



Government of Nepal  
Ministry of Forest and Environment  
Department of Environment  
Babarmahal, Kathmandu

# **Air quality status of Nepal 2016-2020**

**Volume XXI**

**Bhimdatta air quality monitoring station**



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## 1. Bhimdatta Air Quality Monitoring Station

- Address : Bhimdatta Municipality Office
- Location: 28.965051 latitude, 80.182925 longitude
- Surrounding of the station
  - East: North: Metallic Road
  - South: Municipality Office
  - East: Mahakali Hospital
  - West: Market Area
- Establish year: 2020 (2077)
- Brief introduction of the instruments installed in the station
  1. PM instrument- GRIMM EDM 180
  2. Met sensor luffth WS 700
  3. Data logging and data transmission and power backup system

## 2. Air Quality Status of Bhimdatta Station (2020)

### 2.1. Annual average of PM1, PM2.5, PM10 and TSP

The annual average of PM1, PM<sub>2.5</sub>, PM<sub>10</sub> and TSP of the Bhimdatta monitoring station was calculated as shown in figure below.

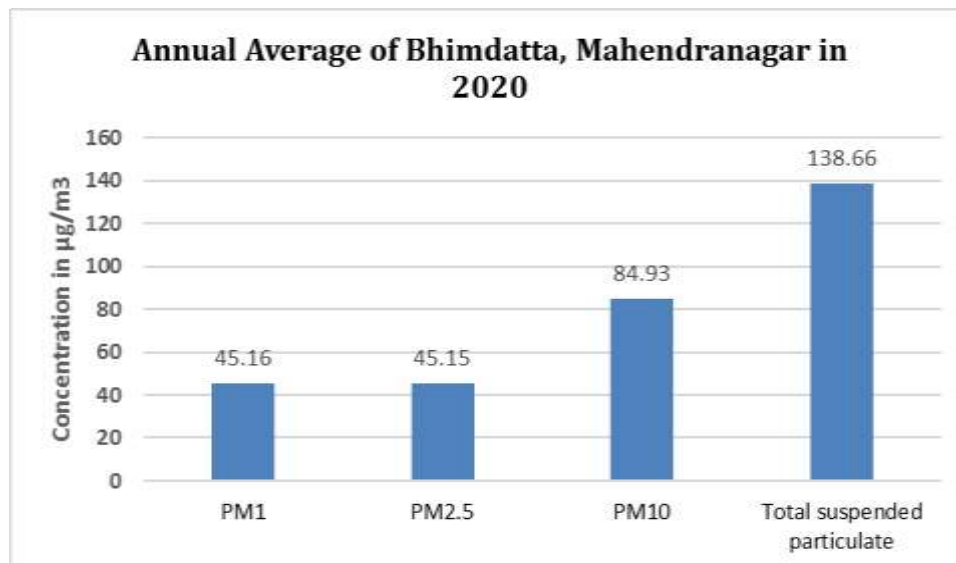


Figure 1: Annual average of Pm1, PM<sub>2.5</sub>, PM<sub>10</sub> and TSP in 2020

## 2.2. Temporal variation of PM<sub>1</sub>

### Annual average of PM<sub>1</sub>

The annual average of PM<sub>1</sub> at Bhimdatta station was found to be 45.16 µg/m<sup>3</sup>. Histogram of hourly average PM<sub>1</sub> is shown in the figure below.

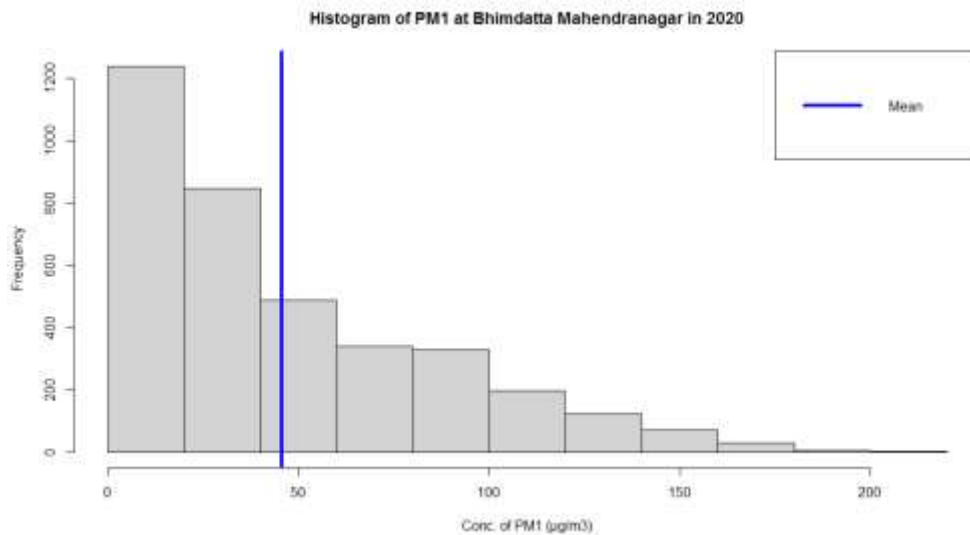


Figure 2 : Histogram of PM<sub>1</sub>

### Daily average of PM<sub>1</sub>:

Daily average concentration of PM<sub>1</sub> was high during December and was found low during August.

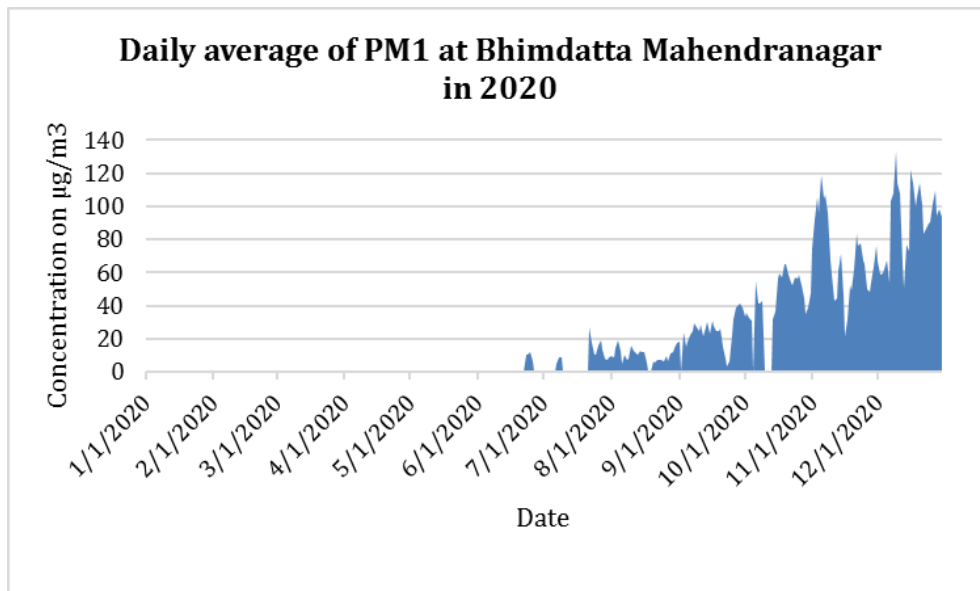


Figure 3: Daily average of PM<sub>1</sub>

### Monthly average of PM<sub>1</sub>

The highest and the lowest monthly average of PM<sub>1</sub> was found during December (90.53  $\mu\text{g}/\text{m}^3$ ) and June (9.82  $\mu\text{g}/\text{m}^3$ ) respectively.

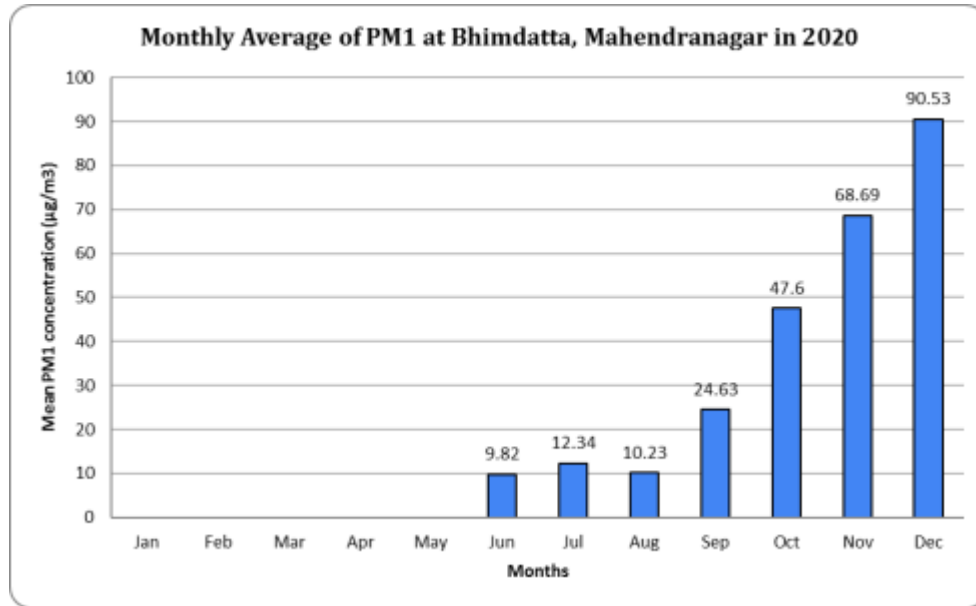


Figure 4: Monthly Average of PM<sub>1</sub>

### Monthly variation of PM<sub>1</sub>

Variation in concentration of PM<sub>1</sub> was found more during November-December whereas low during June.

