Report on Ambient Noise Levels & Ambient Air Quality during Deepawali Festival 2018 & 2019.

CENTRAL POLLUTION CONTROL BOARD
Ministry of Environment, Forest & Climate Change
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CENTRAL POLLUTION CONTROL BOARD
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय भारत सरकार
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Foreword

Noise and Air pollution due to bursting of fire crackers during Deepawali is well known. It is, therefore, necessary to conduct ambient noise and air quality monitoring during the festival to understand level of pollution and to correlate it with the effectiveness of pollution abatement measures. Like every year, Central Pollution Control Board, State Pollution Control Boards, and Pollution Control Committees carried out extensive ambient noise and air quality monitoring across the country during Deepawali festival on October 27, 2019.

This report is a compilation of ambient noise (258 locations in 107 cities) data covering 16 States and 05 UTs in the country. The data of previous year have also been incorporated for comparison. In this comparison, available data of 145 locations are considered. Out of 145 locations, at 79 locations is decreased, at 55 locations it is increased and at 11 locations it is equal to previous year noise level. While such results are encouraging, greater efforts are required for spreading awareness about effects of noise pollution among public in general.

In compliance to Hon'ble Supreme Court, like last year (2018), this year also CPCB conducted ambient Air Quality Monitoring (PM_{10}, $PM_{2.5}$, SO_2, NO_2, Metals (Pb, Ni, As in PM_{10} & Al, Fe and Ba in $PM_{2.5}$) at seven cities namely Delhi (CPCB Head Quarter), Agra, Bhopal, Bengaluru, Kolkata, Lucknow and Vadodara where its Regional Directorates for 15 days (20^{th} October to 3^{rd} November); 7 days prior (21^{st} October to 26^{th} October – Pre-Deepawali period); Deepawali day (27^{th} October) and 7 days after Deepawali (28^{th} October to 3^{rd} November – Post-Deepawali period). In this report, Year wise (2016 – 2019) PM_{10} and $PM_{2.5}$ Deepawali fortnight data of Delhi city has been compared. This report will help in generation of data on pollution caused by the bursting of firecrackers which have harmful effects on inhalation and would be helpful for regulation and controlling quantity of Pb, Ni, As, Al, Fe and Ba used in the manufacture of firecrackers.

I hope that the SPCBs/ PCCs and other concerned authorities will use this document to disseminate information among all sections of society to encourage them to celebrate Deepawali festival in more environment friendly ways.

(S.P.S. Parihar)

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1.0 Introduction

Central Pollution Control Board (CPCB) is monitoring ambient air quality and noise levels during Deepawali day festival from past many years to assess the status of air & noise pollution levels in environment caused by burning of crackers. The main objective of monitoring ambient air quality and noise levels is to ensure compliance of the Hon'ble Supreme Court directions dated October 5, 1999 & September 27, 2001 and also to examine the status & trend of pollution over the years during Deepawali day festival.

Hon'ble Supreme Court in its order dated October 20, 2018 directed as follows:
"CPCB and respective State Pollution Control Boards/Pollution Control Committees (SPCBs/PCCs) of the States and Union Territories shall carry out short –term monitoring in the cities for 15 days (commencing from 7 days prior to Deepawali day and ending 7 days after Deepawali day) for parameters namely Aluminum, Barium, Iron apart from the regulatory parameters against the short term ambient air quality criteria values (AAQCVs) proposed by CPCB with regard to bursting of firecrackers. This will help in generation of data on pollution caused by the bursting of firecrackers and would be helpful for regulation and control quantity of Aluminum, Barium and Iron used in the manufacture of firecrackers".

In view of above CPCB informed all SPCBs/PCCs and RDs via letters dated September 2, 2019 to carry out noise monitoring on pre-Deepawali day (November 21, 2019) and Deepawali day (November 27, 2019) & ambient air quality monitoring from October 20, to November 03, 2019 in state capital at least for two locations and to submit the report by November 14, 2019. In addition to the general parameters like PM_{10}, $PM_{2.5}$, SO_2, NO_2 and metals (Pb, Ni & As in PM_{10}) selected metals/elements like Al, Ba, Sr and Fe in $PM_{2.5}$ are also to be monitored to assess the impact of firecrackers bursting during Deepawali day festival.

Accordingly, CPCB, SPCBs and PCCs has carried out AAQM 15 days continuously for the compliance of Hon'ble supreme court and the final report has been submitted by the respective SPCBs and PCCs individually in the Hon'ble Supreme court of India. Therefore, this year Deepawali 2019 report focused Ambient Noise during the 2 year period i.e 2018 & 2019 and Ambient Air data for the year 2019 across the country. This report divided in the following two Parts.
Part-I: Ambient Noise Levels 2018-2019, Part-II: Ambient Air Quality during 2019.

PART-I

Ambient Noise Levels during Deepawali festival 2018-2019

2.0 Monitoring Network and Findings:

Ambient Noise Levels:

With the view to maintain the uniformity in monitoring across the country, CPCB has prepared protocol for monitoring of ambient noise levels and circulated it to all SPCBs, RDs and PCCs in the country. A total of 06 States and 01 UT, consisting of 18 locations in 2018 and 19 locations in 2019 in 08 cities ambient noise levels monitoring carried out by the CPCB and it's Regional Directorates across the country. The monitoring network is given in the table-1.

Table –1 : State/City-wise No. of locations monitored by CPCB & RDs during Deepawali Festival, 2018 & 2019

S. No.	State/UT	City	Locations	
			2018	2019
1.	Delhi(UT)	Delhi	06	06
2.	Gujarat	Vadodara	02	02
3.	Karnataka	Bangaluru	02	02
4.	Madhya Pradesh	Bhopal	02	02
5.	Meghalaya	Shillong	01	01
6.	Uttar Pradesh	Agra	01	02
		Lucknow	02	02
7.	West Bengal	Kolkatta	02	02
		Total	**18**	**19**

As directed to SPCBs & PCCs, 17 States and 03 UT, consisting of 266 locations at 109 cities in Deepawali festival 2018 and 13 States and 04 UT 239 locations at 99 cities in Deepawali festival 2019 ambient noise levels monitoring carried out by the State Pollution Control Boards SPCBs/PCCs across the country. The monitoring network is given in the table-2.

Table –2: State/City-wise No. of locations monitored by SPCBs during Deepawali Festival, 2018 & 2019

S. No.	State	Ambient Noise(2018)		Ambient Noise(2019)	
		Cities	Locations	Cities	Locations
1.	Arunachal Pradesh	02	02	02	02
2.	Assam	07	19	08	22
3.	Bihar	01	08	-	-
4.	Chandigarh (UT)	01	04	01	04
5.	DD & DNH (UT)	01	02	02	04
6.	Goa	03	03	04	03
7.	Haryana	09	18	09	23
8.	Himachal Pradesh	10	12	11	15
9.	Jammu(UT)	-	-	01	04
10.	Kerala	12	27	-	-
11.	Madhya Pradesh	18	40	01	03
12.	Meghalaya	01	03	01	03
13.	Mizoram	01	02	01	02
14.	Nagaland	01	03	-	-
15.	Odisha	05	20	14	53
16.	Puducherry (UT)	01	01	01	01
17.	Punjab	04	12	11	33
18.	Rajasthan	14	30	14	30
19.	Tamil Nadu	12	23	12	26
20.	Tripura	04	27	-	-
21.	Uttar Pradesh	-	-	06	11
22.	Uttarakhand	02	10	-	-
	Total	**109**	**266**	**99**	**239**

3. Ambient Noise Monitoring carried out by CPCB:

Comparison of Ambient noise levels during Deepawali festival (Pre-deepawali & Deepawali day) 2018 & 2019 received from the Regional Directorates of CPCB is given in the Map.

DELHI (Ambient Noise Levels)

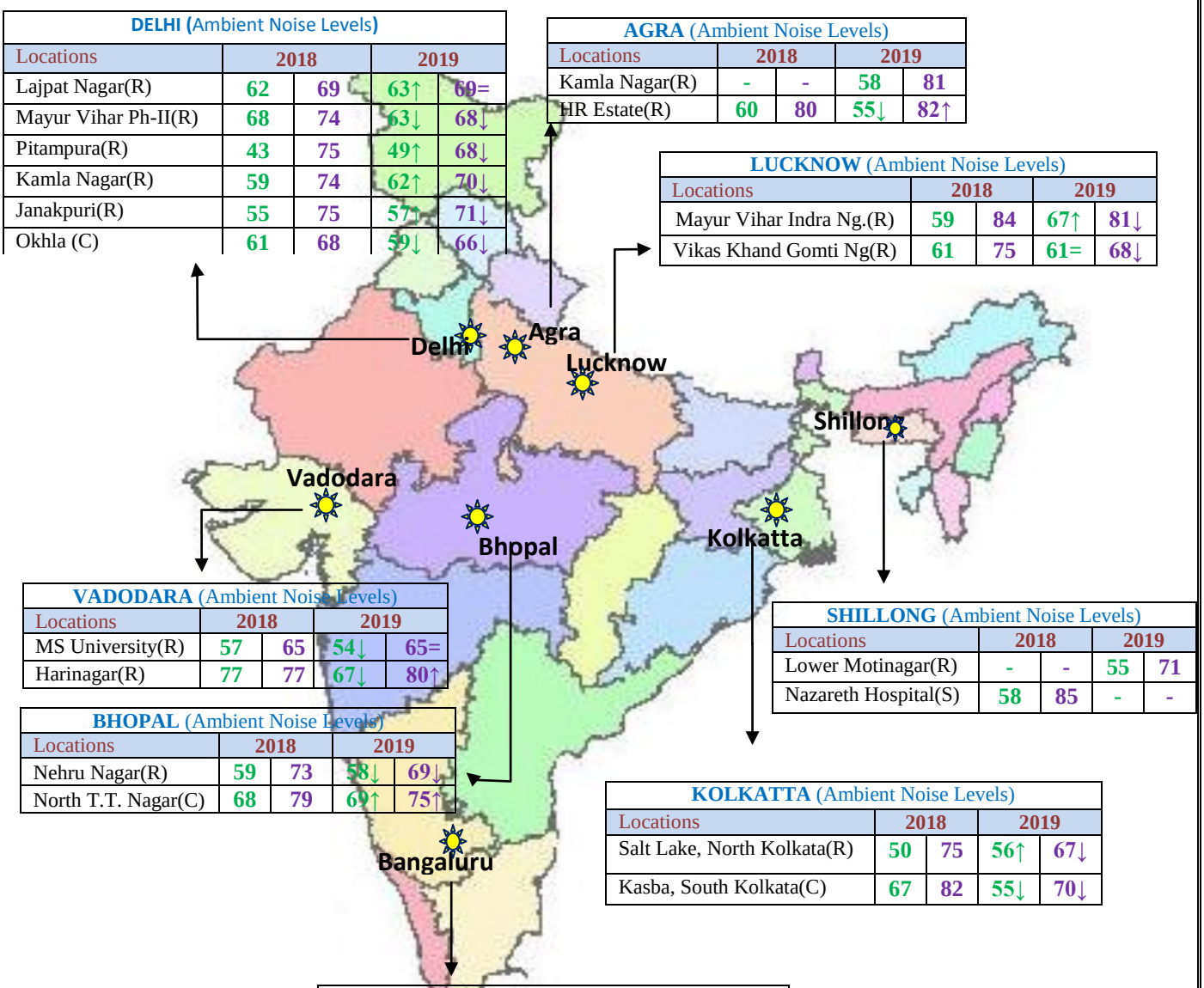
Locations	2018		2019	
Lajpat Nagar(R)	62	69	63↑	69=
Mayur Vihar Ph-II(R)	68	74	63↓	68↓
Pitampura(R)	43	75	49↑	68↓
Kamla Nagar(R)	59	74	62↑	70↓
Janakpuri(R)	55	75	57↑	71↓
Okhla (C)	61	68	59↓	66↓

