1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28$
> barplot(KPK,main="KPK",xlab="Weeks",ylab="Confirmed Cases",names.arg=number,col="blac$
>
```



Balochistan:

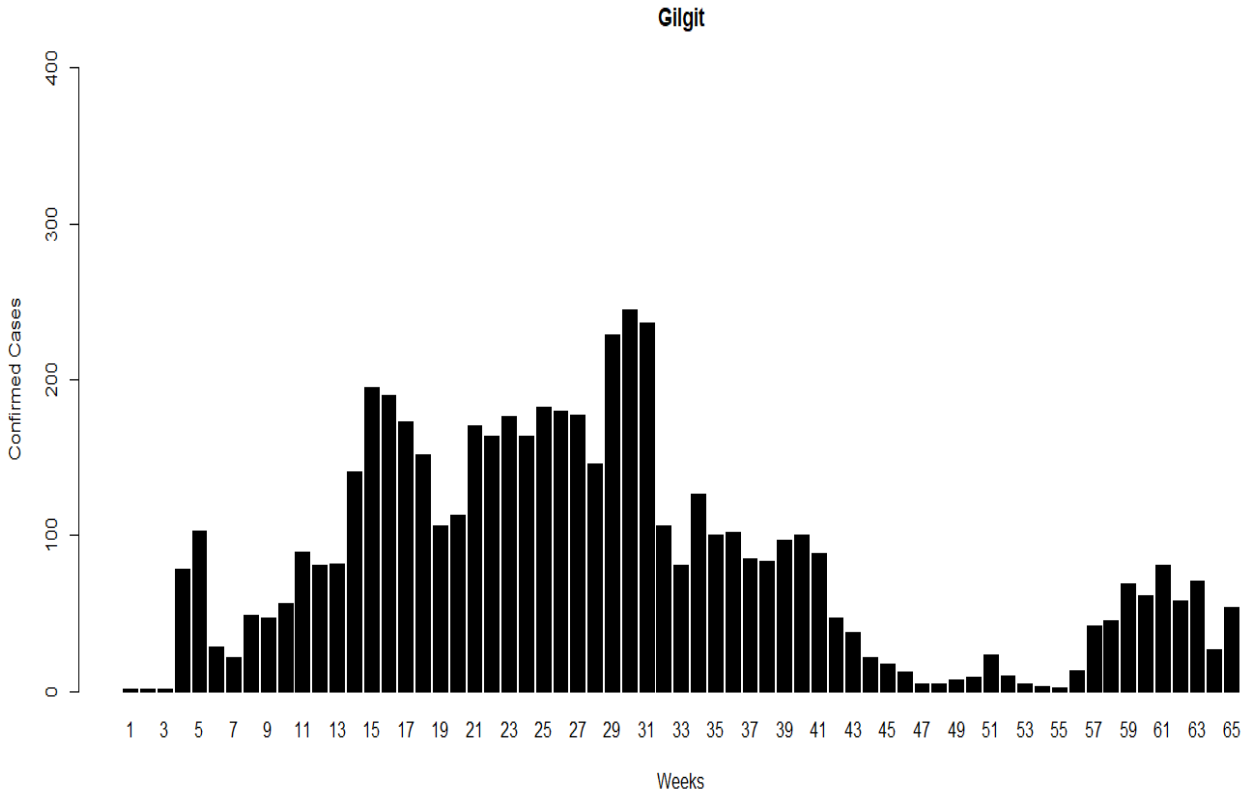
```
R Console
> Baloch = c(0,1,14,95,48,48,36,255,420,580,663,727,651,1317,2178,1406,1197,842,443,320$
> g=max(Baloch)
> g
[1] 2178
> h=min(Baloch)
> h
[1] 0
> summary(Baloch)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
    0.0   132.0   235.0   377.7   542.0  2178.0
> number = c(1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28$
> barplot(Baloch,main="Balochistan",xlab="Weeks",ylab="Confirmed Cases",names.arg=numbe$
>
```



Gilgit:

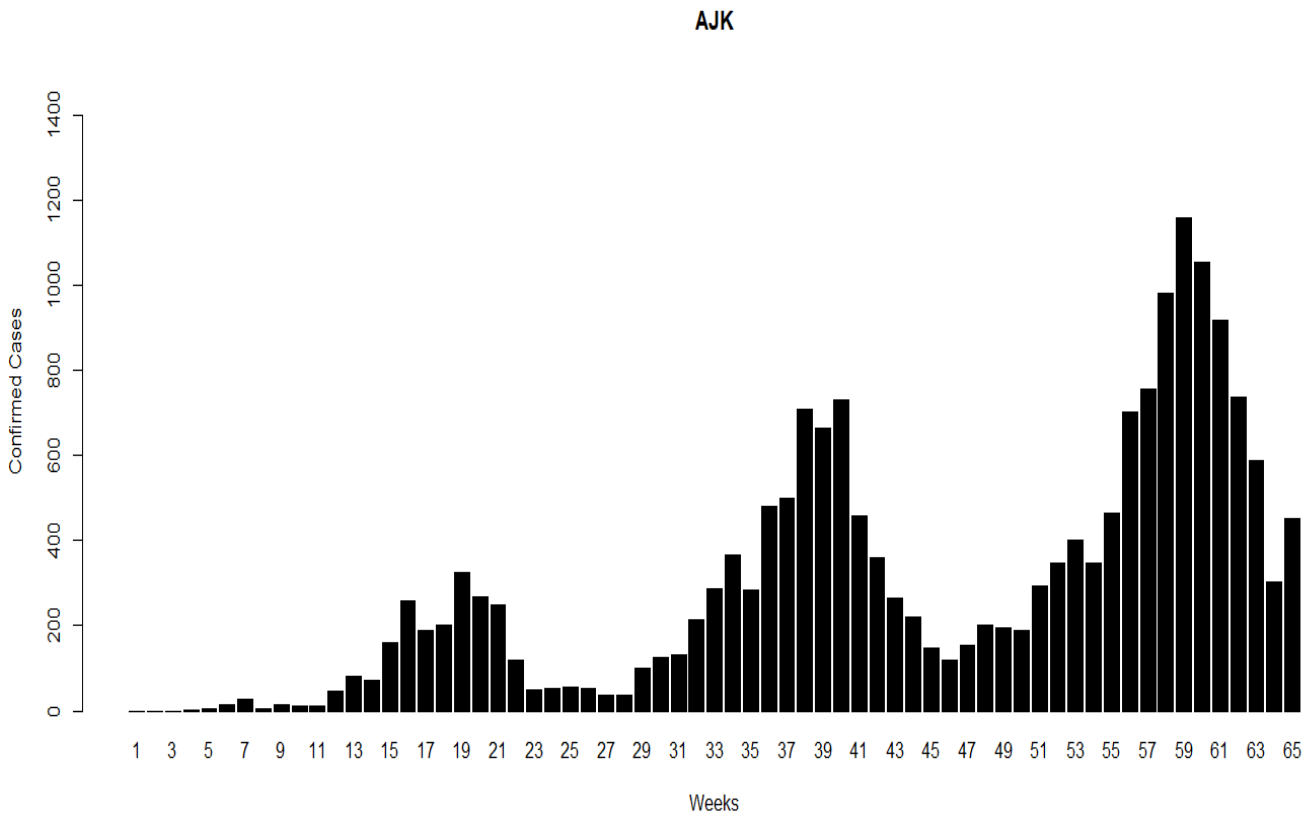
```
R Console

> Gilgit = c(1,1,1,78,103,28,22,49,47,56,89,81,82,141,195,190,173,152,106,113,170,164,1$
> i=max(Gilgit)
> i
[1] 245
> j=min(Gilgit)