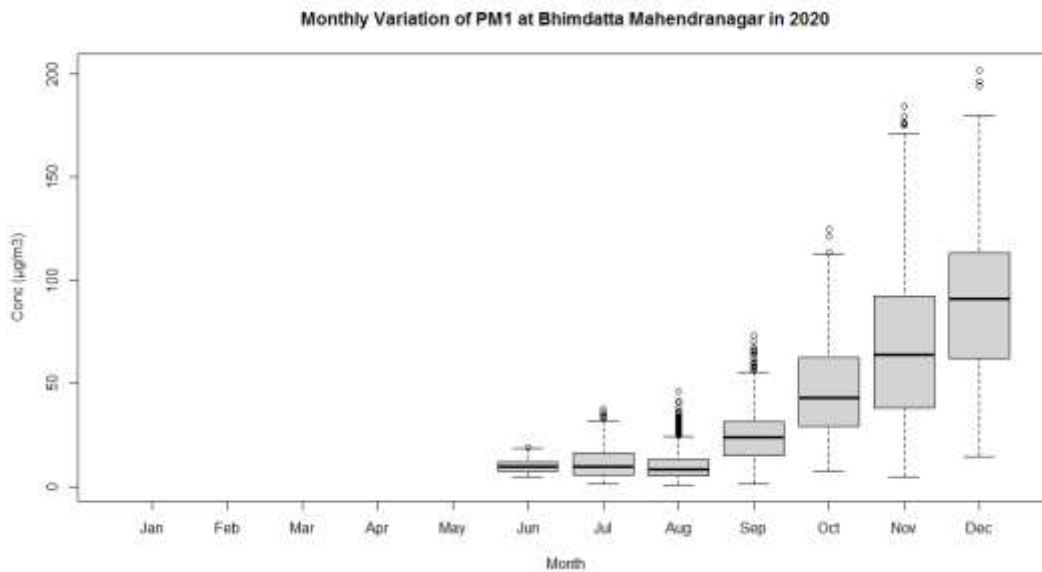


Figure 5: Monthly Variation of PM<sub>1</sub>



### Seasonal variation of average PM<sub>1</sub> concentration

Ambient concentration of average PM<sub>1</sub> during monsoon and post-monsoon as shown in the figure Figure 12 below. The concentration of PM<sub>1</sub> was found higher during post monsoon (46.97  $\mu\text{g}/\text{m}^3$ ) than monsoon season (10.8  $\mu\text{g}/\text{m}^3$ ) Figure 12: Seasonal variation of PM<sub>2.5</sub>.

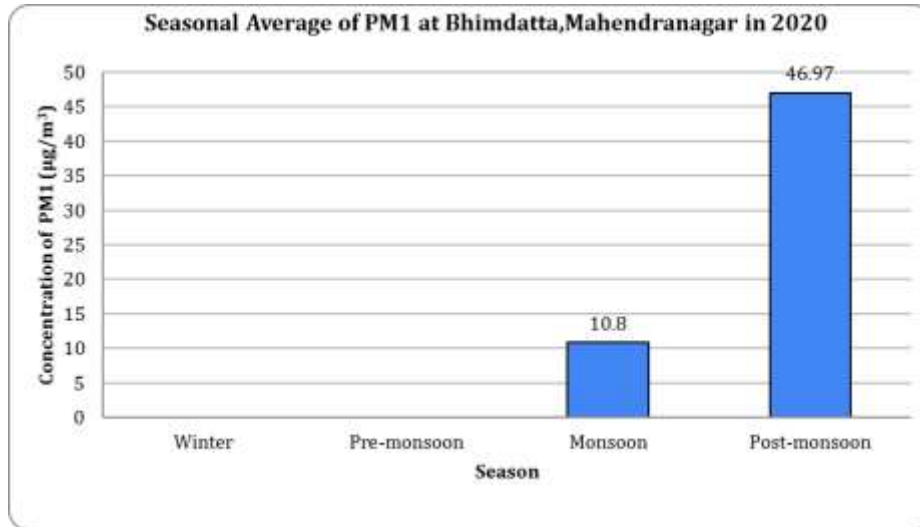


Figure 6: Seasonal variation of PM<sub>1</sub>

### Diurnal variation of average PM<sub>1</sub> concentration

The diurnal variation of average PM<sub>1</sub> concentrations can be shown in the figure below. The variation in PM<sub>1</sub> concentration was high at around 5-6 pm and low at 12 to 2 pm.

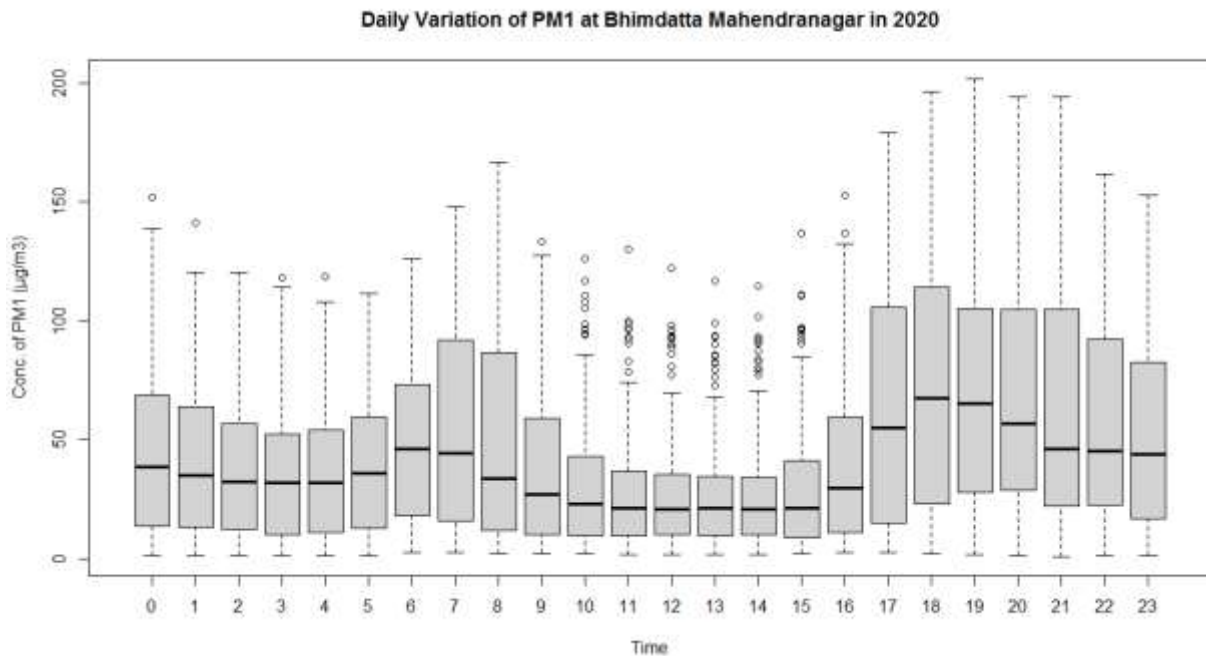


Figure 7: Diurnal variation of PM<sub>1</sub>

### 2.3. Temporal variation of PM2.5

#### Annual average of PM<sub>2.5</sub>

The annual average of PM<sub>2.5</sub> at Bhimdatta station was found to be 45.15  $\mu\text{g}/\text{m}^3$ . Histogram of hourly average PM<sub>2.5</sub> is shown in the figure below.

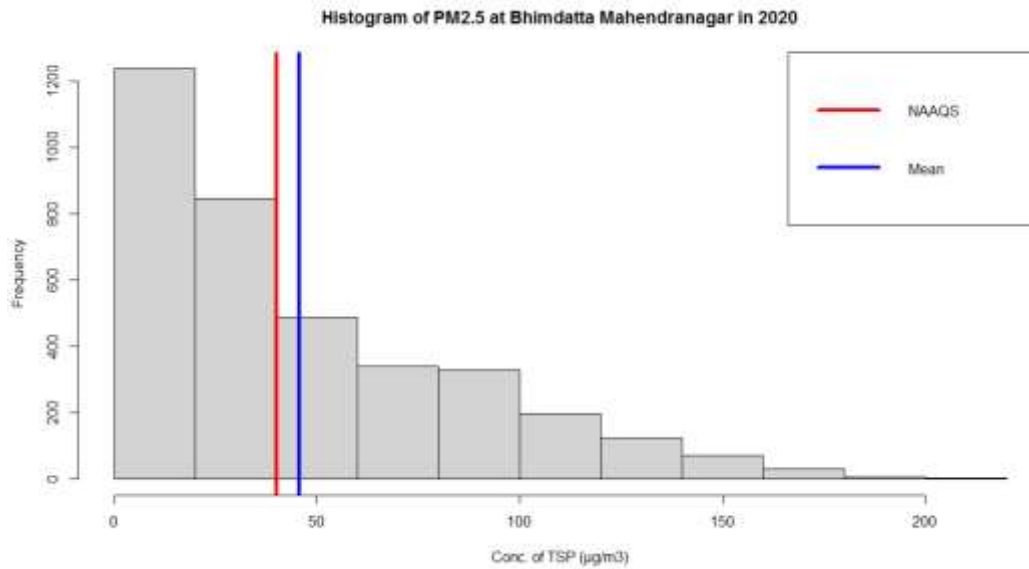


Figure 8 : Histogram of PM<sub>2.5</sub>.

#### Daily average of PM<sub>2.5</sub>:

Daily average concentration of PM<sub>2.5</sub> was high during December and was found low during August.