AGRA (Ambient Noise Levels)

Locations	2018		2019	
Kamla Nagar(R)	-	-	58	81
HR Estate(R)	60	80	55↓	82↑

LUCKNOW (Ambient Noise Levels)

Locations	2018		2019	
Mayur Vihar Indra Ng.(R)	59	84	67↑	81↓
Vikas Khand Gomti Ng(R)	61	75	61=	68↓



VADODARA (Ambient Noise Levels)

Locations	2018		2019	
MS University(R)	57	65	54↓	65=
Harinagar(R)	77	77	67↓	80↑

SHILLONG (Ambient Noise Levels)

Locations	2018		2019	
Lower Motinagar(R)	-	-	55	71
Nazareth Hospital(S)	58	85	-	-

BHOPAL (Ambient Noise Levels)

Locations	2018		2019	
Nehru Nagar(R)	59	73	58↓	69↓
North T.T. Nagar(C)	68	79	69↑	75↑

KOLKATTA (Ambient Noise Levels)

Locations	2018		2019	
Salt Lake, North Kolkata(R)	50	75	56↑	67↓
Kasba, South Kolkata(C)	67	82	55↓	70↓

BANGALURU (Ambient Noise Levels)

Locations	2018		2019	
Rajarajeshwari Nagar(R)	60	65	62↑	67↑
Basaveshwar Nagar(R)	-	-	58	76
Ejipura	58	85	-	-

Pre-Deepawali Day **Deepawali Day**

Map: Ambient Noise Monitoring Data during Pre-Deepawali & Deepawali day 2018 & 2019 monitored by CPCB

4. Ambient Noise Monitoring carried out by SPCBs & PCCs:

Arunachal Pradesh

Observations: In this state, ambient noise monitoring was carried out at 02 locations in 02 cities. On pre-Deepawali-day noise level ranged between 49 and 72.7 Leq.dB(A), while same on the festival day ranged between 57 and 73.4 Leq.dB(A). The maximum noise level value of 73 Leq.dB(A) was reported at Itanagar on the festival day.

Table-3: Noise Levels in Leq.dB(A) at different locations during Pre-deepawali & Deepawali day 2017 - 2019 in Arunachal Pradesh

S. No.	Cities	Pre-deepawali day			Deepawali day		
		2017	2018	2019	2017	2018	2019
1.	Naharlagun	54	50	49↓	63	67	57↓
2.	Itanagar	61	65	72.7↑	73	72	73.4↑

Assam

Observations: In this state, ambient noise monitoring has been carried out at twenty four locations in eight cities. On pre-Deepawali-day noise level ranged between 49 and 73 Leq.dB(A), while same on the festival day ranged between 59 and 87 Leq.dB(A). The maximum noise level value of 87 Leq.dB(A) was reported at Haibargaon Bazar(C), Nagaon city, on the festival day.

Table 4 : Noise Levels in Leq.dB(A) at different locations during Pre-deepawali & Deepawali day 2018 & 2019 in Assam

S. No.	Cities	Locations	Pre-deepawali day		Deepawali day	
			2018	2019	2018	2019
1.	Guwahati	Panbazar MMC (S)	60	58↓	79	79=
2.		Ganeshguri(C)	69	68↓	72	71↓
3.		Ulubari, Charial	-	67	-	79
4.		Rehbari, A.K. Azad Road	65	-	77	-
5.	Silchar	Ambicapatty(R)	59	58↓	80	69↓
6.		Silchar Medical Collage(S)	52	51↓	69	**59**↓
7		Tarapur(C)	63	63=	80	72↓
8.	Bongaigaon	Barapara(R)	54	53↓	68	61↓
9.		Paulpara(R)	-	52	-	65
10.		Civil Hospital(S)	51	**49**↓	55	60↑
11.		Paglasthan(C)	73	-	79	-
12.	Dibrugarh	Maruwipatty(C)	-	64	-	91
13.		Assam Medical Collage & Hospital(S)	-	51	-	64
14.		Milan Nagar(R)	-	62	-	79

S. No.	Cities	Locations	Pre-deepawali day		Deepawali day	
			2018	2019	2018	2019
15.	Tezpur	Main Bazar (C)	68	70↑	81	86↑
16.		Mazgaon (R)	57	60↑	68	80↑
17.		Civil Hosppital (S)	60	62↑	67	78↑
18.	Nagaon	Civil Hospital (S)	67	66↓	72	72=
19.		Christanpatty (R)	72	**73**↑	81	73↓
20.		Haibargaon Bazar(C)	80	71↓	89	**87**↓
21.	Sivasagar	Melachakar (R)	51	56↑	72	71↓
22.		Central Market(C)	69	60↓	91	82↓
23.		Sivadol Near DC office(S)	49	51↑	66	66=
24.	Golaghat	Market Area, Golaghatz(C)	71	67↓	77	71↓
Note: (-) Indicates data not received.						

Bihar

Observations: In this state, ambient noise monitoring was not carried out during Deepawali festival 2019. In the year 2018, ambient noise monitoring has been carried out at eight locations in Patna city. On pre-Deepawali day noise level ranged between 45 and 76 Leq.dB(A), while same on the festival day ranged between 56 and 82 Leq.dB(A). The maximum noise level value of 82 Leq.dB(A) was reported at Boring Road Crossing, Patna city, on the festival day.

Table 5 : Noise Levels in Leq.dB(A) at different locations during Pre-deepawali & Deepawali day 2017 & 2018 in Bihar

S.No.	City	Locations	Pre-deepawali day		Deepawali day	
			2017	2018	2017	2018
1.	Patna	Boring Road Crossing	79	**76**↓	**82**	**82=**
2.		Gandhi Maidan	-	73	-	75
3.		Parivesh Bhawan, Patliputra, IA	-	63	-	79
4.		Betron Bhawan, Shastri Nagar,	44	45↑	63	58↓
5.		Hindustan Coca Cola Beverage Pvt. Ltd, Patliputra (I)	59	58↓	70	56↓
6.		Planetarium (IGSC) Adalatganj	66	62↓	70	64↓
7.		IGIMS, Main Gate, Sheikhpura, Bailey Road	61	59↓	72	68↓
8.		PMCH	-	51	-	63
Note: Data not received.						

Chandigarh (UT)

Observations: In this UT, ambient noise monitoring carried out at four locations in Chandigarh city. On pre-Deepawali day noise level ranged between 55 and 63 Leq.dB(A), while same on the festival day ranged between 63 and 77. The maximum noise value 77 Leq.dB(A) was reported at Sector - 22 on the festival day.

Table 6 : Noise Levels in Leq.dB(A) at different locations during Pre-deepawali & Deepawali day 2018 & 2019 in Chandigarh

S.No.	City	Locations	Pre-deepawali day		Deepawali day	
			2018	2019	2018	2019
1.	Chandigarh	Sector – 22	54	58↑	81	**77**↓
2.		Sector – 17	52	**55**↑	65	63↓
3.		IMTECH	54	56↑	69	**63**↓
4.		PEC – 12	52	**63**↑	77	64↓

Note: Data not received for the year 2017.

DD & DNH (UT)

Observations: In this UT, ambient noise monitoring carried out at four locations in two cities. On pre-Deepawali day noise level ranged between 60 and 70 Leq.dB(A), while same on the festival day ranged between 73 and 97.1. The maximum noise value 97.1 Leq.dB(A) was reported at Kilwani Naka, Dadar & Nagar Haveli on the festival day.

Table- 7 : Noise Levels in Leq.dB(A) at different locations during Pre-deepawali & Deepawali day 2017 - 2019 in Dadar & Nagar Haveli

S. No.	Cities	Locations	Pre-deepawali day			Deepawali day		
			2017	2018	2019	2017	2018	2019
1.	Daman	Taxi Stand, Daman	62	69	**70**↑	66	98	97↓
2.		Collector office Security Gate	-	63	60↓	-	86	**73**↓
3.	Dadar & Nagar Haveli	Hotel Yatri Niwas	-	-	61	-	-	79
4.		Kilwani Naka	-	-	68	-	-	**97.1**

Note: (-) indicates data not received in this locations

Goa

Observations: In this state, ambient noise monitoring carried out in four locations in four cities. On pre-Deepawali day noise level ranged between 32 and 72 Leq.dB(A), while on the festival day, noise level ranged between 66.8 and 67.3 Leq.dB(A). The maximum noise level value 72 Leq.dB(A) was reported at Mapusa Municipality (C), Mapusa on Pre-deepawali day.

Table-8 : Noise Levels in Leq.dB(A) at different locations during Pre-deepawali & Deepawali day 2017 - 2019 in Goa

S. No.	Cities	Locations	Pre-deepawali day			Deepawali day		
			2017	2018	2019	2017	2018	2019
1.	Mapusa	Mapusa Municipality(C)	75	**72**	**72=**	75	70	*
2.	Panjim	Panjim(C)	69	-	32	60	-	67
3.	Vasco	Fuse Call Office(C)	68	67	60↓	82	64	66.8↑
4.	Margao	Margao Municipality Garden(C)	74	67	67=	-	68	**67.3**↓

Note: * indicates data not available. (-) indicates not monitored in this locations.

Haryana

Observations: In this state, ambient noise monitoring carried out at twenty three locations in nine cities this year 2019. On pre-deepawali day noise level ranged between 43 and 84 Leq.dB(A), while same on the festival day ranged between 55 and 97 Leq.dB(A). The maximum noise level value 97 Leq.dB(A) was reported at Vikas Nagar, Panipat on the festival day.