> j
[1] 1
> summary(Gilgit)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
   1.00   23.00   81.00   84.17  126.00  245.00
> number = c(1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28$
> barplot(Gilgit,main="Gilgit",xlab="Weeks",ylab="Confirmed Cases",names.arg=number,col$
>
```



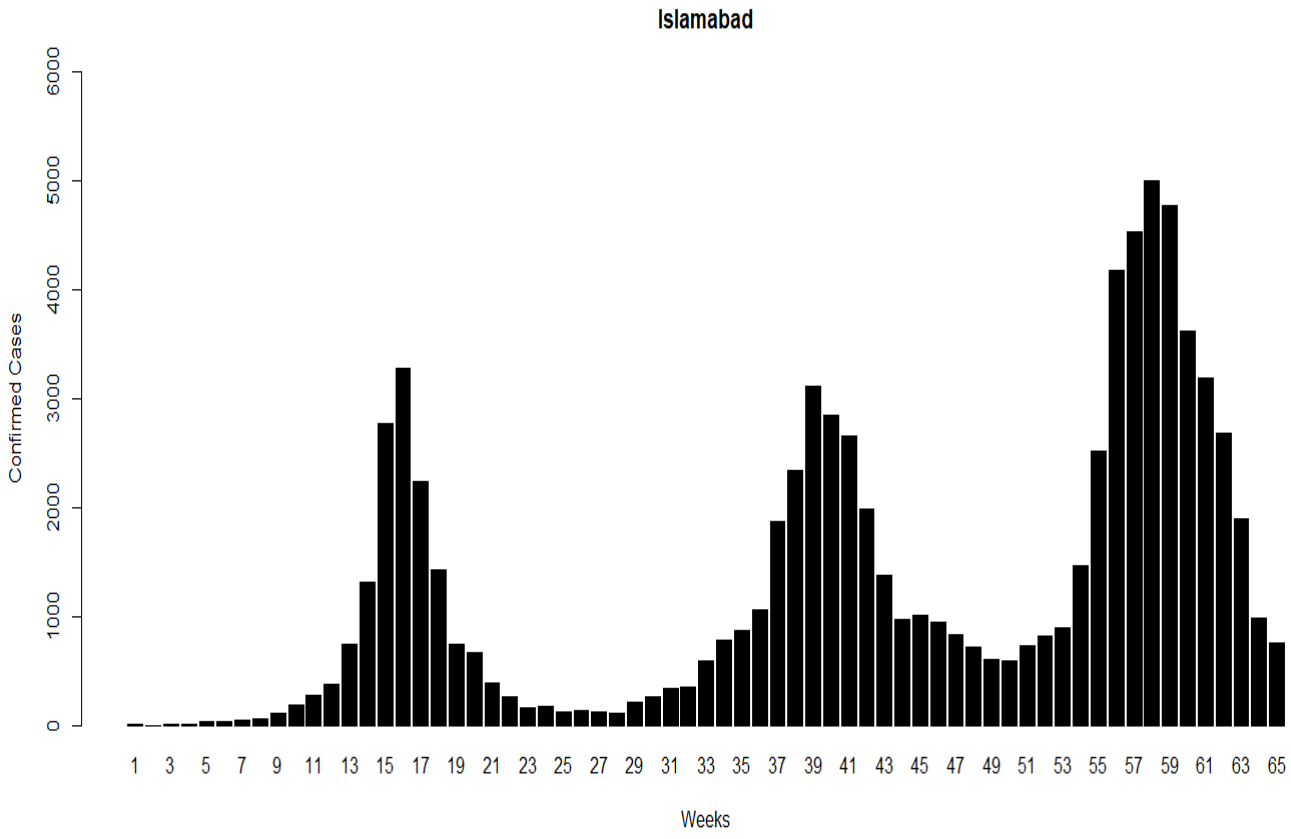
AJK:

```
R Console
> AJK = c(0,0,0,1,5,13,27,5,14,11,12,45,81,70,160,259,189,201,326,269,249,118,50,52,55,$
> k=max(AJK)
> k
[1] 1158
> l=min(AJK)
> l
[1] 0
> summary(AJK)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
    0.0    53.0   201.0   288.3   402.0  1158.0
> number = c(1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28$
> barplot(AJK,main="AJK",xlab="Weeks",ylab="Confirmed Cases",names.arg=number,col="blac$
>
```

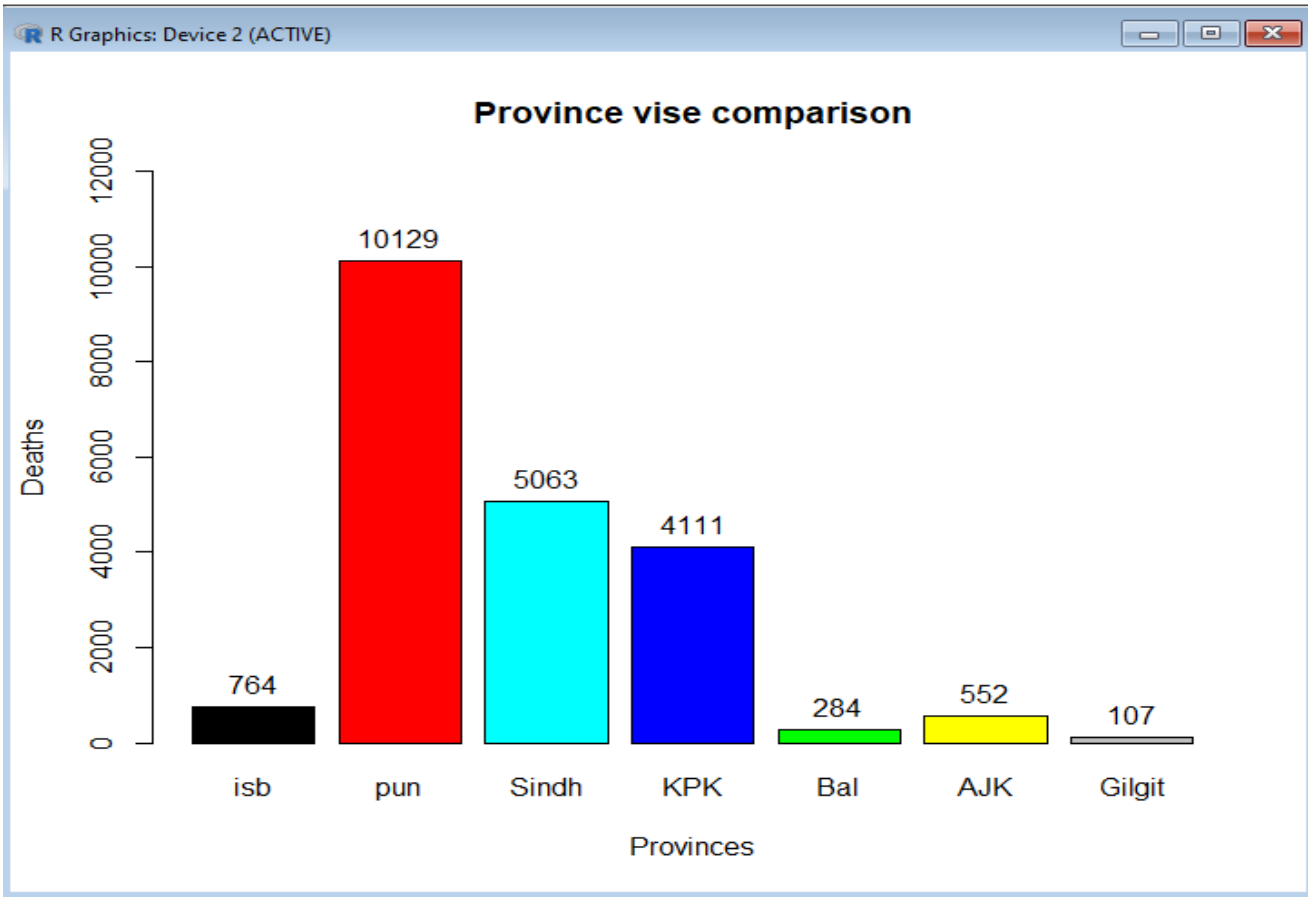


Islamabad:

```
R Console