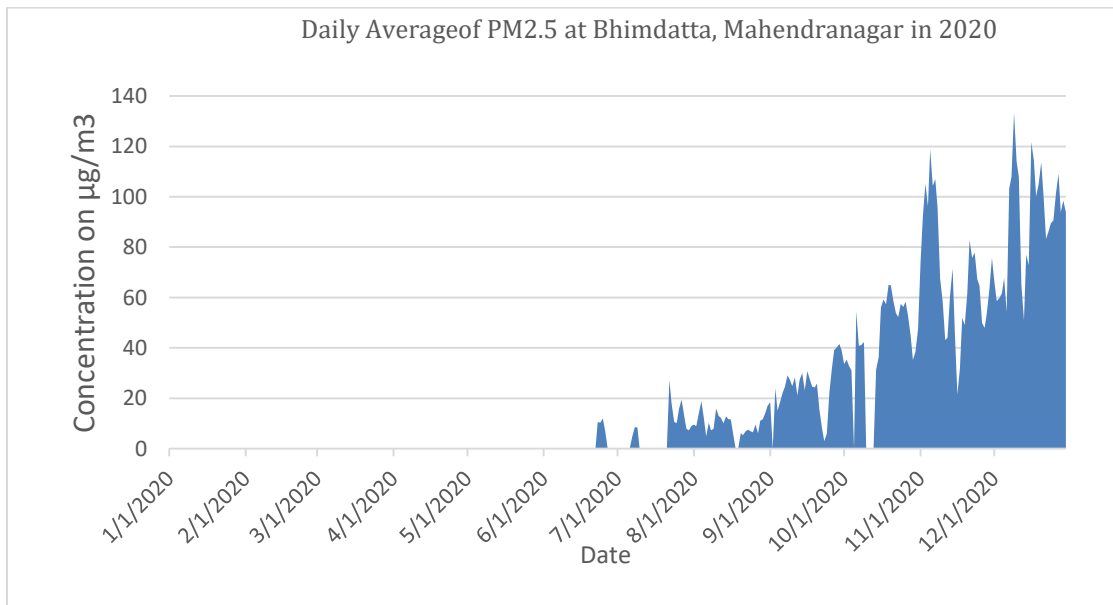


Figure 9: Daily average of PM<sub>2.5</sub>

### Monthly average of PM<sub>2.5</sub>

The highest and the lowest monthly average of PM<sub>2.5</sub> was found during December (90.53  $\mu\text{g}/\text{m}^3$ ) and June (9.82  $\mu\text{g}/\text{m}^3$ ) respectively.

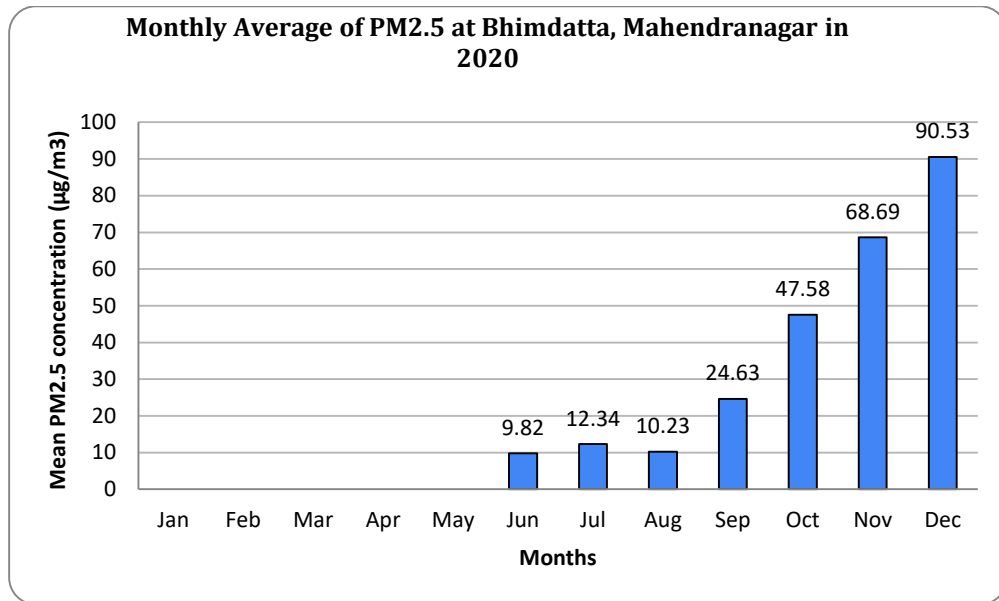


Figure 10: Monthly Average of PM<sub>2.5</sub>

### Monthly variation of PM<sub>2.5</sub>

Variation in concentration of PM<sub>2.5</sub> was found more during November and December whereas low during June.

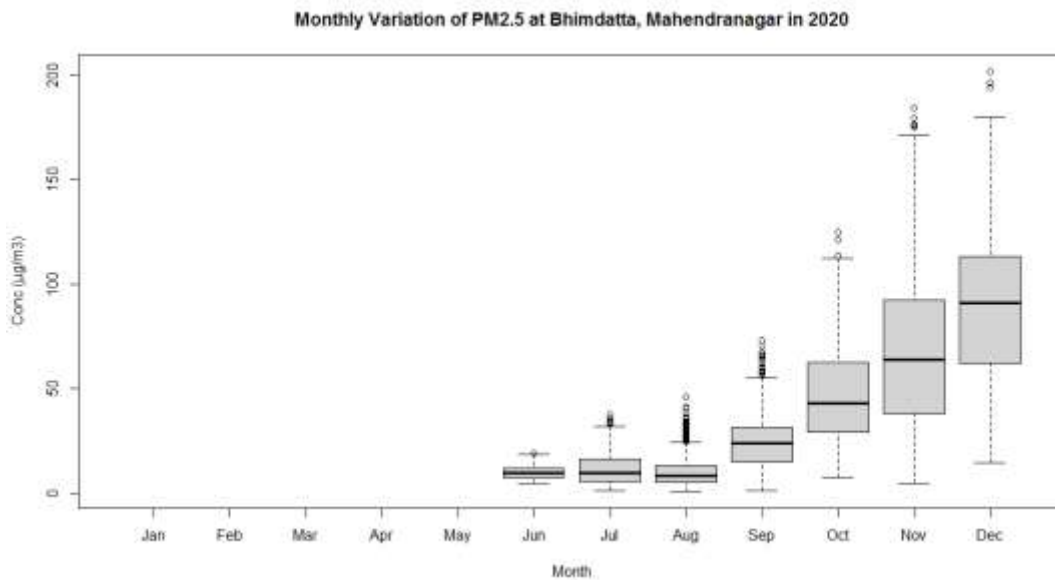


Figure 11: Monthly Variation of PM<sub>2.5</sub>

### Seasonal variation of average PM<sub>2.5</sub> concentration

Ambient concentration of average PM<sub>2.5</sub> during monsoon and post-monsoon can be shown in the Figure 12 below. The concentration of PM<sub>2.5</sub> was found higher during post monsoon (46.97 µg/m<sup>3</sup>) than monsoon season (10.8 µg/m<sup>3</sup>) Figure 12: Seasonal variation of PM<sub>2.5</sub>.

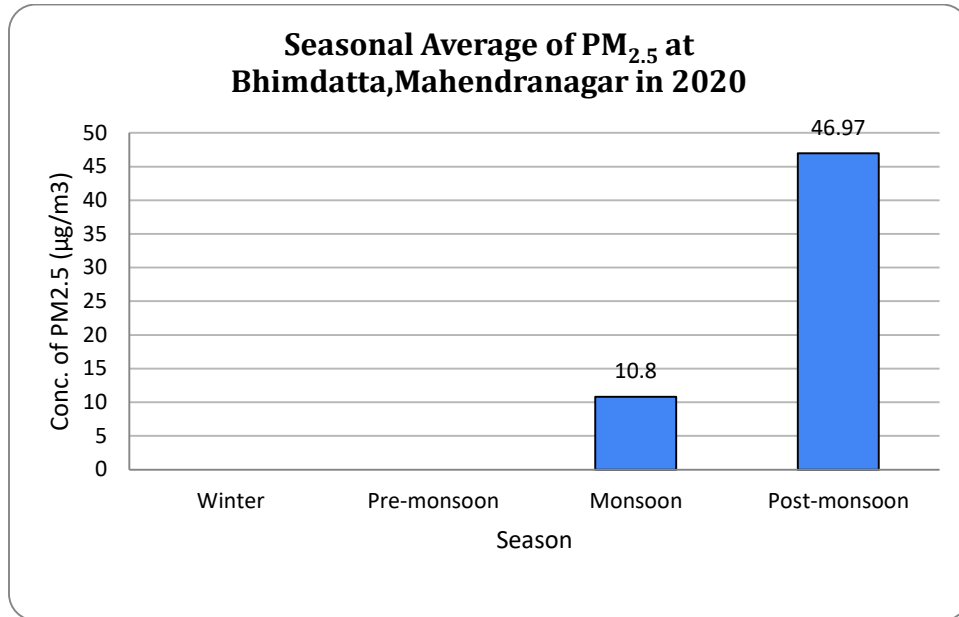


Figure 12: Seasonal variation of PM<sub>2.5</sub>

### Diurnal variation of average PM<sub>2.5</sub> concentration

The diurnal variation of average PM<sub>2.5</sub> concentrations can be shown in the figure Figure 13 below. The variation in PM<sub>2.5</sub> concentrations was high at around 5-6 pm and low at 12 to 2 pm.