Table-9: Noise Levels in Leq.dB(A) at different locations during Pre-deepawali & Deepawali day 2018 & 2019 in Haryana

S. No.	Cities	Locations	Pre-deepawali day		Deepawali day	
			2018	2019	2018	2019
1.	Ambala	Sect-7	-	74	-	90
2.		Huda Colony, Sector-7	-	63	-	89
3.		Civil Hospital	-	54	-	55
4.		MPU Ltd., Jasmeet Nagar (C)	73	-	77	-
5.		Jasmeet Nagar (R)	69	-	76	-
6.	Faridabad	Location-C	-	43	-	64
7.		Sectore-16(C)	-	44	-	64
8.		Sarvodaya Hospital, YMCA Road(C)	56	53↓	64	76↑
9.		ESIC Hospital, KL Mehta Road (R)	58	-	59	-
10.	Gurgaon	DLF Phase-II, IFFCO Chowk, MG Road (C)	69	69=	71	70↓
11.		DLF Phase II (R)	67	69↑	71	69↓
12.	Hisar	HSPCB Office, Urban Estate-II,	-	55	-	61
13.		ITI Chowk, Tosham Road	-	60	-	73
14.		HSPCB, Near Jindal Chowk (C)	69	-	76	-
15.		Dabra Chowk, Urban Estate II (R)	62	-	76	-

S. No.	Cities	Locations	Pre-deepawali day		Deepawali day	
			2018	2019	2018	2019
17.		Model Town, Dayanand Colony	-	50	-	58
18.		Bus Stand	-	49.9	-	59
19.		Bangla Sweet House (C)	69	-	73	-
20.		D.S. College, Dyal Singh Colony (R)	65	-	70	-
21.	Panchkula	Raffles Hospital, District Shopping Centre, Sec-14,	-	64	-	70
22.		Sec-11	-	65	-	81
23.		Sec-12A, Near rally	-	64	-	78
24.		HSPCB (C)	66	-	69	-
25.		Hotel KC Cross Road, Maheshpur Road, Budanpur (C)	75	-	80	-
26.	Panipat	NFL West	-	**84**	-	87
27.		Vikas Nagar	-	71	-	**97**
28.		NFL East	-	75	-	91
29.		HSVP Office Complex (C)	76	-	78	-
30.		RO-HSPCB, HUDA (R)	70	-	77	-
31.	Rohtak	Sector-14	-	65	-	74
32.		MDU, Campus	-	60	-	72
33.		Siwach Hospital, Dev Colony (C)	66	-	70	-
34.		Sunflag Global Hospital, Subhash Nagar	64	-	66	-
35.	Sonipat	Star Complex, HSPCB	-	57	-	70
36.		Sector-15	-	50	-	63
37.		HSPCB Office	60	-	72	-
38.		CEPT BERI	51	-	65	-
Note: (-) indicates data not received						

Himachal Pradesh

Observations: In this State, ambient noise monitoring carried out at fifteen locations in eleven cities. On pre-deepawali day noise level ranged between 39 and 71 Leq.dB(A), while same on the festival day ranged between 45 and 92 Leq.dB(A). The maximum noise level value 92 Leq.dB(A) was reported at**,** Rotary Chowk (R), Una city on the festival day.

Table-10 : Noise Levels in Leq.dB(A) at different locations during Pre-deepawali & Deepawali day 2017-2019 in Himachal Pradesh

S. No.	Cities	Locations	Pre-deepawali day			Deepawali day		
			2017	2018	2019	2017	2018	2019
1.	Baddi	Phase-I(R)	49	59	60↑	61	68	72↑
2.	Bilaspur	Bilaspur Town(R)	52	52	53↑	76	60	61↑
3.	Chamba	Near Medical Collage/Distt. Hospital Chamba(S)	-	-	39	-	-	58
4.		Chowgan Bazar Chamba, Main Market Chamba(C)	-	-	70	-	-	75

5.		Residential Area Hardaspur, Chamba(R)	-	-	44	-	-	51
6.	Dharmshala	Dharmshala Building(R)	51	45	45=	69	65	64↓
7.	Kullu	Near Dhalpur Ground(C)	45	53	46↓	61	66	52↓
8.	Kinnaur	Recongpeo(C)	54	54	53↓	69	69	76↑
9.	Parwanoo	Sector IV(R)	54	57	52↓	69	67	62↓
10.	Paonta Sahib	Himuda Colony, Shubkhera,(R)	47	53	50↓	57	64	64=
11.	Rampur	Bhushar (C)	63	64	53↓	81	82	81↓
12.	Shimla	Rigde (C)	47	47	47=	68	65	79↑
13.	Una	Rotary Chowk (R)	73	75	**71**↓	73	71	**92**↑
14.		Rakkar Colony (R)	62	44	42↓	59	48	45↓
15.		Govt. Hospital (S)	38	42	46↑	39	43	66↑
Note: (-) indicates data not received.								

Jammu & Kashmir

Observations: In this state, ambient noise monitoring carried out in four locations in Jammu city. On pre-Deepawali day noise level ranged between 75 and 78 Leq.dB(A), while same on the festival day ranged between 83 and 93 Leq.dB(A). The maximum noise level value 93 Leq.dB(A) was reported at Gole Market, Gandhi Nagar(B/C) on the festival day. Since, the data of 2018 has not received, comparison made with 2017 data only.

Table-11 : Noise Levels in Leq.dB(A) at different locations during Pre-deepawali & Deepawali day 2017 & 2019 in Jammu

S. No.	City	Locations	Pre-deepawali day		Deepawali day	
			2017	2019	2017	2019
1.	Jammu	Rehari Chungi(B/C)	81	75↓	98	86↓
2.		Gole Market Gandhi Nagar(B/C)	86	75↓	101	**93**↓
3.		Bakshi Nagar(Govt. Medical College)	87	77↓	104	83↓
4.		Kachi Chowini/ Parade(B/C)	83	**78**↓	100	87↓
Note: Data not received for the year 2018.						

Kerala

Observations: In this state, ambient noise monitoring data 2019 has not received. In the last year (i.e.2018), ambient noise monitoring carried out in twenty seven locations in twelve cities. On the pre-Deepawali day noise level ranged between 46 and 78 Leq.dB(A), while same on the festival day ranged between 52 and 81 Leq.dB(A). The maximum noise level value 81 Leq.dB(A) was reported at Commercial Area, Kottayam on the festival day.

Table-12 : Noise Levels in Leq.dB(A) at different locations during Pre-deepawali & Deepawali day 2018 in Kerala

S.No.	Cities	Locations	2018	
			Pre-Deepawali day	Deepawali day
1.	Thiruvana-thapuram	SMV School	67	62
2.		COSMO	60	59
3.	Kollam	Chammakada	67	69
4.		Chinnakada	68	61
5.		Shankar Nagar	63	66
6.	Pathanamthitta	Aban Junction	55	66
7.		Stadium Jn.	62	56
8.		Vettipuram	55	57
9.	Alappuzha	Punnamada	62	63
10.		Mullackal	71	71
11.		Iron Bridge	67	67
12.		Alappey Bridge	69	71
13.	Idukki	District Office, Idukki	63	63
14.	Ernakulam	Panampilly Nagar, Ernakulam	57	61
15.		Kuttippadam	75	68
16.	Thrissur	Punkunnam	62	71
17.		Patturaikkal	55	59
18.		Vivekodayam School	56	59
19.	Palakkad	Precot Mill Colony Kanjikode	53	52
20.	Kozhikkode	Gujurati Street, Kozhikode	46	72
21.	Kottayam	Kottayam(C)	**78**	**81**
22.		Vadavathoor(I)	74	75
23.		Chungam(I)	55	59
24.	Kannur	Kannur Thana,	52	58
25.	Kasargod	Kanhangad Town	65	65
26.		Nileswaram Town	62	62
27.		Kasaragod District Office Premises	54	54

Note: Data not received in the year 2017 & 2019 for the same locations.

Madhya Pradesh

Observations: In this state, ambient noise monitoring carried out in three locations in Jabalpur city. The pre-Deepawali day noise level ranged between 50 and 51 Leq.dB(A), while same on the Deepawali day ranged between 68 and 71 Leq.dB(A). The maximum noise level value 71 Leq.dB(A) was reported at JP Nagar, Adhartal(C)on the festival day. However, the last year (i.e.2018) noise monitoring was carried out at forty locations in eighteen cities and data has been given in the table-II.

Table-13: Noise Levels in Leq.dB(A) at different locations during Pre-deepawali & Deepawali day 2018 & 2019 in Madhya Pradesh

S. No.	City	Locations	Pre-Deepawali day		Deepawali day	
			2018	2019	2018	2019
1.	Jabalpur	Office Building, Vijay Nagar(R)	50	50=	71	70↓
2.		JP Nagar, Adhartal(C)	51	**51=**	72	**71↓**
3.		Nr. High Court, CRP Ground(S)	52	**51↓**	70	68↓

Table-14: Noise Levels in Leq.dB(A) at different locations during Pre-deepawali & Deepawali day 2018 in Madhya Pradesh

S. No.	Cities	Locations	2018	
			Pre-Deepawali day	Deepawali day
1.	Bhopal	Govindpura Industrial Area(I)	68	75
2.		Hamidia Road (C)	58	63
3.		Arera Colony(R)	52	68
4.	Gwalior	Nagar Nigam, Maharaj Bada (C)	60	72
5.		Deen Dayal Nagar (R)	48	64
6.		J.A. Hospital (S)	42	67
7.	Singrali	Vindhya Nagar (S)	60	80
8.		Waidhan (C)	69	86
9.		C. Jayant (R)	-	79
10.	Shahdol	MPPCB Office Building (R)	55	64
11.		Near Trafic Office (C)	61	78
12.		Pandav Nagar, Nr. Saraswati School(S)	48	58
13.	Katni	Subhash Chauk(C)	61	62
14.		HIG-4 Housing Board Colony(R)	50	52
15.		Civil Hospital(S)	45	45
16.		Bargawan I.A. (I)	69	70
17.	Chhindwara	Sarvottam Nagar(R)	71	80
18.		Jabalpur Maryadit Dugdh Sangh(I)	77	81
19.		Nagar Palika Nigam(C)	71	86
20.		Pashu Chikitshalaya(S)	71	79
21.	Rewa	Office Building, Nehru Nagar(R)	53	70
22.		Near A.P.S. University Campus(S)	48	69

S. No.	Cities	Locations	2018	
			Pre-Deepawali day	Deepawali day
23.	Indore	Vijay Nagar(R)	55	82
24.		Kothari Market(C)	56	83
25.	Ganganagar	Ganga Nagar(R)	54	74
26.		Gajra Gears(C)	58	76
27.		Shree Mohan Hotal, Nr. AB Road (C)	54	77
28.	Guna	Soni Colony(R)	62	89
29.		Laxmiganj Market(C)	57	92
30.		Aasirwad Hospital(S)	55	63
31.	Morena	District Court(S)	45	58
32.	Dhar	Choudhary Hospital(S)	56	81
33.	Ujjain	Mohan Nagar(R)	56	87
34.	Sagar	Katra Bazar(C)	76	80
35.	Pithampur	Vikas Bhawan	51	82
36.	Khandwa	District Hospital(S)	56	75
37.	Rajgarh	Nagar Palika Parishad	62	90
Note: data not received in the year 2017 & 2019 for same locations				

Meghalaya

Observations: In this state, ambient noise monitoring carried out at three locations in Shillong city. On pre-Deepawali day noise level ranged between 52 and 63 Leq.dB(A), while same on the festival day ranged between 64 and 73 Leq.dB(A). The maximum noise level value of 73 Leq.dB(A) was reported at Police Bazar on the festival day.

Table-15: Noise Levels in Leq.dB(A) at different locations during Pre-deepawali & Deepawali day 2018 & 2019 in Meghalaya

S.No.	City	Locations	Pre-Deepawali day		Deepawali day	
			2018	2019	2018	2019
1.	Shillong	Lumpyngngad(R)	59	52↓	67	64↓
2.		Police Bazar(C)	62	**63**↑	75	**73**↓
3.		Lawmali(S)	48	55↑	70	68↓

Mizoram

Observations: In this State, ambient noise monitoring carried out at two locations in Aizawl city. On pre-Deepawali day noise level ranged between 48.7 and 56.6 Leq.dB(A), while same on the festival day ranged between 48.8 and 56.4 Leq.dB(A). The maximum noise level value of 56.6 Leq.dB(A) was reported at **Dawrpui** on the pre-Deepawali day.