> ISB = c(2,0,6,10,36,38,48,54,103,189,274,379,741,1309,2775,3279,2241,1429,738,665,386$
> m=max(ISB)
> m
[1] 5007
> n=min(ISB)
> n
[1] 0
> summary(ISB)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
      0     204     761    1233    1890    5007
> number = c(1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28$
> barplot(ISB,main="Islamabad",xlab="Weeks",ylab="Confirmed Cases",names.arg=number,col$
>
```



Part 3

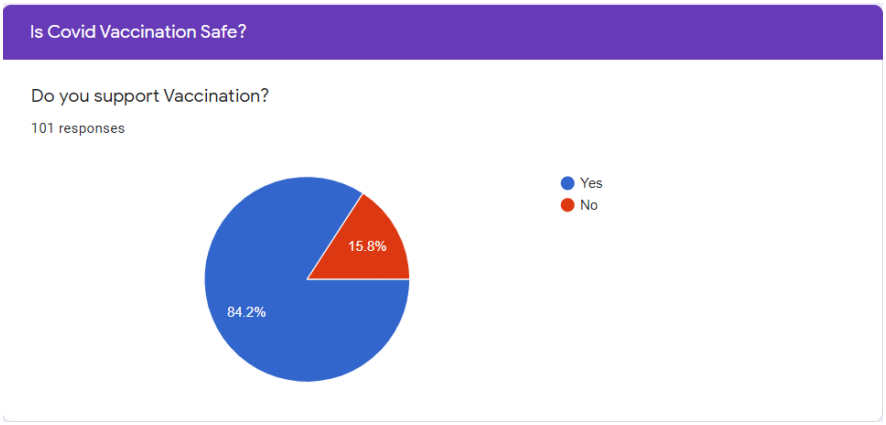


From the above table, we see that the no of confirmed cases in Punjab is the highest whereas the least no of cases were reported in Gilgit baltistan. The death rate in KPK is 3.08, whereas Islamabad has the lowest death rate which is estimated to be 0.93% only according to the updated statistics. Talking about the other provinces, the death rate is having a variation between 1 and 3%.