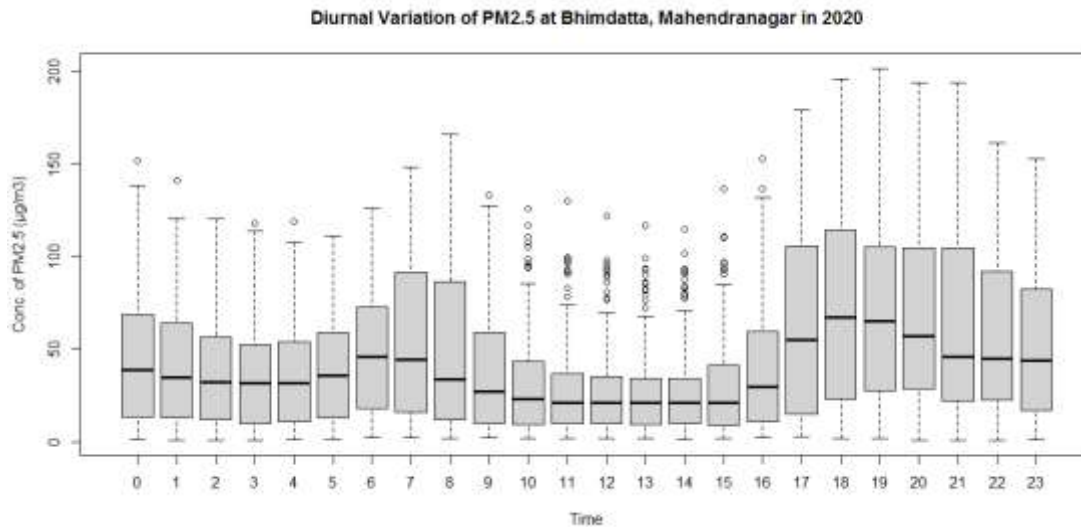


Figure 13: Diurnal variation of PM<sub>2.5</sub>

**Compliance status of PM<sub>2.5</sub>**

The total days of PM<sub>2.5</sub> monitored in the year 2020 counts 161, of which 78 days exceed the NAAQS guideline.

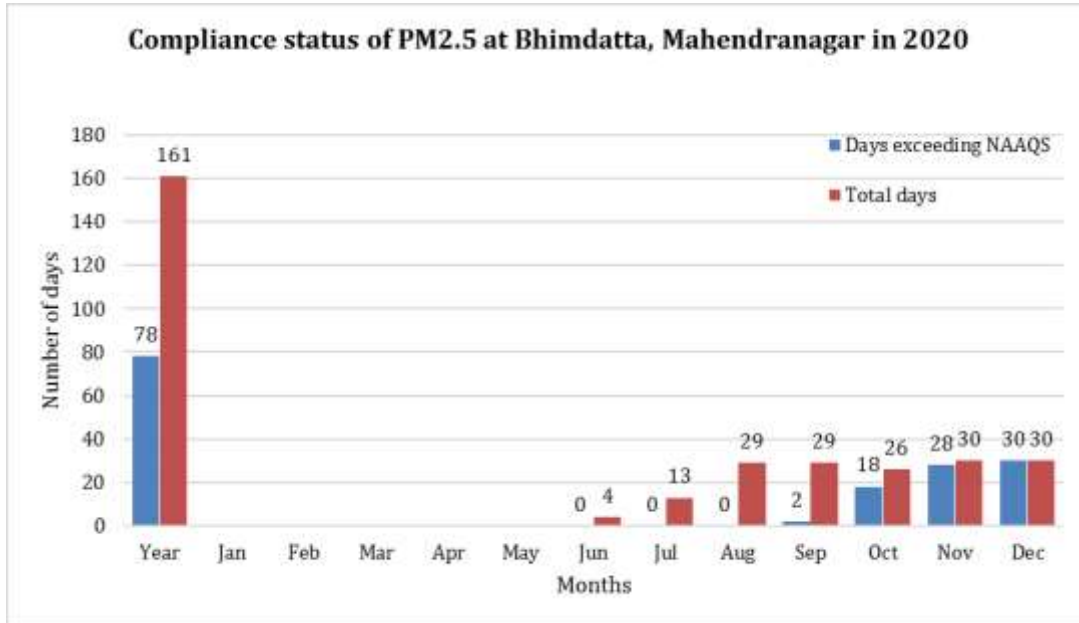


Figure 14: Compliance status of PM<sub>2.5</sub>

2.4. Temporal variation of PM<sub>10</sub>

**Annual average of PM<sub>10</sub>**

The annual average of PM<sub>10</sub> at Bhimdatta station was found to be 84.93 µg/m<sup>3</sup>. Histogram of hourly average PM<sub>10</sub> is shown in the figure below.

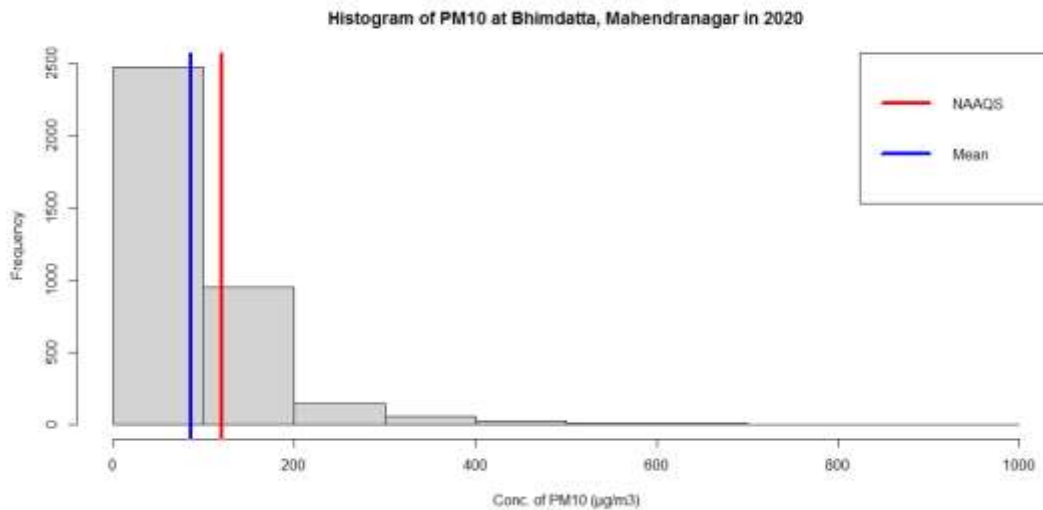


Figure 15 : Histogram for the ambient concentration of PM<sub>10</sub>.

**Daily average of PM<sub>10</sub>:**

Daily average concentration of PM<sub>10</sub> was high during November and December and was found low during July and August.

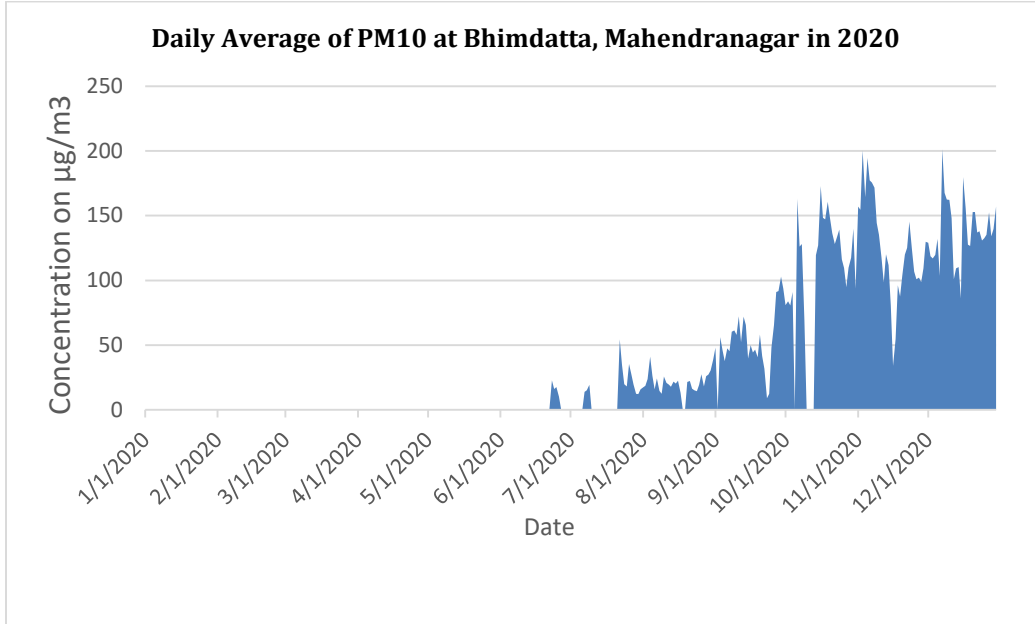


Figure 16: Daily average of PM<sub>10</sub>

**Monthly average of PM<sub>10</sub>**

The highest and the lowest monthly average of PM<sub>2.5</sub> was found during December (137.5 µg/m<sup>3</sup>) and June (16.68 µg/m<sup>3</sup>) respectively.