Table-16 : Noise Levels in Leq.dB(A) at different locations during Pre-deepawali & Deepawali day 2018 & 2019 in Mizoram

S.No.	City	Locations	Pre-deepawali day		Deepawali day	
			2018	2019	2018	2019
1.	Aizawl	Laipuitlang	-	48.7	-	48.8
2.		Dawrpui	63	**56.6**↓	62	**56.4**↓
3.		Khatla	48	-	55	-

Note: (-) indicates data not received. No data available for the year 2017.

Nagaland

Observations: In this State, this year Deepawali 2019 data has not received. For the last year (i.e. 2018) ambient noise monitoring carried out at three locations in Dimapur city**.** The pre-Deepawali day noise level ranged between 42 and 54 Leq.dB(A), while same on the festival day ranged between 40 and 70 Leq.dB(A). The maximum noise level value 70 Leq.dB(A) was reported at Bank colony (R), Dimapur on the festival day.

Table-17 : Noise Levels in Leq.dB(A) at different locations during Pre-deepawali & Deepawali day 2017 & 2018 in Nagaland

S.No.	City	Locations	Pre-deepawali day		Deepawali Day	
			2017	2018	2017	2018
1.	Dimapur	Bank colony (R)	54	**54**=	62	**70**↑
2.		City Tower (C)	56	44↓	69	54↓
3.		District Hospital (S)	51	42↓	61	40↓

Note: data not received in the year 2019

Odisha

Observations: In this State, ambient noise monitoring carried out at fifty three locations in fourteen cities**.** The pre-Deepawali day noise level ranged between 49 and 80 Leq.dB(A), while same on the festival day ranged between 60 and 89 Leq.dB(A). The maximum noise level value 89 Leq.dB(A) was reported at Indira Nagar, Rayagada on the festival day.

Table-18: Noise Levels in Leq.dB(A) at different locations during Pre-deepawali & Deepawali day 2017 - 2019 in Odisha

S.No.	Cities	Locations	Pre-deepawali day			Deepawali day		
			2017	2018	2019	2017	2018	2019
1.	Angul	Amalpada (R)	69	-	63	Rainy day on the festival day	-	73
2.		Bazar Chhak (C)	77	-	74		-	82
3.		District HQ (S)	66	-	65		-	66
4.		Hakimpada, East Angul (I)	62	-	61		-	67
5.	Balasore	Sahadevkhunta (R)	57	-	63		-	79
6.		Motiganj (C)	64	-	**80**		-	87
7.		District HQ Hos. (I)	53	-	60		-	66
8.		Balasore Industrial Estate I)	64	-	58		-	73
9.	Berhampur	Brahmanagar (R)	67	53	55↑		79	73↓
10.		Girija Market Square (C)	83	76	76=		82	76↓
11.		MKCG Medical College Hospital Campus (S)	61	55	64↑		65	67↑
12.		Ankuli Industrial Estate (I)	74	71	65↓		80	67↓
13.	Bhubaneswar	Nayapalli (R)	69	65	65=	Rainy day on the festival day	78	67↓
14.		Sahid Nagar (C)	69	68	61↓		75	72↓
15.		Capital Hospital (S)	60	59	55↓		64	63↓
16.		Rasulgarh (I)	71	70	58↓		70	69↓
17.	Cuttack	Suryaihar Link (R)	71	70	67↓		72	76↑
18.		Badambadi (C)	81	69	76↑		75	77↑
19.		SCB Medical College & Hospital (S)	66	70	67↓		75	69↓
20.		Khapuria Industrial Estate(I)	69	67	71↑		79	76↓
21.	Jharsuguda	Cox Colony(R)	-	-	68	-	-	88
22.		Jhanda Chowk (C)	-	-	70	-	-	82
23.		Near Mangala Bazar(S)	-	-	67	-	-	86
24.		Bombay Chowk (I)	-	-	71	-	-	80

S. No.	Cities	Locations	Pre-deepawali day			Deepawali day		
			2017	2018	2019	2017	2018	2019
25.	Kalinganagar	Sapagadia (R)	57	-	71	Rainy day on the festival day	-	84
26.		Gopabandhu Chhak (C)	66	-	77		-	83
27.		CHC Hospital (S)	60	-	71		-	78
28.		Duburi Chowk, Kalignagar	-	-	68	-	-	78
29.	Keonjhar	Baniapat Chowk (R)	72	-	72	82	-	75
30.		Punjabi Chowk (C)	79	-	76	89	-	81
31.		Govt. Hospital (S)	65	-	64	72	-	71
32.	Konark	Madhipur(R)	-	-	58	-	-	64
33.		NAC Market (C)	-	-	75	-	-	72
34.		Public Health Center(I)	-	-	60	-	-	60
35.	Pardeep	PPT colony, Madhuban (R)	62	-	64	Rainy day on the festival day	-	72
36.		Badpadia Market (C)	67	-	70		-	76
37.		Biji Memorial Hos.,Atharbanki(S)	63	-	58		-	73
38.		IFFCO Ltd. (I)	66	-	67		-	78
39.	Puri	Kumutisahi, Old Sadar lane(R)	79	-	71		-	77
40.		Sri Mandir, Puri(C)	76	-	77		-	84
41.		District HQ Hospital (S)	62	-	65		-	74
42.	Rayagada	Indira Nagar	75	-	74	87	-	**89**
43.		Main Market	70	-	74	84	-	83
44.		Dist. HQ Hospital	68	-	72	69	-	81
45.		JESCO(I)	-	-	68	-	-	80
46.	Rourkela	Sec- 6(R)	-	-	51	-	-	71
46.		Amabagan(C)	-	-	64	-	-	72
47.		IGH, Steel Township(S)	48	43	49↑	58	51	62↑
48.		Main Gate of RSP (SAIL)(I)	60	61	67↑	65	65	68↑
50.		Sector-4(R)	49	45	-	74	76	-
51.		Bisra Chowk(C)	76	74	-	83	85	-
52.	Sambalpur	Ainthapall(R)	52	66	59↓	63	82	78↓
53.		Goal Bazar Chowk(C)	55	73	75↑	61	91	83↓
54.		Dist. HQ Hospital,Modipara(S)	49	60	53↓	62	69	71↑
55.		Bareipali (I)	59	66	67↑	65	81	84↑

Puducherry (UT)

Observations: In this UT, ambient noise monitoring carried out at only one location i.e. Mudaliarpet**.** On pre-Deepawali day, noise level 70 Leq.dB(A), while same on the festival day 91 Leq.dB(A).

Table-19: Noise Levels in Leq.dB(A) at different locations during Pre-deepawali & Deepawali day - 2019 in Puducherry

S.No.	City	Location	Pre-deepawali day			Deepawali day		
			2017	2018	2019	2017	2018	2019
1.	Puducherry	Mudaliarpet (R)	67	77	70↓	91	95	91↓

Punjab

Observations: In this State, ambient noise monitoring carried out at thirty three locations in eleven cities. On pre-Deepawali day noise level ranged between 38 and 78 Leq.dB(A), while same on the festival day ranged between 46 and 88 Leq.dB(A). The maximum noise level value 88 Leq.dB(A) was reported at Residential at Sangrur city on festival day .

Table-20: Noise Levels in Leq.dB(A) at different locations during Pre-deepawali & Deepawali day 2017 - 2019 in Punjab

S. No.	Cities	Locations	Pre-deepawali day			Deepawali day		
			2017	2018	2019	2017	2018	2019
1.	Amritsar	Residential area	-	51	51=	-	69	53↓
2.		Silence Zone	-	50	45↓	-	67	53↓
3.		Commercial area	-	59	61↑	-	69	63↓
4.	Batla	Residential area	-	-	51	-	-	64
5.		Silence Zone	-	-	47	-	-	50
6.		Commercial area	-	-	63	-	-	64
7.	Bhatinda	Model Town (R)	42	-	41	44	-	46
8.		Civil Hospital (S)	46	-	48	56	-	52
9.		Gole Diggi (C)	61	-	62	69	-	69
10.	Fa rid Ko	Harindra Nagar(R)	39	-	38	70	-	70
11.		Civil Hospital (S)	43	-	43	56	-	55
12.		Main Bazar, Near Clock Tower (C)	60	-	59	73	-	72

S. No.	Cities	Locations	Pre-deepawali day			Deepawali day		
			2017	2018	2019	2017	2018	2019
13.	Gurdaspur	Residential Area	53	-	-	68	-	-
14.		Silence Zone	53	-	-	61	-	-
15.		Commercial Area	66	-	-	76	-	-
16.	Hoshiarpur	Purhiran (R)	50	-	53	70	-	73
17.		Sessions Chowk (S)	49	-	49	68	-	74
18.		Phagwara Chowk (C)	72	-	72	71	-	73
19.	Jalandhar	Residential	61	-	62	71	-	67
20.		Commercial	52	-	67	60	-	69
21.		Silence Zone	67	-	52	75	-	56
22.	Ludhiana	Milk Plant (R)	68	54	55↑	70	69	59↓
23.		Sheela Hospital (S)	65	53	52↓	72	70	69↓
24.		Vishavkarma Chowk (C)	78	70	67↓	77	76	69↓
25.	Patiala	Residential	69	68	66↓	71	73	70↓
26.		Silence Zone	60	60	58↓	63	63	63=
27.		Commercial Zone	80	80	**78**↓	78	79	78↓
28.	Mohali	Residential Area	54	-	61	77	-	74
29.		Silence Zone	54	-	56	69	-	59
30.		Commercial Area	53	-	65	75	-	68
31.	Sirhind	Residential area	62	60	59↓	66	62	65↑
32.		Silence Zone	62	58	64↑	65	59	63↑
33.		Commercial area	66	66	62↓	71	71	71=
34.	Sangrur	Residential	67	-	68	87	-	**88**
35.		Silence Zone	58	-	59	62	-	65
36.		Commercial	69	-	72	82	-	84

Note: (-) indicates data not received for the same locations.

Rajasthan

Observations: In this State, ambient noise monitoring carried out at thirty locations in fourteen cities. On pre-Deepawali day noise level range between 56 and 76 Leq.dB(A), while same on the Deepawali day noise level ranged between 67 and 93 Leq.dB(A). The maximum noise level 93 Leq.dB (A) was reported at Gandhi Nagar (R)**,** Jaipur on the festival day.