Part 4

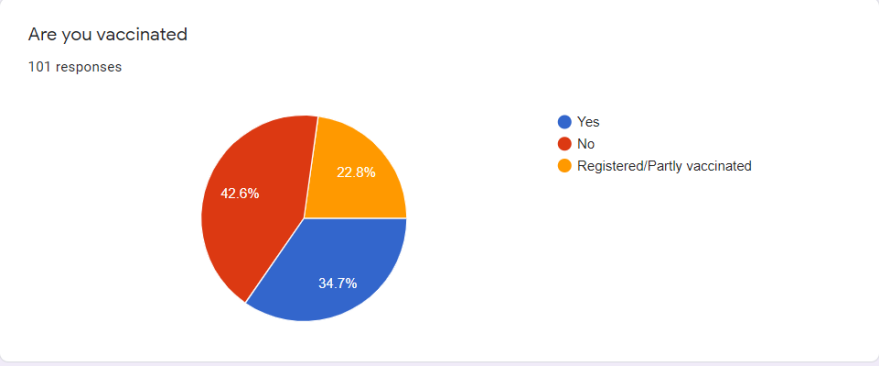
https://docs.google.com/forms/d/17uqxmqYvOjSkrBom0uejwwSNqWoIflhsH6Lf2AJ6hqU/edit?usp=sharing

From the day, the government announced the arrival of vaccine in pakistan, people have been thinking about the safety as well as availability of the vaccine. According to the survey we conducted, we have got the following results.



As seen from the above pie chart, around 84% of the people believed and expressed their consent about the vaccine and they support it in order to avoid the spread of cirus.

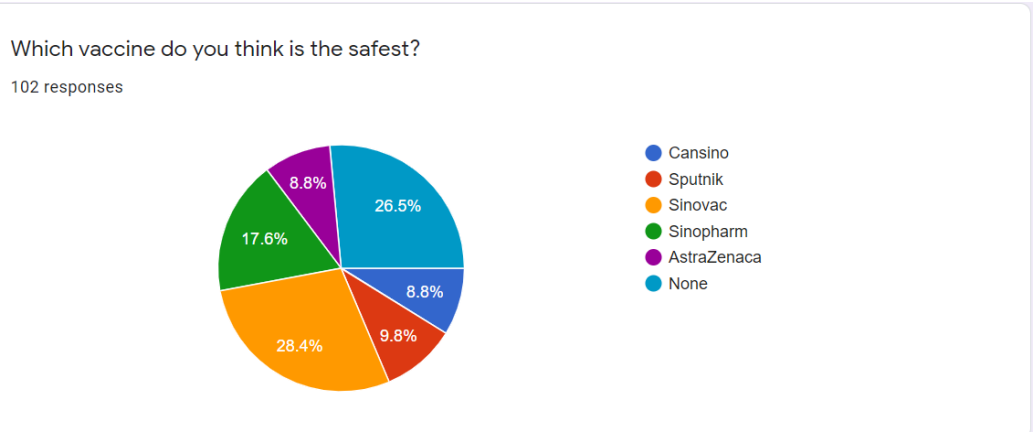
The next step includes the vaccination process which is currently taking place in different parts of the capital as well as the neighbouring city. We have asked the public whether they are vaccinated or not and we got the following results.