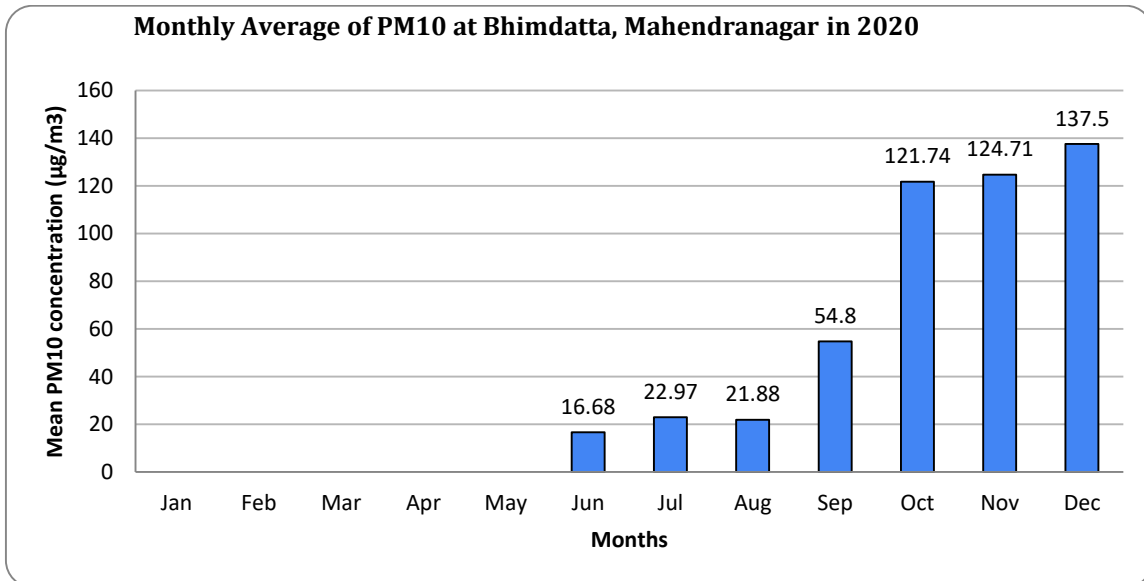


Figure 17: Monthly average of  $PM_{10}$

### Monthly variation of $PM_{10}$

Variation in concentration of  $PM_{10}$  was found more during November and low during June.

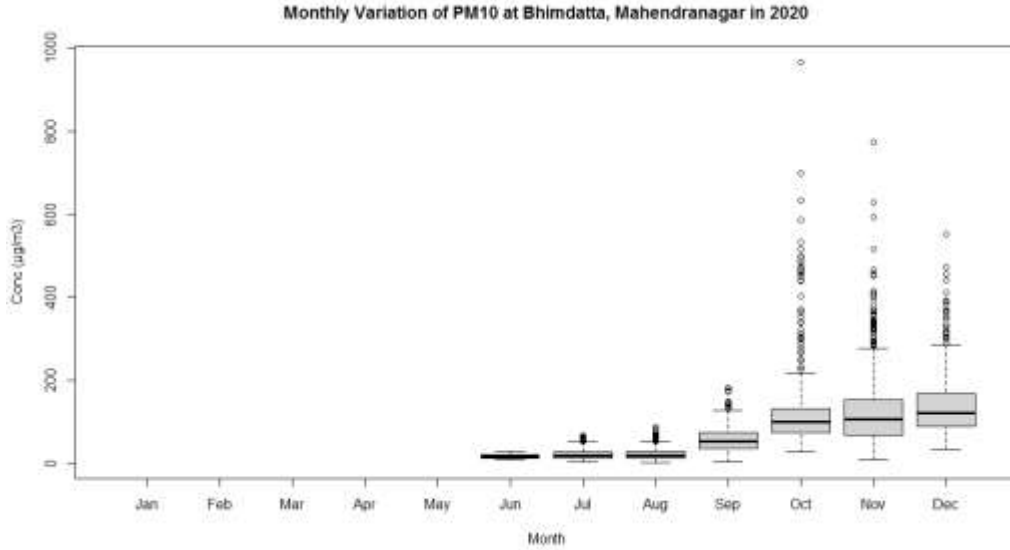


Figure 18: Monthly Variation of  $PM_{10}$

### Seasonal variation of average $PM_{10}$ concentration:

Ambient concentration of average  $PM_{10}$  during monsoon and post-monsoon can be shown in the figure below. The concentration of  $PM_{10}$  was found higher during post monsoon ( $100.42 \mu g/m^3$ ) than monsoon season ( $20.51 \mu g/m^3$ ).

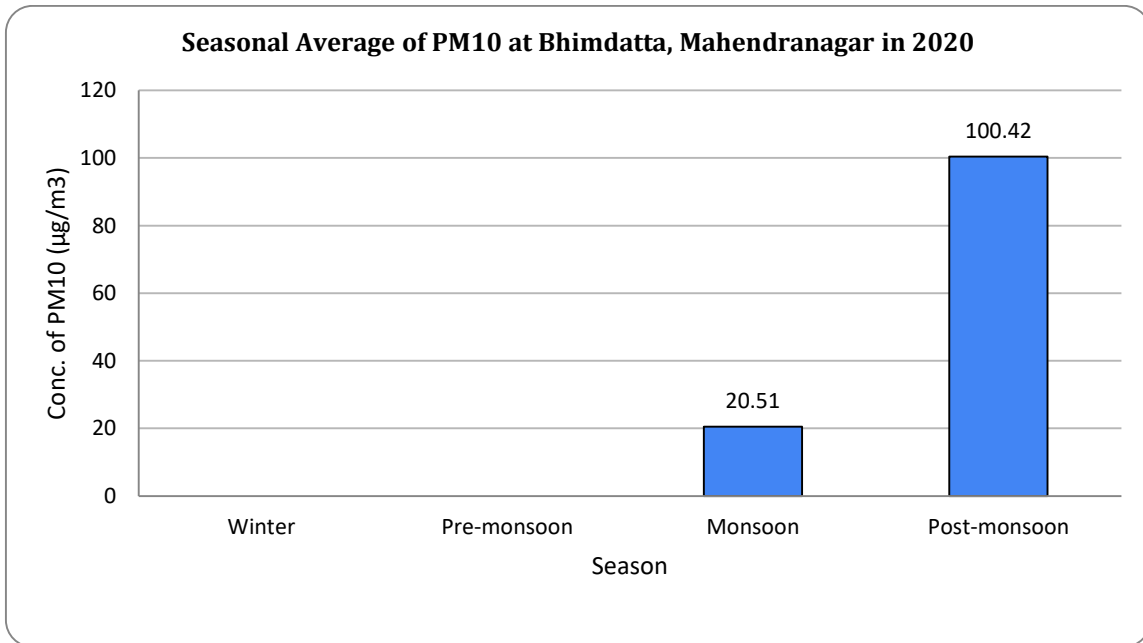


Figure 19: Seasonal variation of PM<sub>10</sub>.

**Diurnal variation of average PM<sub>10</sub> concentration**

The diurnal variation of average PM<sub>10</sub> concentrations can be shown in the figure below. The variation in PM<sub>10</sub> concentration was high at around 5 pm and low at 2 to 3 am.

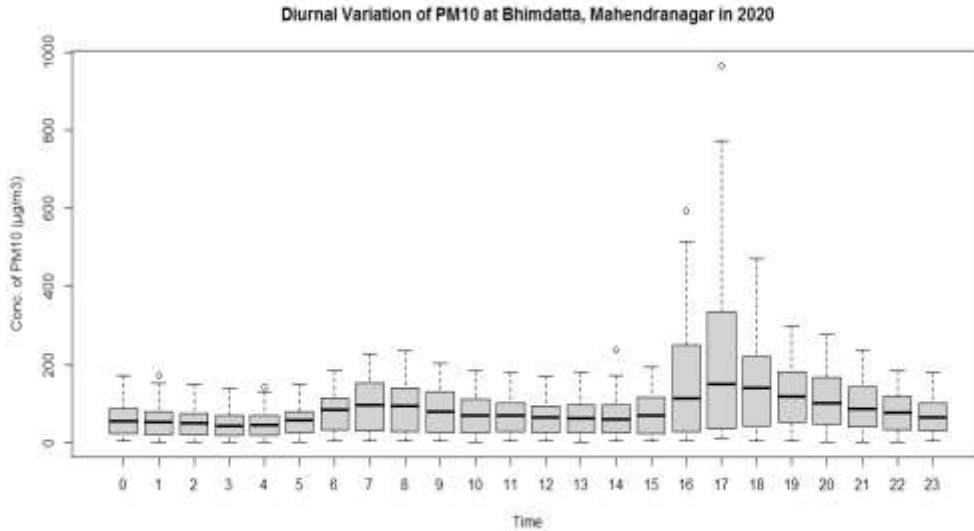


Figure 20: Diurnal variation of PM<sub>10</sub> concentration

**Compliance status of PM<sub>10</sub>**

The total days of PM<sub>10</sub> monitored in the year 2020 counts 161, of which 24 days exceed the NAAQS guideline.

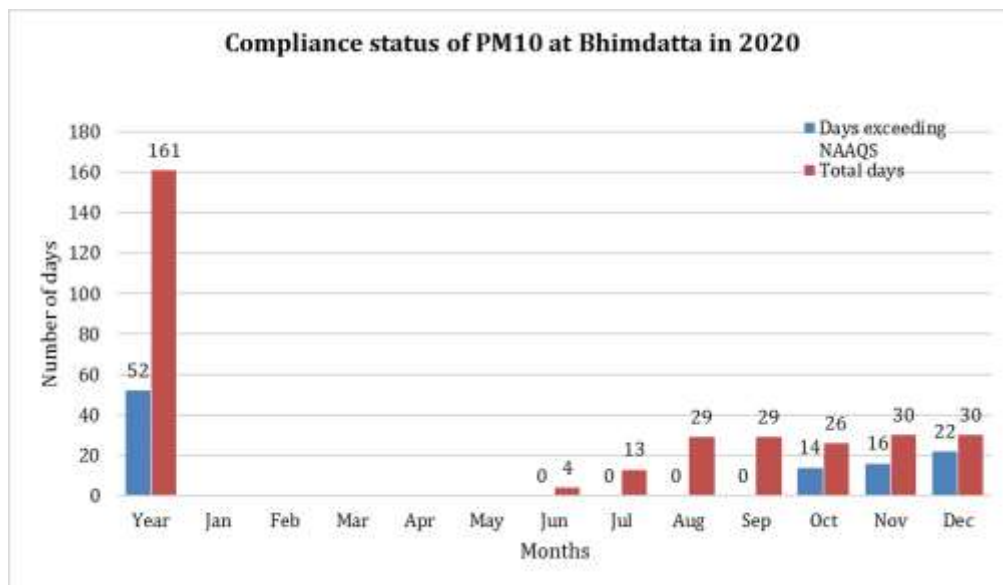


Figure 21: Compliance status of PM<sub>10</sub>



## 2.5. Temporal variation of TSP

### Annual average of TSP

The annual average of TSP at Bhimdatta station was found to be  $138.66\mu\text{g}/\text{m}^3$ . Histogram of hourly average TSP is shown in the figure below.