Table- 21: Noise Levels in Leq.dB(A) at different locations during Pre-deepawali & Deepawali day 2017 - 2019 in Rajasthan

S. No.	Cities	Locations	Pre-deepawali day			Deepawali day		
			2017	2018	2019	2017	2018	2019
1.	Jaipur	Gandhi Nagar (R)	59	56	57↑	72	80	**93**↑
2.		Jawahar Nagar (R)	67	62	63↑	79	69	81↑
3.		Raja Park (C)	67	74	66↓	75	83	80↓
4.		Mansarovar (C)	64	63	57↓	79	74	83↑
5.		SDM Hospital (S)	79	62	65↑	81	71	72↑
6.		Civil Line (S)	67	66	67↑	75	59	71↑
7.	Ajmer	Kutchery Road (R)	63	74	73↓	75	78	74↓
8.	Bhil wara	Azad Nagar (R)	66	53	70↑	87	68	91↑
9.		Kumbha Circle Azad Ngr (C)	66	73	66↓	84	77	76↓
10.	Pali	Maharaja Shree Umed Mils (R)	62	62	69↑	78	67	68↑
11.		Surajpol,Townhall (C)	68	69	67↓	87	69	68↑
12.		Bangur Hospital (S)	48	51	65↑	65	66	68↑
13.	Bikaner	Junagarh (C)	73	70	71↑	82	78	79↑
14.	Jodhpur	Shashtri Ngr P.Station (C)	68	64	64=	73	79	79=
15.		Maha Mandir Police Station(R)	72	67	64↓	80	82	81↓
16.	Kota	MBS Hospital(S)	68	71	69↓	65	62	74↑
17.		Dadawada(R)	56	59	56↓	70	70	67↓
18.		Gumanpura(C)	66	66	70↑	78	82	86↑
19.	Udaipur	Pole Gate (C)	77	78	**76**↓	87	78	83↑
20.		M.B. Hospital (S)	69	64	68↑	77	67	69↑
21.		Amba Mata Scheme (R)	65	70	69↑	73	74	79↑
22.	Alwar	Kala Kuan (R)	65	59	64↑	78	62	91↑
23.		General Hospital (S)	57	60	61↑	75	68	71↑
24.	Bhiwadi	Ashiana Garden Society (R)	57	57	62↑	80	82	78↓
25.		Star Hospital (S)	70	60	60=	77	72	73↑
26.	Sikar	Nawalgarh Road	61	53	59↑	67	69	71↑
27.	Chitorgarh	Public Park (C)	66	67	63↓	77	81	77↓
28.		Guard Ofc. Kumbha	66	63	60↓	84	83	80↓
29.	Bharatpur	laxmi Mandir Shouwk (C)	63	64	61↓	69	71	71=
30.	Balotra	Maheshwari railway Crossing (C)	55	54	59↑	71	68	76↑

Tamil Nadu

Observations: In this State, ambient noise monitoring carried out at twenty four locations in twelve cities. On pre-deepawali day noise level range between 50 and 79.6 Leq.dB(A), while same on the festival day noise level ranged between 60 and 88 Leq.dB(A). The maximum noise level 88 Leq.dB (A) was reported at Thirunagar (R), Madurai on festival day.

Table-22: Noise Levels in Leq.dB(A) at different locations during Pre-deepawali & Deepawali day 2017-2019 in Tamil Nadu

S. No.	Cities	Locations	Pre-deepawali day			Deepawali day		
			2017	2018	2019	2017	2018	2019
1.	Chennai	Besant Nagar(R)	62	72	55↓	73	77	76↓
2.		Nungambakkam(R)	73	79	57↓	80	84	79↓
3.		Sowcarpt(C)	69	69	73↑	72	69	84↑
4.		T. Nagar(C)	64	81	**79.6**↓	81	-	79.5
5.		Triplicane(R)	64	61	-	86	79	-
6.	Coimbatore	Kavundampalayam(R)	64	63	68↑	67	72	79↑
7.		District Collector Office(M)	63	64	62↓	-	75	66↓
8.	Cuddalore	Imperial Road (C)	77	76	77↑	80	81	81=
9.		Pudupalayam Village(R)	66	65	65=	75	75	77↑
10.	Dindigul	Nagal Pudhur(R)	53	54	55↑	69	66	64↓
11.		Rajagopal(C)	74	74	72↓	74	75	79↑
12.	Hosur	INEL Transit House(R)	Rain	63	51↓	86	78	80↑
13.		ESI Hospital(S)	Rain	63	50↓	79	85	79↓
14.	Madurai	Thirunagar(R)	66	61	65↑	74	71	**88**↑
15.		Birla Visram(C)	-	-	68	-	-	71
16.		Madurai Corporation South(C)	66	55	-	75	65	-
17.	Salem	Sri Saradha Balamandhir(R)	62	60	55↓	82	73	72↓
18.		Siva Tower(C&I)	-	-	58	-	-	71
19.		Salem Sowdeswari College (C)	59	59	-	73	72	-
20.	Thoothukudi	Raju Nagar, Thoothukudi(R)	-	51	59↑	-	55	75↑
21.	Tiruppur	Rayapuram(R)	62	62	55↓	90	82	81↓
22.		Kumaran Complex(C)	-	-	63	-	-	86
23.	Trichy	Thillai Nagar(R)	62	62	61↓	90	83	82↓
24.		Arulanatha ammal Nagar(R)	-	-	59	-	-	81
25.	Tirunelveli	Pettai Nearer to nursing home(S)	-	50	56↑	78	66	60↓
26.		Vannarpettai(C)	59	59	59=	85	66	64↓
27.	Vellore	Gandhi Nagar (R)	58	61	57↓	68	61	74↑
28.		SIDCO Thiru Nagar (C)	-	63	50↓	-	63	67↑

Note: (-) indicates data not received for the same locations.

Tripura

Observations: In this State, this year 2019, ambient noise data has not received. In the last year (i.e.2018), ambient noise monitoring carried out at twenty seven locations in four cities. On the pre-Deepawali day noise level ranged between 46 and 73 Leq.dB(A), while same on the festival day noise level ranged between 46 and 98 Leq.dB(A). The maximum noise level 98 Leq.dB (A) was reported at Hospital Area (S), Udaipur on the festival day.

Table-23: Noise Levels in Leq.dB(A) at different locations during Pre-deepawali & Deepawali day 2017&2018 in Tripura

S. No.	Cities	Locations	Pre-deepawali day		Deepawali Day	
			2017	2018	2017	2018
1.	Dharmanagar	Railway Stataion (C)	60	58↓	65	82↑
2.		Dharmanagar circuit house (R)	48	55↑	73	64↓
3.		SDM and judges quarter (R)	64	66↑	67	76↑
4.		Hospital Area (S)	48	51↑	53	58↑
5.		D.N. Vidyamandir (S)	64	62↓	64	79↑
6.	Ambassa	Kulai District Hospital (S)	50	49↓	46	46=
7.		Bhawaliya Basti / Jawahar Nagar Office Complex (R)	52	51↓	57	55↓
8.		Dalubari Gate /Ambassa PHC, Chandraicherra (S)	51	51=	54	57↑
9.		Ambassa Bazar (C)	61	60↓	65	65=
10.		Kuali Bazar (C)	61	62↑	60	60=
11.	Agartala	Ashram chowmuhani (C)	58	66↑	75	57↓
12.		Capital complex (R)	53	46↓	48	49↑
13.		Circuit House (R)	53	48↓	65	51↓
14.		Indranagar (R)	56	54↓	66	57↓
15.		G.B Hospital (S)	54	54=	61	59↓
16.		M.B.B. Collage (S)	45	48↑	56	58↑
17.		Battala (C)	75	**73**↓	69	73↑
18.		Astabal (C)	58	66↑	61	65↑
19.		Duraga Chowmuhani (C)	67	67=	71	72↑
20.		Netaji Chowmuhani (C)	60	65↑	62	71↑
21.		A. D. Nagar (R)	48	50↑	62	65↑
22.		I.G.M Hospital (S)	63	60↓	60	61↑
23.	Udaipur	Brahmabari (C)	59	57↓	68	70↑
24.		Bridge Chowmuhani (R)	54	55↑	70	67↓
25.		West Bank of Amar Sagar (R)	55	51↓	64	65↑
26.		Hospital Area (S)	49	49=	50	**98**↑
27.		Matabari/Tripureswari Temple(S)	52	52=	72	77↑

Uttar Pradesh

Observations: In this State, ambient noise monitoring carried out at eleven locations in six cities. On pre-deepawali day noise level ranged between 42 and 66 Leq.dB(A), while same on the deepawali day noise level ranged between 64 and 79 Leq.dB(A). The maximum noise level 79 Leq.dB (A) was reported at Bodla(R) and Sanjay Place(C), Agra city on the festival day. Since, the data of 2018 has not received, comparison made with 2017 data only.

Table-24: Noise Levels in Leq.dB(A) at different locations during Pre-deepawali & Deepawali day 2017 & 2019 in Uttar Pradesh

S.No.	Cities	Locations	Pre-deepawali day		Deepawali day	
			2017	2019	2017	2019
1.	Agra	Bodla(R)	47	46↓	79	**79=**
2.		Sanjay Place(C)	57	52↓	77	**79**↑
3.		Tajmahal(S)	43	44↑	55	64↑
4.		District Hospital (S)	50	46↓	63	68↑
5.	Unnao	Krishnanagar(R)	48	42↓	66	70↑
6.		IBP Chauraha,Motinagar(C)	69	**66**↓	74	74=
7.	Bijnor	Judgi Chowk	-	64	-	67
8.		Ram Ka Chauraha	-	64	-	77
9.	Pryagraj	Mumford Ganj,(R)	-	53	-	77
10.	Jhansi	Near District Courts, Kacheri(S)	-	65	-	68
11.	Sonebhadra	New Market Robertsganj(C)	-	59	-	70

Note: (-) indicates data not received in the 2018. However, data compared with the year 2017.

Uttarakhand

Observations: In this state, ambient noise monitoring in the year 2019 has not carried out. In the year(i.e.2018) ambient noise monitoring carried out at ten locations in two cities. On pre-Deepawali day noise level ranged between 42 and 83 Leq.dB(A), while same on the festival day ranged between 58 and 86 Leq.dB(A). The maximum noise level value of 86 Leq.dB(A) was reported at Maharana Pratap Chock, Kashipur, U.S. Nagar, on the festival day.