We can see that more than 50% people have either got vaccinated or they have registered themselves and around 42.6% people are not in favor of getting vaccinated due the rumors they have heard about vaccination as well their age and health factors. Some of the other reasons are mentioned below as well.

- Side effects are observed.
- Heard about the deaths due to the vaccine.
- Can cause high fever and body aches.
- Rumors about having headache, tiredness, fatigue due to vaccination.

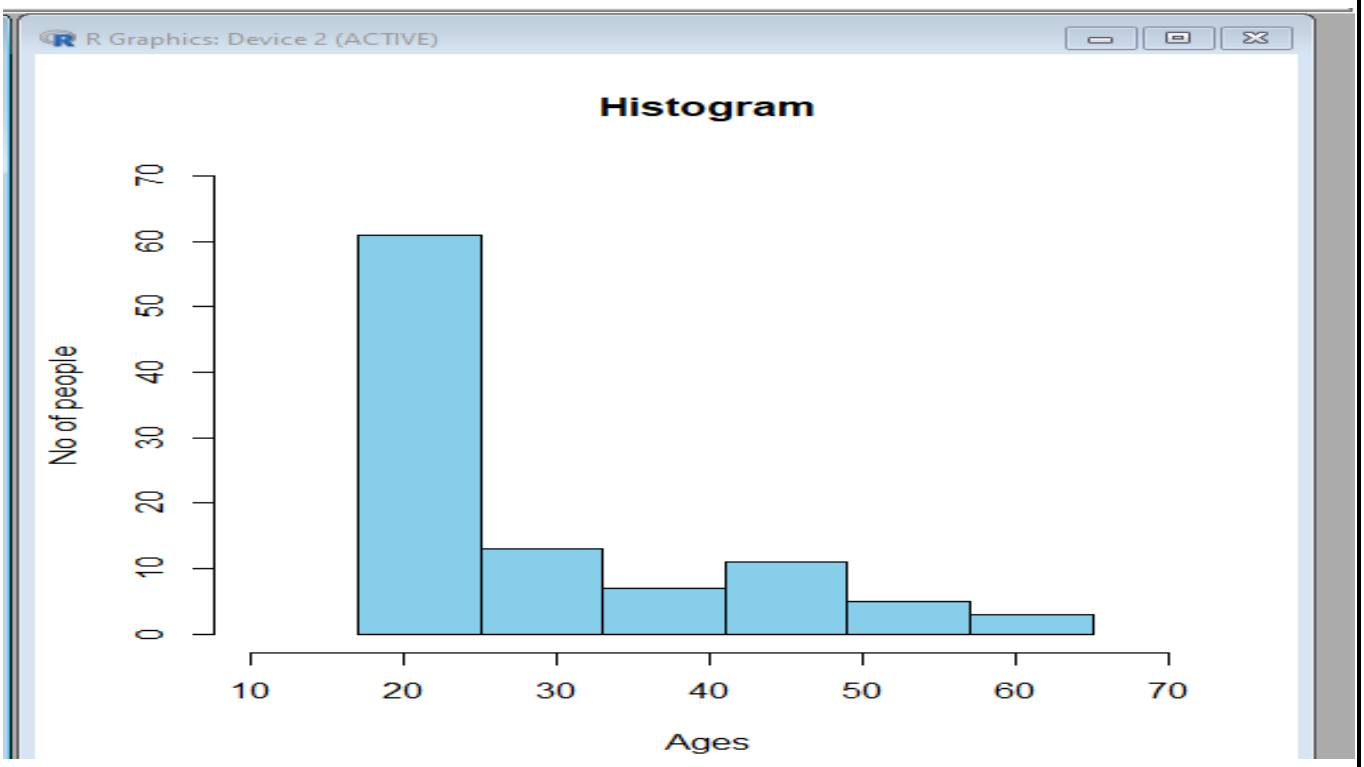
Talking about he safety of vaccines, it can not be compromised at all. Their safety must be ensured from the government. We asked the people about the safety and their opinion is shared below.