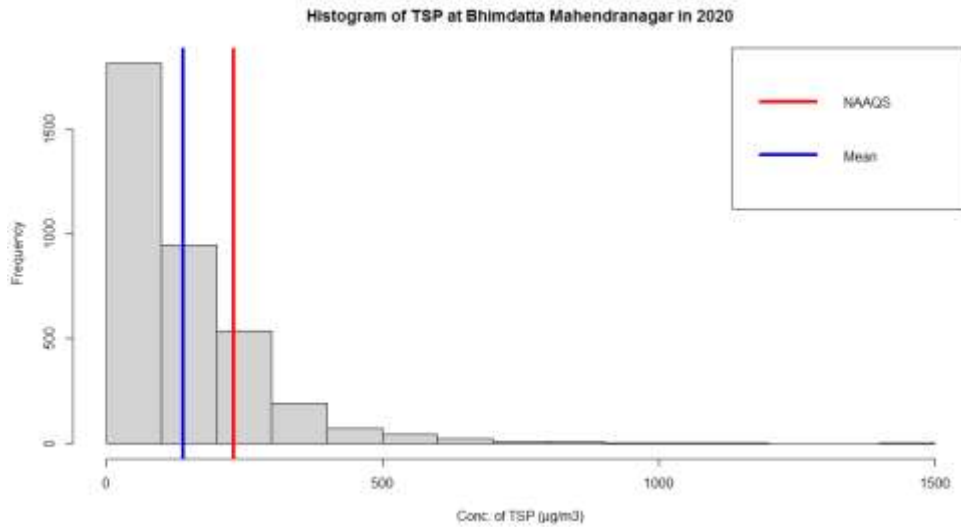


Figure 22 : Histogram for the ambient concentration of TSP

### Daily average of TSP:

Daily average concentration of TSP was high during November and December and was found low during July and August.

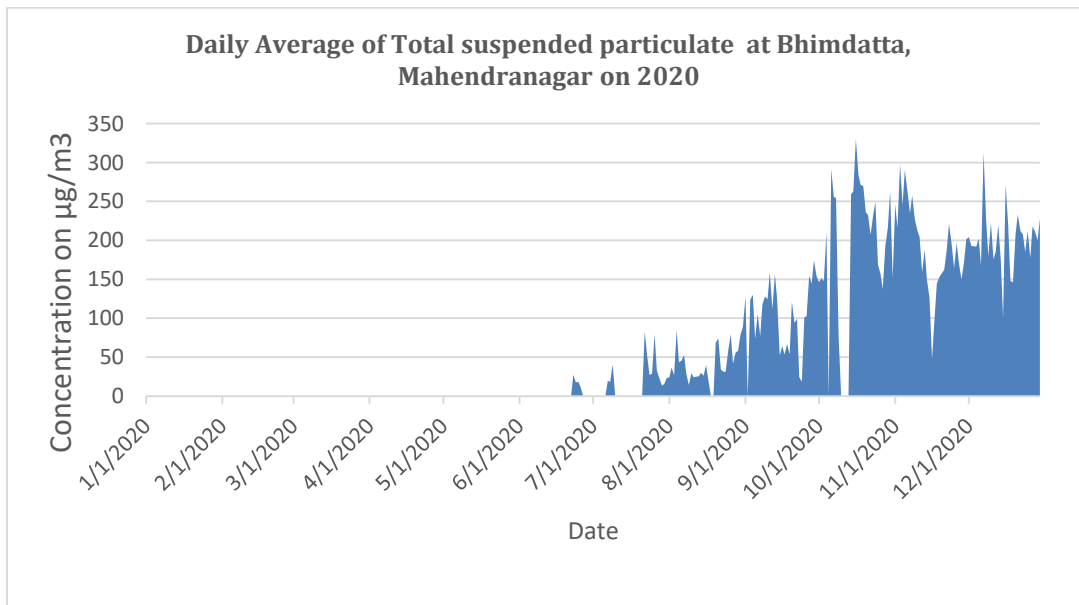


Figure 23: Daily average of TSP

### Monthly average of TSP

The highest and the lowest monthly average of PM<sub>2.5</sub> was found during October (217.61  $\mu\text{g}/\text{m}^3$ ) and June (18.59  $\mu\text{g}/\text{m}^3$ ) respectively.

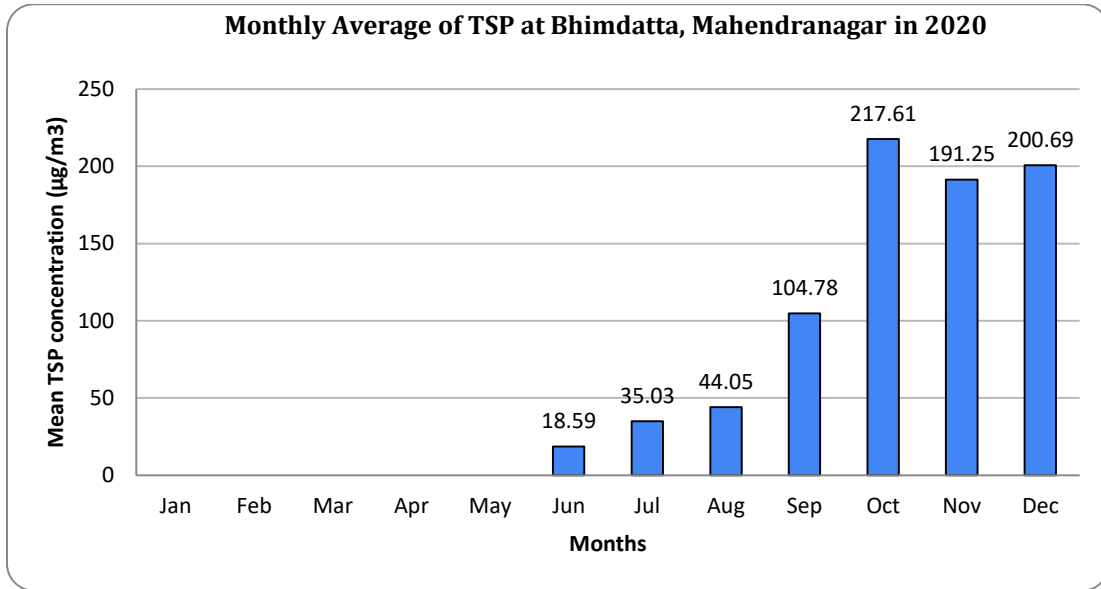


Figure 24: Monthly Average of TSP

### Monthly variation of TSP

Variation in concentration of TSP was found more during October and low during June.

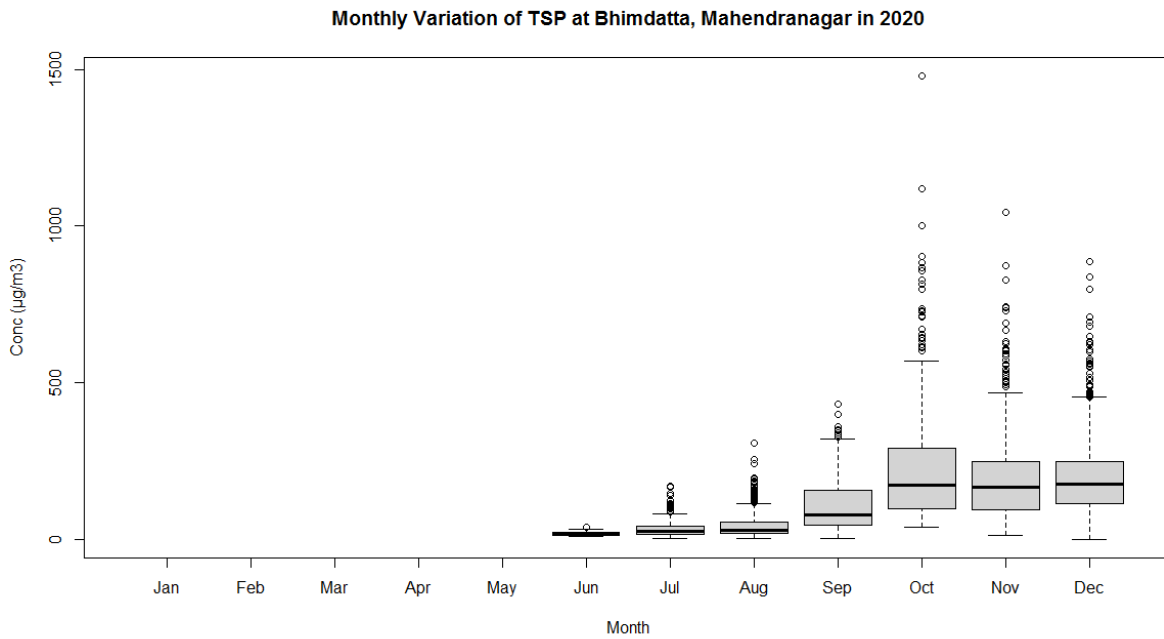


Figure 25: Monthly Variation of TSP.