Table-25: Noise Levels in Leq.dB(A) at different locations during Pre-deepawali & Deepawali day 2018 in Uttarakhand State

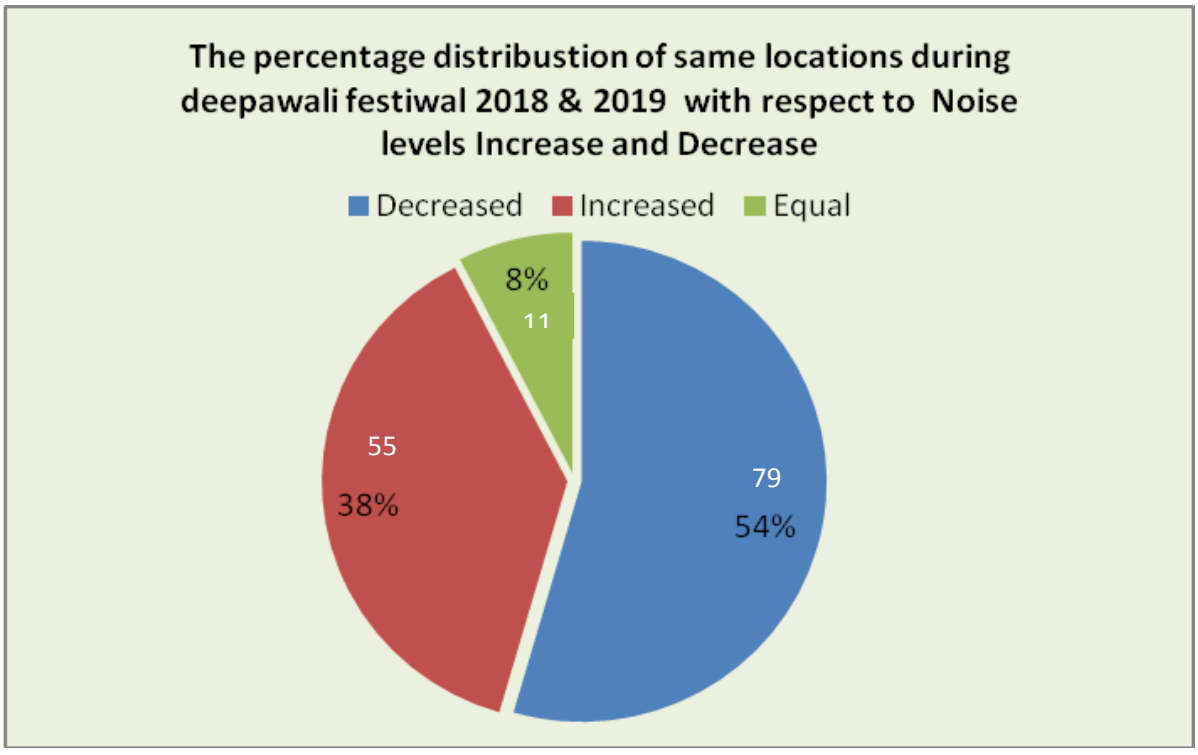
S. No.	Cities	Locations	2018	
			Pre-deepawali day	Deepawali day
1.	Haridwar	Dawa Chowk(I)	65	60
2.		Shivalik Nagar(C)	72	84
3.		Residencial Zone	50	78
4.		Sidcul, Bhel Hospital (S)	42	58
5.	Kashipur, U.S. Nagar	Maharana Pratap Chock Kashipur	**83**	**86**
6.		Govt. Hospital	71	58
7.		Awas Vikash(R)	51	80
8.		Avas Vikash colony	58	73
9.		Beer Shiva	56	74
10.		Chowk Bazar	61	78

Note: data not received for the year 2017& 2019.

5. Conclusion:

The ambient noise monitoring has been carried out across the nation consisting of 258 locations in 107 cities for pre-deepawali and deepawali day this year 2019. The pre-deepawali day noise level ranged between 32 and 84 Leq.dB(A) while same on the deepawali day ranged between 45 and 98 Leq.dB(A). The minimum noise level on pre-deepawali day was reported at Commercial Area, Panjim city, (Goa) and the maximum noise level on pre-deepawali day was reported at NFL, Panipat, (Haryana) while the minimum noise level on deepawali day was reported at Rakkar colony®, Una(Himachal Pradesh) and the maximum noise level on deepawali day was reported at Hospital Area (S), Udaipur (Tripura).

Out of 258 locations, the data of 145 locations are compared with previous year noise level, as these locations are common in the both the year (2018 & 2019). In general, a noise levels at these 145 locations shows some improvement as compared to the last year (2018). The percentage distributions of Noise level with respect to locations are depicted in the following in pie chart.



Out of 145 locations, noise level at 79 locations are decreased, 55 locations it is increased and 11 locations are equal to the previous year levels.

6. Recommendations:

1. The Noise standards for fire-crackers were notified by MoEF under the Environment (Protection) (Second Amendment) Rules, 1999 vide G.S.R.682(E), dated the 5th October, 1999 and inserted as serial no. 89 of Schedule I of the Environment (Protection) Rules, 1986. Subsequently these Rules were amended by the Environment (Protection) Second Amendment Rules, 2006 vide G.S.R. 640(E), dated the 16th October, 2006, under the Environment (Protection) Act, 1986 guidelines should be followed by the manufacturer and the Department of Explosives to implement the following standards

   (i) The manufacture, sale or use of fire-crackers generating noise level exceeding 125 dB(AI) or 145 dB(C)pk at 4 meters distance from the point of bursting should be prohibited.
   (ii) For individual fire-cracker constituting the series (joined fire-crackers), the above mentioned limit be reduced by 5 log10(N)dB, where N = number of crackers joined together.

2. The State Government shall take measures for abatement of air pollution including noise emanating from various zones during Deepawali day festival and ensure that the existing level do not exceed the Ambient Air Quality Standards and Ambient Noise Standards.

3. All concerned agencies like Electronic, print media, Central & State Governments, Central & State Pollution Control Boards or Pollution Control Committees, Educational institutions & NGOs should create awareness among students & public at large to avoid bursting of fire-crackers to reduce air pollution & noise during festival of Deepawali day.

4. The order of the Hon'ble Supreme Court of India, dated September 27, 2001, prohibiting the use of fireworks between 10.00 p.m. and 06.00 a.m. should be strictly enforced.

5. Enforcement of legal action on un-authorized manufacturing, processing and selling of fireworks should be strictly ensured.

6. Designed places for burning of fire-crackers/fireworks may be identified by the local authority, so that fire-crackers could be played at community level and not at individual houses.

7. Recognition for fire-crackers noise under criteria of cruelty to animals should be incorporated under relevant acts and rules.

Annexure-I

The Noise Pollution {Regulation and Control) Rules, 2000 SCHEDULE

(see rule 3(1) and 4(1)}

Ambient Air Quality Standards in respect of Noise

Area Code	Category of Area / Zone	Limits in dB(A) Leq*	
		Day Time	Night Time
A	Industrial area	75	70
B	Commercial area	65	55
C	Residential area	55	45
D	Silence Zone	50	40

Note:

(a) Day time shall mean from 6.00 a.m. to 10.00 p.m.

(b) Night time shall mean from 10.00 p.m. to 6.00 a.m.

(c) Silence zone is an area comprising not less than 100 meters around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority.

(d) Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

***** dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

A "decibel" is a unit in which noise is measured.

"A", in dB (A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.

Leq: It is an energy mean of the noise level over a specified period

Annexure-II

Protocol for Ambient Noise Monitoring on Deepawali day

1.0 Purpose of Monitoring

This protocol presents the method for Ambient Noise monitoring during Deepawali day Festival. The objective is to see the impact of bursting crackers on Environment and whether ambient noise level is within prescribed noise level standard limit.

2.0 Monitoring Locations/Site Selection:

- Site in a city shall be selected such that each category (Residential, Commercial and Silence Zones) should be covered.
- Instrument should be placed considering following points :
  - Instrument must be away from fascades
  - Instrument must be away from obstacles
  - Microphone must be placed 1.2 -1.5 m above the ground level
  - In dry conditions with a wind speed of less than 5 m/s
  - Isolate the instrument from strong vibration and shock
- Close to any domestic premises, Hotel, Hostel, Hospital, Educational institution etc. do not keep the noise level meter and the measurement.

3.0 Monitoring Equipments

Noise measurements will be made with a Type 1 integrating sound level meter with free-field microphone which meets the Accuracy of noise measurement as per IEC 804 (BS 6698) Grade I or ANSI Type I or equivalent IEC 61672-1(2002-05) Class-I.

4.0 Monitoring frequency: Noise Monitoring on Deepawali day Day is to be carried out from 18.00 Hrs to 24.00 Hrs continuously at each location.

5.0 Sampling Frequency/rate: Duration is of 6 hours from 18.00 Hrs to 24.00 Hrs with 1 sec sampling period.

6.0 Monitoring Parameters: Leq, L10, L90, L50, Lmax, Lmin, LAI (with 1sec sampling period at all locations).

7.0 Criteria for monitoring:

The following criteria will be observed when undertaking the noise monitoring:

a) During Deepawali day sound comes from more than one direction, it is important to choose a microphone and mounting which gives the best possible Omni directional characteristics;
b) The noise measurement equipment will be supervised continuously during the monitoring period and notes will be made of the date, time and prevailing weather conditions;
c) Immediately prior to and following each noise measurement session the accuracy of the noise level meter shall be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Make sure that the instrument is properly

calibrated. The sound level meter and calibrator will hold a current calibration certificate traceable to national standards;

d) Noise measurements should not be made in fog and rain;
e) A wind shield will be used at all times to prevent interference with sound levels;
f) As far as is practicable, the pause facility on the noise measurement equipment will be used to exclude extraneous noise (e.g. low flying aircraft and road traffic passing in front of the microphone) so that the results recorded are representative of the site noise or if possible for road traffic/other source background noise can be eliminated from final reading by using the following formula:

$$L_{pressure} = 10.\log [10^{(Lp/10)} - 10^{(LpBackground/10)}]$$

8.0 The following details will be recorded:

(i) The date, time, location and duration of the measurement;
(ii) All predominant noise sources will be noted, which may include extraneous noise such as road traffic, aero-planes and other activity;
(iii) Weather conditions will be recorded including wind speed and approximate direction, cloud cover, rain and ground frost;

9.0 Noise Monitoring Records

The particulars of the measurements recorded by the noise level meter shall be furnished in the monitoring data sheet, which is attached at **Annexure VII.**

Annexure-III

Data sheet for Ambient Noise Monitoring on Deepawali day

Location:				Date:
Noise Level Meter				
Make	:			
Model	:			
Serial No.	:			
Calibration Result of Noise Level Meter				
Calibration		94 dB at 1000 Hz	114 dB at 1000 Hz	
Initial				
Final				
Sampling rate				
S. No.	Time duration		File No.	L equivalent dB(A)
	18:00 Hrs. to 19:00 Hrs			
	19:00 Hrs. to 20:00 Hrs			
	20:00 Hrs. to 21:00 Hrs			
	21:00 Hrs. to 22:00 Hrs			
	22:00 Hrs. to 23:00 Hrs			
	23:00 Hrs. to 24:00 Hrs			
Average L equivalent dB(A) Between (18:00 to 24:00 Hrs)				
Name & signature of Official on Duty				

L_{max} Between (18:00 to 24:00 Hrs) and L_{min} Between (18:00 to 24:00 Hrs).

PART-II

Ambient Air Quality during Deepawali festival 2019

REPORT ON AMBIENT AIR QUALITY DURING DEEPAWALI FESTIVAL 2019

1.0 Background

Hon'ble Supreme Court in its order dated October 23, 2018 in the matter of Arjun Gopal and Others Versus Union of India and Others Writ Petition (Civil) No. 728 of 2015, directed as follows:

"CPCB and respective State Pollution Control Boards/Pollution Control Committees (SPCBs/PCCs) of the States and Union Territories shall carry out short –term monitoring in the cities for 14 days (commencing from 7 days prior to Deepawali and ending 7 days after Deepawali) for parameters namely Aluminium, Barium, Iron apart from the regulatory parameters against the short-term Ambient Air Quality Criteria Values (AAQCVs) proposed by CPCB with regard to bursting of firecrackers. This will help in generation of data on pollution caused by the bursting of firecrackers and would be helpful for regulation and control quantity of Aluminium, Barium and Iron used in the manufacture of firecrackers".