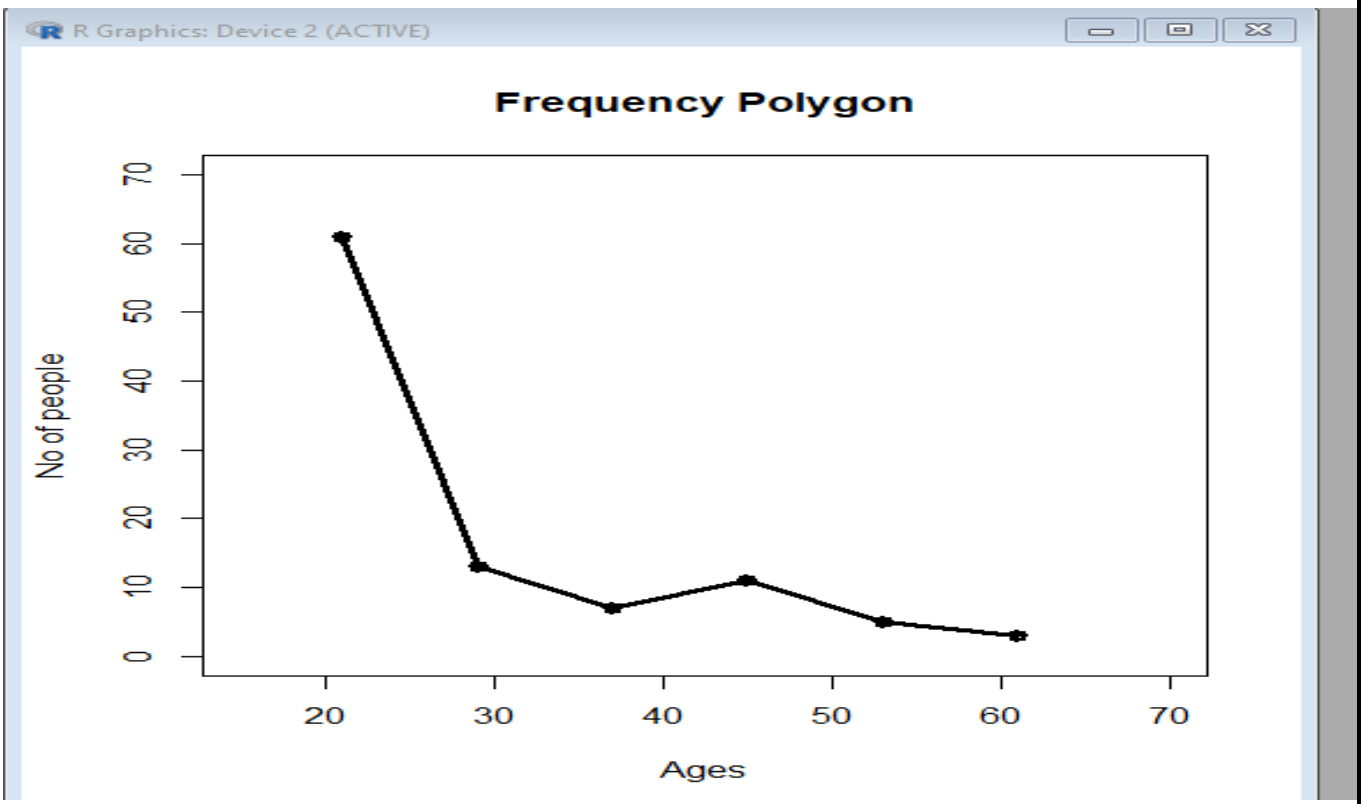


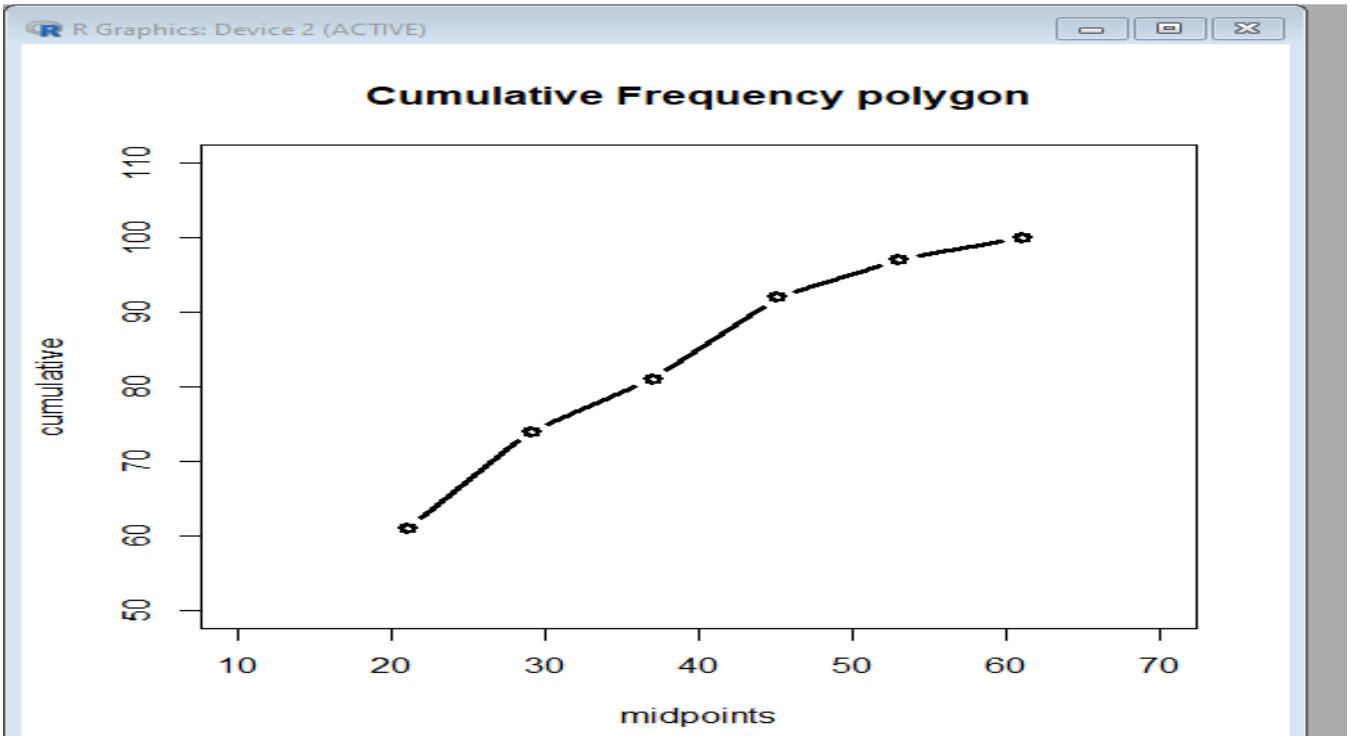
People have showed their consent in Sinovac which is currently available for vaccination process and their reasons include safety, protection from virus, no side effects observed so far, creates antibodies, effective and efficient.