### Seasonal variation of average TSP concentration

Ambient concentration of average TSP during monsoon and post-monsoon as shown in the figure below. The concentration of TSP was found higher during post monsoon (171.2  $\mu\text{g}/\text{m}^3$ ) than monsoon season (32.56  $\mu\text{g}/\text{m}^3$ ).

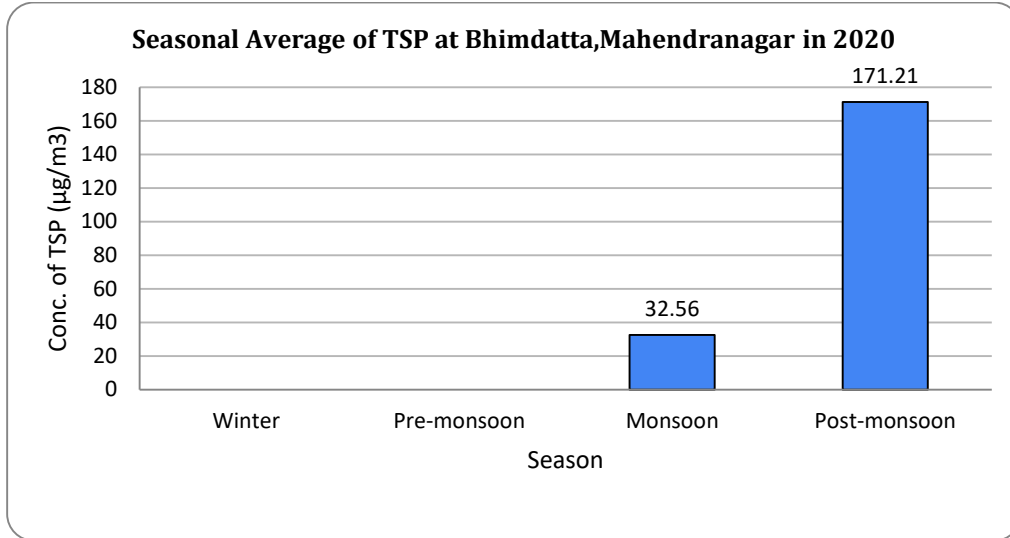


Figure 26: Seasonal variation of TSP

### Diurnal variation of average TSP concentration

The diurnal variation of average TSP concentrations can be shown in the figure below. The variation in TSP concentration was high at around 5 pm and low at 2 to 3 am.

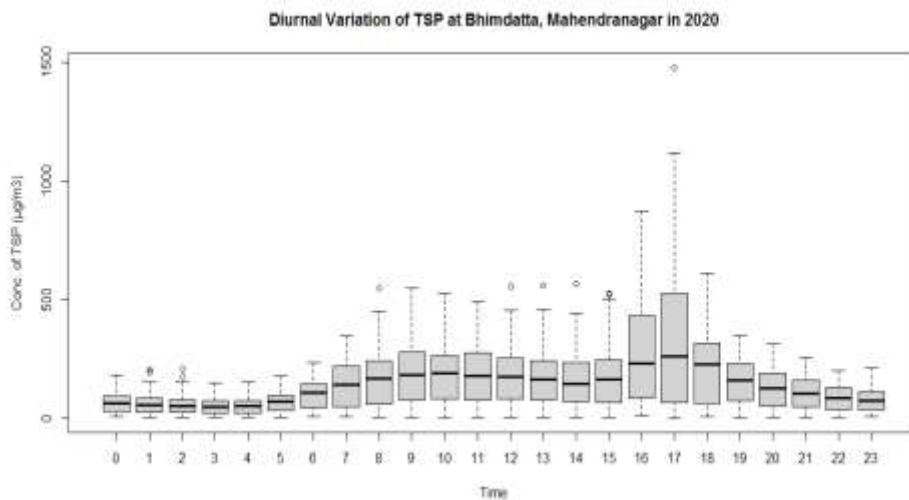


Figure 27: Diurnal Variation of TSP

### Compliance status of TSP

The total days of PM<sub>2.5</sub> monitored in the year 2020 counts 161, of which 24 days exceed the NAAQS guideline.

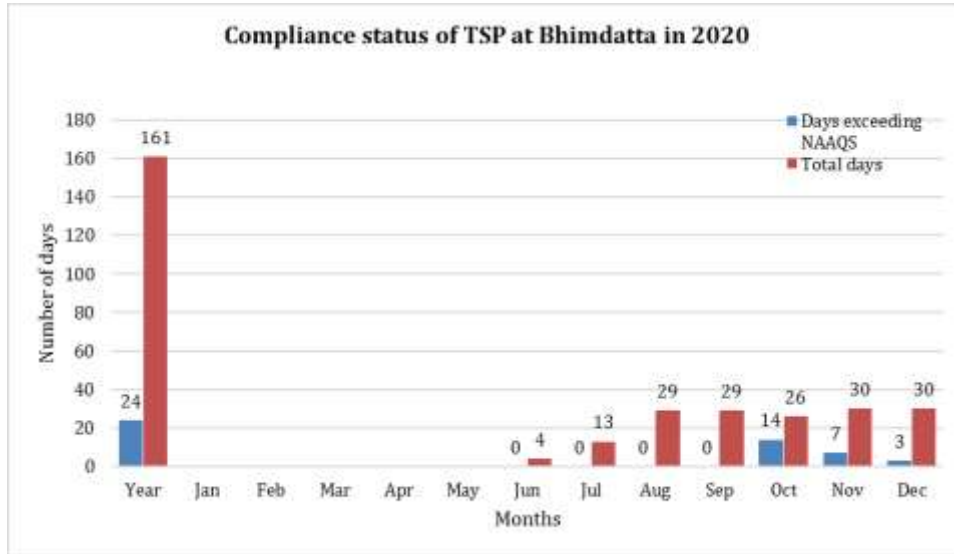


Figure 28: Compliance status of TSP

## Annex

### PM1, PM2.5, PM10 and TSP

Date	PM1	PM2.5	PM10	TSP
1/1/2020				
1/2/2020				
1/3/2020				
1/4/2020				
1/5/2020				
1/6/2020				
1/7/2020				
1/8/2020				
1/9/2020				
1/10/2020				
1/11/2020				
1/12/2020				
1/13/2020				
1/14/2020				
1/15/2020				
1/16/2020				
1/17/2020				
1/18/2020				
1/19/2020				
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1/21/2020				
1/22/2020				

1/23/2020				
1/24/2020				
1/25/2020				
1/26/2020				
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1/28/2020				
1/29/2020				
1/30/2020				
1/31/2020				
2/1/2020				
2/2/2020				
2/3/2020				
2/4/2020				
2/5/2020				
2/6/2020				
2/7/2020				
2/8/2020				
2/9/2020				
2/10/2020				
2/11/2020				
2/12/2020				
2/13/2020				
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2/26/2020				
2/27/2020				
2/28/2020				
2/29/2020				
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3/3/2020				
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3/24/2020				
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4/13/2020				
4/14/2020				
4/15/2020				
4/16/2020				
4/17/2020				
4/18/2020				
4/19/2020				
4/20/2020				
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4/28/2020				
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4/30/2020				
5/1/2020				
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5/7/2020				
5/8/2020				
5/9/2020				
5/10/2020				
5/11/2020				
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6/1/2020				
6/2/2020				
6/3/2020				
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6/13/2020				
6/14/2020				

6/15/2020				
6/16/2020				
6/17/2020				
6/18/2020				
6/19/2020				
6/20/2020				
6/21/2020				
6/22/2020				
6/23/2020	10.55389	10.55389	22.76333	27.35667
6/24/2020	10.30447	10.30447	16.06385	17.60721
6/25/2020	11.95894	11.95894	17.71249	18.47948
6/26/2020	6.472576	6.472576	10.16897	10.92758
6/27/2020				
6/28/2020				
6/29/2020				
6/30/2020				
7/1/2020				
7/2/2020				
7/3/2020				
7/4/2020				
7/5/2020				
7/6/2020				
7/7/2020	4.811904	4.811904	13.99708	19.8499
7/8/2020	8.556181	8.556181	15.05243	17.97417

7/9/2020	8.414035	8.414035	19.35441	40.58886
7/10/2020				
7/11/2020				
7/12/2020				
7/13/2020				
7/14/2020				
7/15/2020				
7/16/2020				
7/17/2020				
7/18/2020				
7/19/2020				
7/20/2020				
7/21/2020				
7/22/2020	27.26355	27.26355	54.54412	82.88643
7/23/2020	17.79361	17.79361	34.55736	51.25375
7/24/2020	10.58785	10.58785	19.80771	27.56188
7/25/2020	10.19778	10.19778	18.07319	28.61535
7/26/2020	15.7416	15.7416	35.40201	79.17201
7/27/2020	19.43847	19.43847	27.80194	32.56153
7/28/2020	13.29424	13.29424	19.56611	22.82382
7/29/2020	7.887639	7.887639	12.38632	13.50257
7/30/2020	7.308958	7.308958	12.11007	15.35472
7/31/2020	9.09	9.09	15.94799	23.26882
8/1/2020	9.543125	9.543125	17.40562	24.20347