In compliance of above, like last year (2018) this year also CPCB conducted monitoring at seven cities namely Delhi (CPCB Head Quarter) and Agra, Bhopal, Bengaluru, Kolkata, Lucknow and Vadodara where its Regional Directorates are situated and Deepawali is widely celebrated. 15 days monitoring (20th October to 3rd November); 7 days prior (21st October to 26th October – Pre-Deepawali period); Deepawali day (27th October) and 7 days after Deepawali (28th October to 3rd November – Post-Deepawali period); was conducted by CPCB.

In addition to the NAAQS parameters (PM_{10}, $PM_{2.5}$, SO_2 and NO_2 and metals such as Pb, Ni & As in PM_{10}) and elements (Al, Ba, and Fe) used in composition of firecrackers, which may have harmful effects on inhalation, are also included in monitoring plan. Al, Ba, and Fe are monitored in $PM_{2.5}$ fraction as proposed in AAQCVs.

2.0 Monitoring locations

City wise locations covered for monitoring is presented in Table 1.

Table 1: Locations Covered in Deepawali Special Monitoring

S. No.	States	City	Name of the location	Parameters covered
01	Delhi	Delhi NCT	1) Pitampura 2) Janakpuri,	Regulatory Parameters like PM_{10}, $PM_{2.5}$, SO_2, NO_2, Metals (Pb, Ni, As in PM_{10}) and parameters related to AAQCVs (Al, Fe and Ba in $PM_{2.5}$)
02	Gujarat	Vadodara	1) Hari Nagar 2) M.S. University Campus	
03	Karnataka	Bengaluru	1) Rajarajeshwari Nagar 2) Basaveshwara Nagar	
04	Madhya Pradesh	Bhopal	1) North T.T.Nagar, 2) Nehru Nagar	
05	Uttar Pradesh	Agra	1) Taj Mahal	
		Lucknow	1) Viksh Khand, Gomt Nagar, 2) Mayur Vihar, Indira Nagar	
06	West Bengal	Kolkata	1) Kasba 2) Behala 3) North avenue	

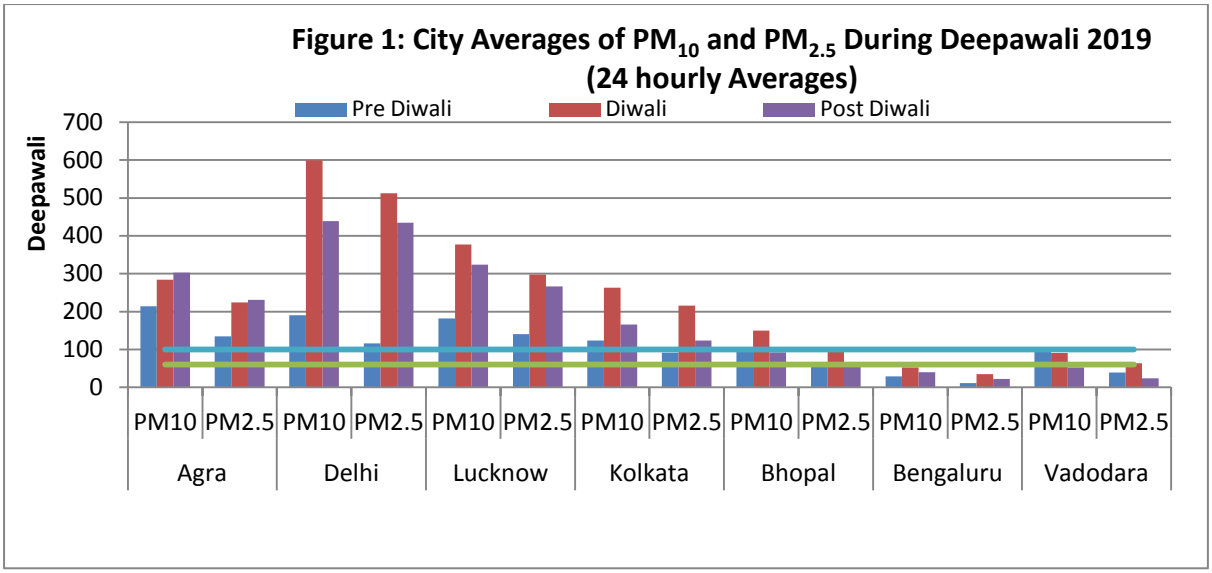
3.0 Results and Discussion

Data were analysed for Pre-Deepawali (20th October to 26th October, Deepawali (27th October and Post Deepawali period (28th October to 03rd November). Parameter-wise results are discussed as under:

3.1 NAAQS parameters (PM_{10}, $PM_{2.5}$, SO_2, NO_2 and metals (Pb, Ni & As) in PM_{10}

a) **Particulate Matter (PM_{10} and $PM_{2.5}$)**

PM_{10} and $PM_{2.5}$ data of representative stations in respective cities are averaged to assess the overall air quality of the city with respect to Particulate matter during pre-Deepawali, Deepawali day and post Deepawali is depicted in Figure 1.



From Figure 1 it may be seen that PM_{10} was above the NAAQS (National Ambient Air Quality Standard, i.e 100 µg/m^3 24 hourly averages) in Agra, Delhi, Lucknow and Kolkata; however, $PM_{2.5}$ was above prescribed standards in all cities except Bengaluru and Vadodara on pre-Deepawali days. On Deepawali day $PM_{2.5}$ was found above 60 µg/m^3 (above 24 hourly NAAQS) in all cities except Bengaluru.

Post Deepawali Monitoring has revealed that particulates (both PM_{10} and $PM_{2.5}$) in all the cities except Agra declined. It was also evident that the northern Indian cities are behaving similarly in dispersion pattern of Deepawali effect due to changes in weather conditions and perhaps additions of transported pollution as Delhi is facing during post Deepawali days.

City-wise increase/decrease in PM_{10} and $PM_{2.5}$ on Deepawali day is presented in Table 2.

Table 2: City-wise increase in PM_{10} and $PM_{2.5}$ on Deepawali day compared to Pre-Deepawali period (in %)

	Agra	Delhi	Kolkata	Bengaluru	Bhopal	Lucknow	Vadodara
PM_{10}	33	247	112	83	59	107	-9.0
$PM_{2.5}$	68	592	137	218	57	113	64

PM_{10} was increased in all the cities except Vadodara where torrential rain falls perhaps wiped out coarser particulates. The increase in PM_{10} was recorded by 33% to 247% on 27th October 2019 (Deepawali day) compared to Pre-Deepawali period among various cities monitored. Highest increment in PM_{10} on Deepawali day was

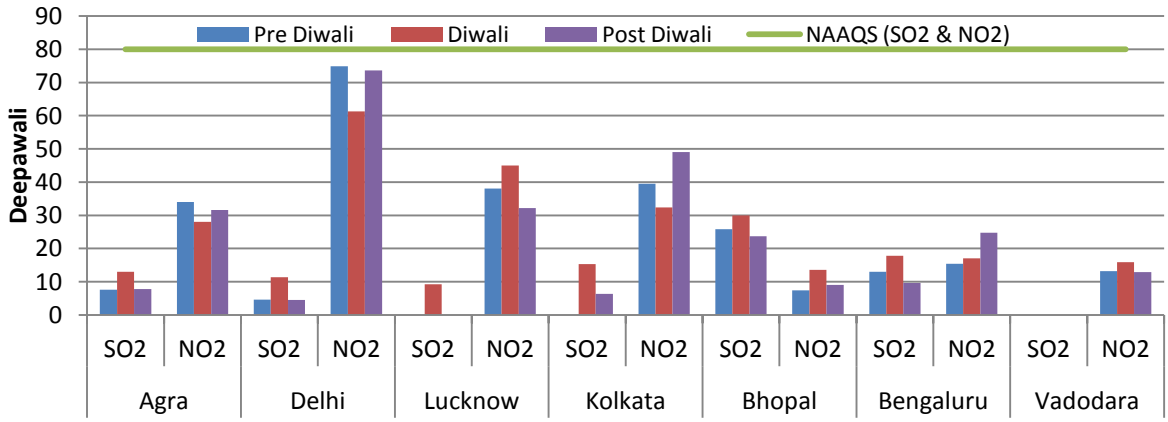
reported in Delhi (247%) followed by Kolkata (112%) and Lucknow (107%). PM_{10} in Vadodara was declined by (9%) on Deepawali day.

On Deepawali day, $PM_{2.5}$ was increased by 64 – 592% compared to Pre-Deepawali period among the various cities monitored. Highest increment was recorded in Delhi (592%), followed by Bengaluru (218%) Kolkata (137%) and Lucknow (113%). Minimum increase (57%) was reported in Bhopal this year.

b) **Sulphur di oxide (SO_2) and Nitrogen di oxide (NO_2)**

Fig 2 depicts the concentrations of criteria gaseous pollutants (SO_2 and NO_2) at all cities. SO_2 was found always within the prescribed 24 hourly NAAQS (80µg/m^3) throughout the monitoring period including Deepawali day. Increase in SO_2 concentration on Deepawali day at all cities are evident. Increase on Deepawali day may be attributed to oxidation of sulphur due to bursting of cracker.

Figure 2: City Averages of SO_2 and NO_2 During Deepawali 2019 (24 hourly Averages)



NO_2 was reported within prescribed 24 hourly NAAQS (80µg/m^3) in all the cities during Pre-Deepawali and Deepawali. On Deepawali day NO_2 was found to increase at 5 out of 7 cities. Agra, Kolkata and Vadodara have reported decline in NO_2 on Deepawali day compared to Pre-Deepawali period.

3.2 Metals in PM_{10} (NAAQS Parameters)

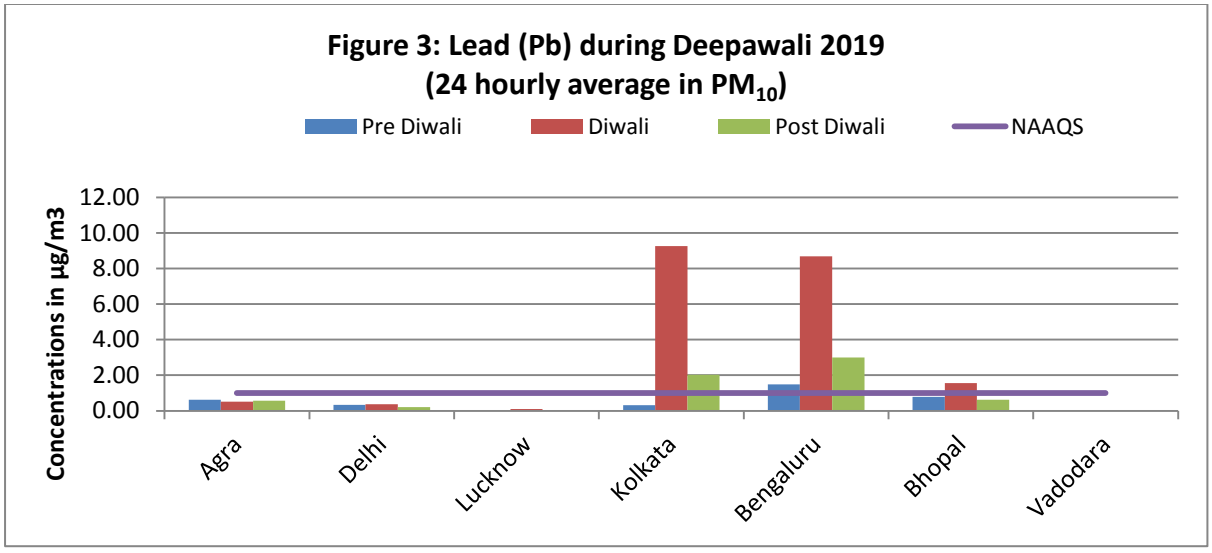
Lead Nickel and Arsenic (Pb, Ni and As) concentrations are prescribed in NAAQS 2009. The value of these metals found during Deepawali 2019 is presented in Table 3.