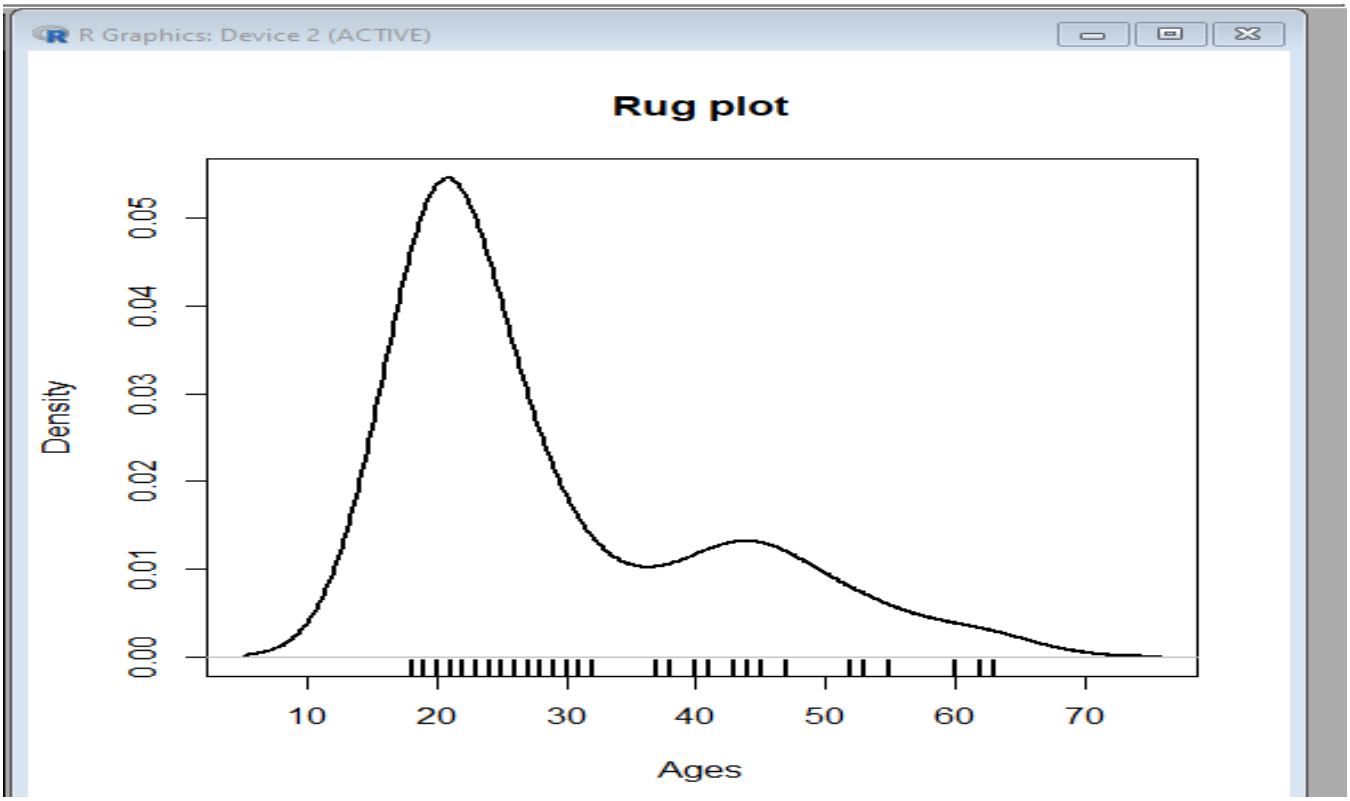
Moreover We have got many opinions from the people which said that vaccination must be done from the goernment centres due to safety and effectivity. Most of the people have gained information about the vaccine from news, Social media, Health care workers and friends or relatives. They have gave their opinion that we must spread awareness about covid, its consequences as wel as the vaccine through news, social media, print media and awareness campaigns.