8/2/2020	8.897153	8.897153	18.6609	36.63583
8/3/2020	14.18854	14.18854	23.85417	26.85917
8/4/2020	18.82382	18.82382	41.13569	84.77118
8/5/2020	12.75035	12.75035	26.27799	43.31271
8/6/2020	4.843542	4.843542	16.00826	45.30764
8/7/2020	10.37021	10.37021	24.41924	52.73257
8/8/2020	7.314653	7.314653	14.75139	29.01639
8/9/2020	7.936736	7.936736	12.47194	14.45118
8/10/2020	15.97076	15.97076	25.87146	29.65667
8/11/2020	12.98655	12.98655	20.91361	24.11881
8/12/2020	12.22947	12.22947	19.62343	25.00645
8/13/2020	10.08926	10.08926	17.87244	25.27577
8/14/2020	12.90875	12.90875	21.86103	29.71958
8/15/2020	11.71521	11.71521	20.23937	26.03062
8/16/2020	11.59549	11.59549	22.448	39.58243
8/17/2020	5.233333	5.233333	13.18722	20.29945
8/18/2020				
8/19/2020				
8/20/2020	6.162951	6.162951	21.5327	68.45489
8/21/2020	5.356864	5.356864	22.43164	74.47376
8/22/2020	6.86	6.86	16.29903	34.56
8/23/2020	7.552569	7.552569	15.20667	31.36028
8/24/2020	6.842083	6.842083	14.49087	31.21021
8/25/2020	6.550625	6.550625	19.33875	58.27854

8/26/2020	9.515069	9.515069	27.48451	79.43312
8/27/2020	6.157083	6.157083	18.07412	41.32785
8/28/2020	11.04174	11.04174	26.14425	55.96403
8/29/2020	11.74639	11.74639	27.30389	58.40097
8/30/2020	14.30521	14.30521	30.46381	78.1418
8/31/2020	17.09062	17.09062	38.79278	88.87875
9/1/2020	18.48428	18.48428	48.07655	128.2369
9/2/2020				
9/3/2020	24.09067	24.09067	56.15225	123.5516
9/4/2020	15.01042	15.01042	46.34122	130.0219
9/5/2020	18.55222	18.55222	37.62021	73.57174
9/6/2020	22.24257	22.24257	47.48104	105.0794
9/7/2020	24.52493	24.52493	45.37778	77.23319
9/8/2020	29.1541	29.1541	60.46886	118.0057
9/9/2020	27.20201	27.20201	61.28611	128.0414
9/10/2020	24.74375	24.74375	57.85931	124.5231
9/11/2020	28.20958	28.20958	72.21264	159.0509
9/12/2020	21.1775	21.1775	52.2549	111.8315
9/13/2020	27.33368	27.33368	71.899	156.6168
9/14/2020	30.03611	30.03611	65.45696	123.7385
9/15/2020	23.13333	23.13333	39.56982	52.17424
9/16/2020	30.76007	30.76007	50.02805	64.20472
9/17/2020	27.90521	27.90521	44.33603	53.46354
9/18/2020	24.67658	24.67658	46.544	66.67292

9/19/2020	24.25868	24.25868	40.49991	53.84097
9/20/2020	25.82472	25.82472	58.17456	121.2668
9/21/2020	15.29104	15.29104	41.49426	94.10111
9/22/2020	8.053403	8.053403	31.66088	99.43778
9/23/2020	3.009931	3.009931	8.920586	24.4909
9/24/2020	6.014236	6.014236	12.5584	18.33722
9/25/2020	22.39396	22.39396	48.02156	101.0561
9/26/2020	32.06646	32.06646	65.59478	102.5384
9/27/2020	39.17426	39.17426	91.02212	154.6002
9/28/2020	40.12597	40.12597	91.6734	144.3537
9/29/2020	41.55433	41.55433	102.7668	174.3829
9/30/2020	39.19646	39.19646	93.84435	154.0577
10/1/2020	33.60153	33.60153	80.76825	146.3325
10/2/2020	35.39035	35.39035	83.88556	151.7019
10/3/2020	32.90646	32.90646	80.73339	147.757
10/4/2020	31.01961	31.01961	91.01402	211.1723
10/5/2020				
10/6/2020	54.58459	54.58459	162.8166	291.6919
10/7/2020	40.85007	40.85007	126.1407	255.776
10/8/2020	41.48972	41.18548	128.133	254.3137
10/9/2020	42.52914	42.301	69.27266	77.02516
10/10/2020				
10/11/2020				
10/12/2020				



10/13/2020				
10/14/2020	31.47364	31.47364	119.5219	259.2377
10/15/2020	36.25153	36.25153	127.1988	262.8885
10/16/2020	56.08674	56.08674	172.7265	330.4414
10/17/2020	59.28535	59.28535	148.4575	284.3281
10/18/2020	57.35014	57.35014	147.1305	270.9681
10/19/2020	65.01417	65.01417	160.8103	269.7155
10/20/2020	64.8593	64.8593	148.0872	236.1886
10/21/2020	58.60826	58.60826	136.4927	232.6248
10/22/2020	53.7759	53.7759	128.1156	207.0954
10/23/2020	52.27104	52.27104	133.5493	232.6266
10/24/2020	57.41	57.41	139.1912	249.208
10/25/2020	56.27125	56.27125	116.3151	168.8187
10/26/2020	58.29736	58.29736	109.6428	156.7665
10/27/2020	52.44625	52.44625	94.82133	137.4519
10/28/2020	44.71297	44.71297	109.7103	192.6192
10/29/2020	35.23757	35.23757	117.403	216.5166
10/30/2020	38.51313	38.51313	139.9341	263.1424
10/31/2020	47.42653	47.42653	93.40839	151.3948
11/1/2020	74.39715	74.39715	156.9549	246.1425
11/2/2020	92.01903	92.01903	154.6119	216.1421
11/3/2020	105.1602	105.1602	200.2922	297.9897
11/4/2020	96.24576	96.24576	164.0774	245.5976
11/5/2020	118.7778	118.7778	194.4515	290.4949

11/6/2020	104.3458	104.3458	177.3054	263.8098
11/7/2020	107.0413	107.0413	175.4372	234.7114
11/8/2020	95.52375	95.52375	171.4924	257.57
11/9/2020	67.6125	67.6125	144.4092	227.6382
11/10/2020	58.45319	58.45319	135.3443	212.8369
11/11/2020	43.12382	43.12382	117.5657	204.4082
11/12/2020	44.10417	44.10417	98.40181	158.8481
11/13/2020	60.65597	60.65597	120.1233	187.7262
11/14/2020	71.55618	71.55618	111.6988	149.3887
11/15/2020	46.00278	46.00278	80.57097	126.5019
11/16/2020	21.54861	21.54861	33.95382	47.57993
11/17/2020	32.09535	32.09535	54.68132	94.10875
11/18/2020	51.97986	51.97986	96.21542	144.5208
11/19/2020	49.00549	49.00549	87.54937	152.7639
11/20/2020	61.79569	61.79569	103.7922	157.1028
11/21/2020	82.88611	82.88611	120.0221	162.0702
11/22/2020	75.79444	75.79444	125.0175	187.5276
11/23/2020	77.8109	77.8109	145.4865	221.2421
11/24/2020	67.39792	67.39792	124.1325	195.9947
11/25/2020	64.64972	64.64972	106.8353	164.335
11/26/2020	49.91368	49.91368	100.9544	196.926
11/27/2020	47.97375	47.97375	102.1327	170.314
11/28/2020	53.7675	53.7675	98.64417	149.958
11/29/2020	63.34514	63.34514	109.2974	172.0688

11/30/2020	75.76389	75.76389	129.7256	201.2233
12/1/2020	66.84854	66.84854	128.9477	204.2585
12/2/2020	58.58667	58.58667	118.6557	192.7754
12/3/2020	59.73326	59.73326	116.9636	192.5251
12/4/2020	61.64875	61.64875	119.7667	191.8572
12/5/2020	67.71729	67.71729	131.9555	201.9503
12/6/2020	54.23943	54.23943	103.4279	167.4541
12/7/2020	103.3592	103.3592	201.2867	313.0292
12/8/2020	107.9328	107.9328	167.5097	226.1789
12/9/2020	133.3272	133.3272	162.381	179.2989
12/10/2020	113.9296	113.9296	162.214	222.7772
12/11/2020	107.9317	107.9317	148.0816	175.9285
12/12/2020	65.10285	65.10285	100.9124	185.4307
12/13/2020	51.01569	51.01569	109.185	219.6923
12/14/2020	76.96083	76.96083	110.2634	173.429
12/15/2020	72.8045	72.8045	86.08417	100.2512
12/16/2020	121.6845	121.6845	179.781	272.0524
12/17/2020	114.3302	114.3302	155.4891	218.6186
12/18/2020	100.1035	100.1035	127.6602	147.6564
12/19/2020	105.1457	105.1457	126.5115	146.2831
12/20/2020	113.7341	113.7341	152.8896	207.7896
12/21/2020	100.8001	100.8001	152.8435	233.4906
12/22/2020	83.2991	83.2991	136.9577	212.1791
12/23/2020	86.22578	86.22578	138.0253	207.6064

12/24/2020	89.43743	89.43743	130.7998	185.2425
12/25/2020	90.56903	90.56903	132.5981	211.6617
12/26/2020	101.2228	101.2228	135.2799	177.3601
12/27/2020	109.1606	109.1606	152.5058	217.794
12/28/2020	93.95708	93.95708	133.9566	211.2374
12/29/2020	98.52055	98.52055	139.8024	200.1854
12/30/2020	93.86292	93.86292	157.0367	228.51
12/31/2020	103.0992	103.0992	142.6899	197.0256