Part 5


R Graphics: Device 2 (ACTIVE)
Histogram
No of people
0
10
20
30
40
50
60
70
10
20
30
40
50
60
70
Ages


R Graphics: Device 2 (ACTIVE)
Frequency Polygon
No of people
0
10
20
30
40
50
60
70
20
30
40
50
60
70
Ages


R Graphics: Device 2 (ACTIVE)
Cumulative Frequency polygon
cumulative
50
60
70
80
90
100
110
10
20
30
40
50
60
70
midpoints


R Graphics: Device 2 (ACTIVE)
Rug plot
Density
0.00
0.01
0.02
0.03
0.04
0.05
10
20
30
40
50
60
70
Ages

RGui (32-bit) - [R Console]

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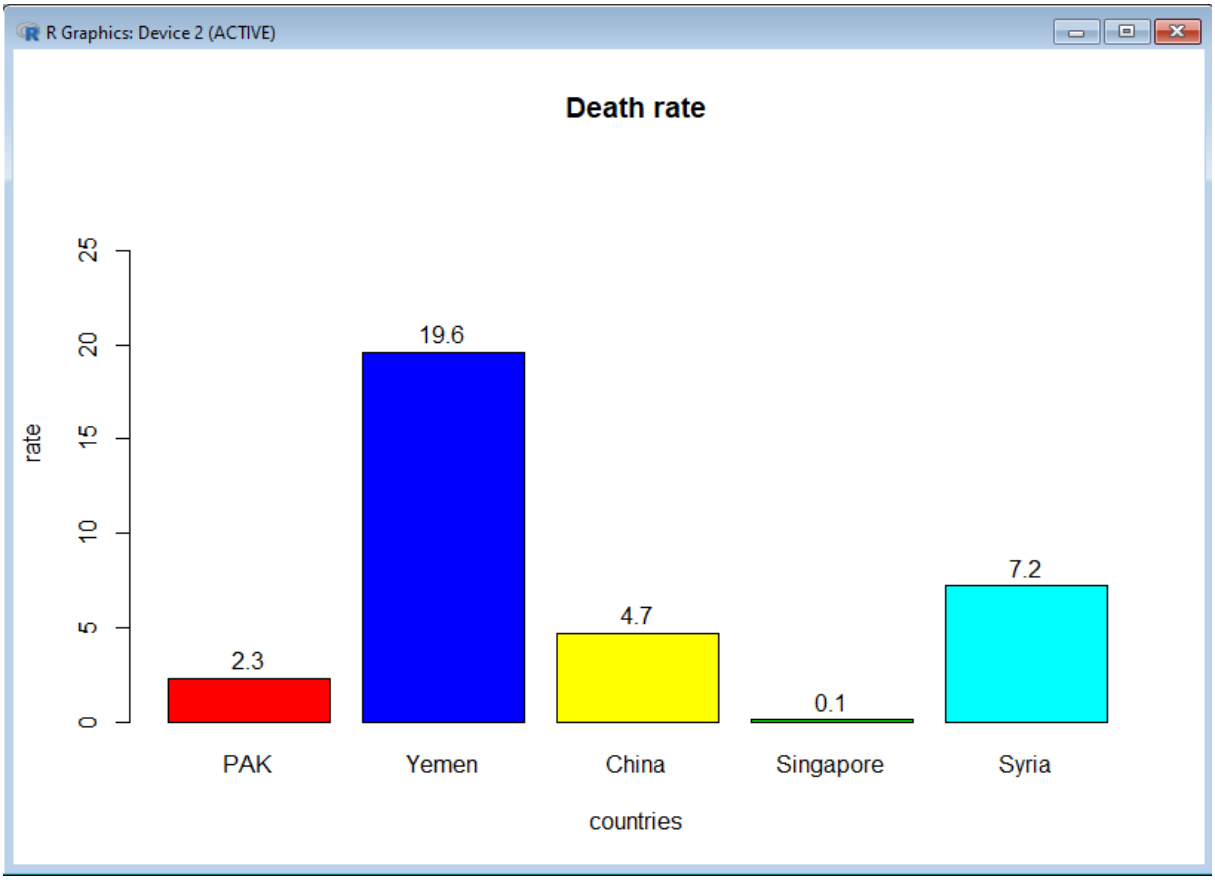
```
data = c(18,18,18,18,18,18,19,19,19,19,19,19,19,19,19,19,19,19,20,20,20,20,20,20,20,20,20,20,20,20,20,20,20,20,20,20,21,21,21,21,21,21,21,21,21,22,22,22,22,22,22$
maximum = max(data)
minimum = min(data)
range = maximum-minimum
classes = range/8
classes = ceiling(classes)
breaks = seq(17,65,by=8)
breaks
] 17 25 33 41 49 57 65
datacut = cut(data,breaks,right=T)
frequency=table(datacut)
i=1:6
width = 8
midpoints = c(21+width*(i-1))
cumulative = cumsum(frequency)
show = cbind(frequency,midpoints,cumulative)
show
      frequency midpoints cumulative
7,25]        61        21         61
5,33]        13        29         74
3,41]         7        37         81
1,49]        11        45         92
9,57]         5        53         97
7,65]         3        61        100
polygon=cbind(midpoints,frequency)
polygon1=cbind(midpoints,cumulative)
hist(data,breaks,main="Histogram",xlab="Ages",ylab="No of people",col="skyblue",xlim=c(10,70),ylim=c(0,70))
plot(polygon,type="o",main="Frequency Polygon",xlab="Ages",ylab="No of people",ylim=c(0,70),xlim=c(15,70),pch=1,lwd=3)
plot(polygon1,main="Cumulative Frequency polygon",type="b",ylim=c(50,110),xlim=c(10,70),lwd=3)
dense=density(data)
plot(dense,lwd=2,main="Rug plot",xlab="Ages",ylab="Density")
rug(data,side=1,col="black",lwd=2)
```

Part 6



Data from: https://coronavirus.jhu.edu/data/mortality

The data has been collected for 4 different countries from a reliable source which is mentioned above. The death rate has been 19.6% in Yemen which is the highest in the world where as Singapore is one of the major countries having the lowest death rate of only 0.1% according to the updated statistics. Talking about china which was the origin of COVID-19, it has taken over the pandemic and decreased he death rate to 4.7% only. Pakistan due to its strict lockdown and by the efforts of the government and public of Pakistan, it has been able to decrease the death rate to 2.3% only.