Table 3: Lead Nickel and Arsenic in PM_{10} in Delhi during Deepawali - 2019

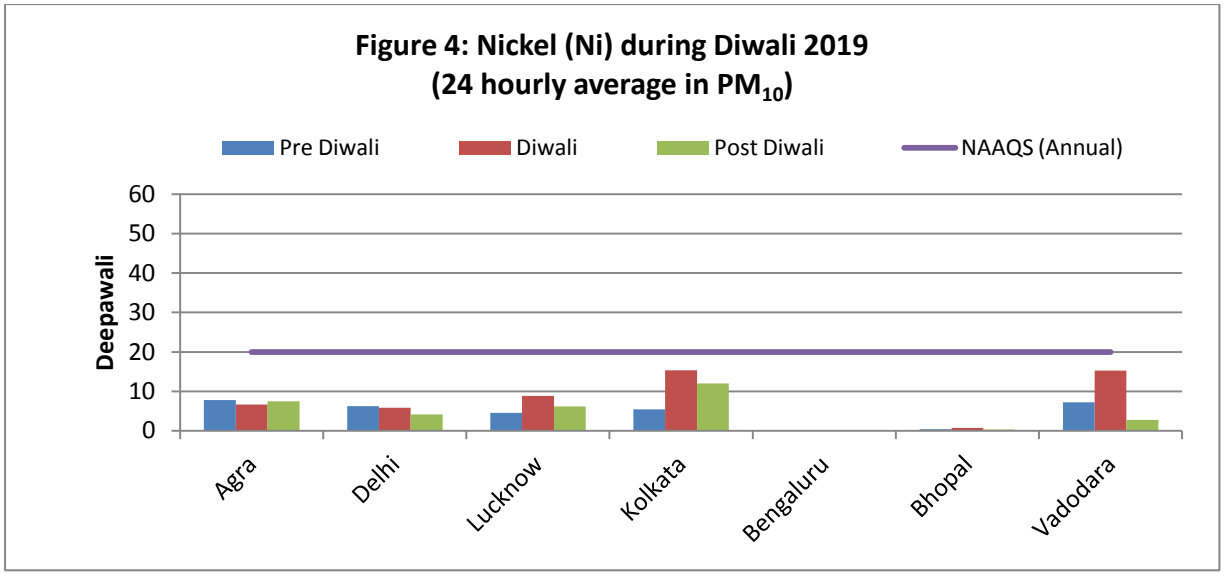
	Nickel (Ni)	Lead (Pb)	Arsenic (As)
Pre - Deepawali	6	360	5
Deepawali	6	328	9
NAAQS	20	1000	6

Notes: (i) All values are in ng/m^3 (ii) Ni and As has only annual standard and (iii) Pb have both 24 hourly (1000 ng/m^3) and annual standards (500 ng/m^3)

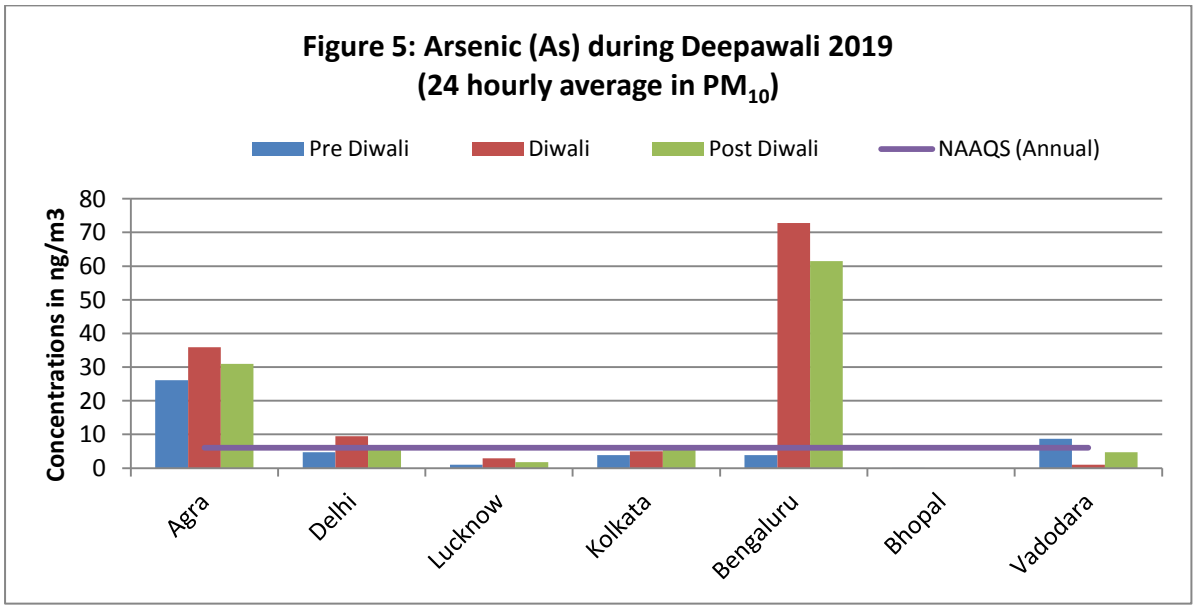
Lead (Pb), Nickel (Ni) and Arsenic in ambient air (PM_{10}) in various cities during the study period are depicted in Figure 3, Figure 4 and Figure 5.



Lead (Figure 3) found to cross 24 hourly prescribed NAAQS limit on Deepawali day in Bhopal, Bengaluru and Kolkata. Bengaluru and Kolkata witnessed substantial increase in lead on Deepawali day and it remained in air during post Deepawali days. Higher lead concentrations in Bengaluru and Kolkata in pre and post Deepawali period may be a matter of further investigation.



Nickel (Ni): As depicted in Figure 4 concentration of Nickel was increased in Lucknow, Kolkata and Vadodara; however it remained always within 20 ng/m^3 (NAAQS – Annual average value).



Arsenic was found to increase and crossed the prescribed annual concentration limit on Deepawali day. It may not be considered as an exceedence as these are 24 hourly values.

3.3 Elements in $PM_{2.5}$

Three parameters (Aluminium, Barium and Iron) used in manufacturing of firecrackers for which proposed short term Ambient Air Quality Criteria Values (AAQCVs) were proposed due to possible health impact. City-wise summary of 15 days' data of prescribed elements in $PM_{2.5}$ for Pre-Deepawali period, Deepawali day and Post Deepawali period is presented in Table 3.

Table 3: Comparison of Metal concentrations in $PM_{2.5}$ at various Indian Cities during Deepawali 2019

	Agra			Bhopal			Bengaluru			Delhi		
	Al	**Ba**	**Fe**	**Al**	**Ba**	**Fe**	**Al**	**Ba**	**Fe**	**Al**	**Ba**	**Fe**
Pre Deepawali	0.97	0.05	0.93	0.55	0.03	0.53	0.02	0.01	0.13	1.30	0.27	0.59
Deepawali	14.45	8.67	0.81	9.16	6.04	0.40	4.17	2.63	0.25	32.87	18.77	1.12
Post Deepawali	3.38	1.55	0.82	1.09	0.42	0.47	0.97	0.49	0.24	2.66	0.86	0.51
	Kolkata			**Lucknow**			**Vadodara**					
	Al	**Ba**	**Fe**	**Al**	**Ba**	**Fe**	**Al**	**Ba**	**Fe**			
Pre Deepawali	1.05	0.52	0.67	0.85	0.23	0.44	0.53	0.15	0.41			
Deepawali	19.44	20.03	0.53	23.63	15.08	0.81	2.63	1.60	0.20			
Post Deepawali	4.03	3.21	0.84	4.60	2.60	0.54	0.62	0.42	0.25			

Note: (a) All Values are in µg/m³ in $PM_{2.5}$ (b) Short Term Critical Ambient Air Quality Critical Values (CAAQVs) are: Al - 40 µg/m³; Ba - 4.0 µg/m³ and Fe - 40.0 µg/m³ (All these are given for 24 hourly averages)

From the above Table it is evident that Aluminium and Iron in $PM_{2.5}$ fraction are well within the prescribed short term AAQCVs in all cities; however, the main violation occurred in Barium. Barium exceeded AAQCVs (4.0 µg/m^3) in Delhi, Kolkata, Agra, Bhopal and Lucknow. This year with the promotion of Green Cracker and new formulation crackers increase in Barium concentration was not expected.

Year wise comparison (2016 – 2019) of Deepawali day's data of Delhi is presented in Table 4. Aluminium was increased this year compared to 2018 in Delhi; however, the level was far less than 2016 and 2017 data Deepawali. Except Barium other elements (Aluminium and Iron) was within proposed AACQVs concentrations; however, Barium in $PM_{2.5}$ got reduced by about three times this year on Deepawali day.

Table 4: Comparison of $PM_{2.5}$ and elements in $PM_{2.5}$ in Delhi during Deepawali 2016, 2017 and 2018

All Concentrations are in µg/m³

	$PM_{2.5}$				Aluminum (Al)				Barium (Ba)				Iron (Fe)			
	2016	2017	2018	2019	2016	2017	2018	2019	2016	2017	2018	2019	2016	2017	2018	2019
Pitampura	1238	677	831	513	183	165	3.09	25.8	95.9	34.5	53.7	16.3	3.2	1.49	1.44	1.0
Janakpuri	842	638	988	511	180	177	3.82	39.9	65.34	45.7	56.5	21.2	2.76	1.51	1.52	1.2
Parivesh Bhawan	958	496	990	NM	166	136	4.37	NM	60.92	23.7	52.2	NM	2.02	1.1	1.27	NM
City Average	1013	604	936	512	176	159	3.8	32.9	74	34.7	54.2	18.8	2.66	1.37	1.41	1.1

Notes: a) NM - Not Measured and b) AAQCVs: Al – 40 µg/m³, Ba – 4.0 µg/m³ and Fe – 40 µg/m³

3.4 Trend of Particulate matter during Deepawali fortnight (7 days before and 7 days after Deepawali in Delhi

Comparative data collected by CAAQMS since 2016 is presented in Figure 6 and Table 5. From the data and Figure it is evident that the after effects of Deepawali celebration depend on date (week) of Deepawali celebration. It is clearly evident that in 2016 (Deepawali on 30th October) and 2019 (Deepawali on 27th October) the after effect of Deepawali was similar as it coincides with peak period of stubble burning.

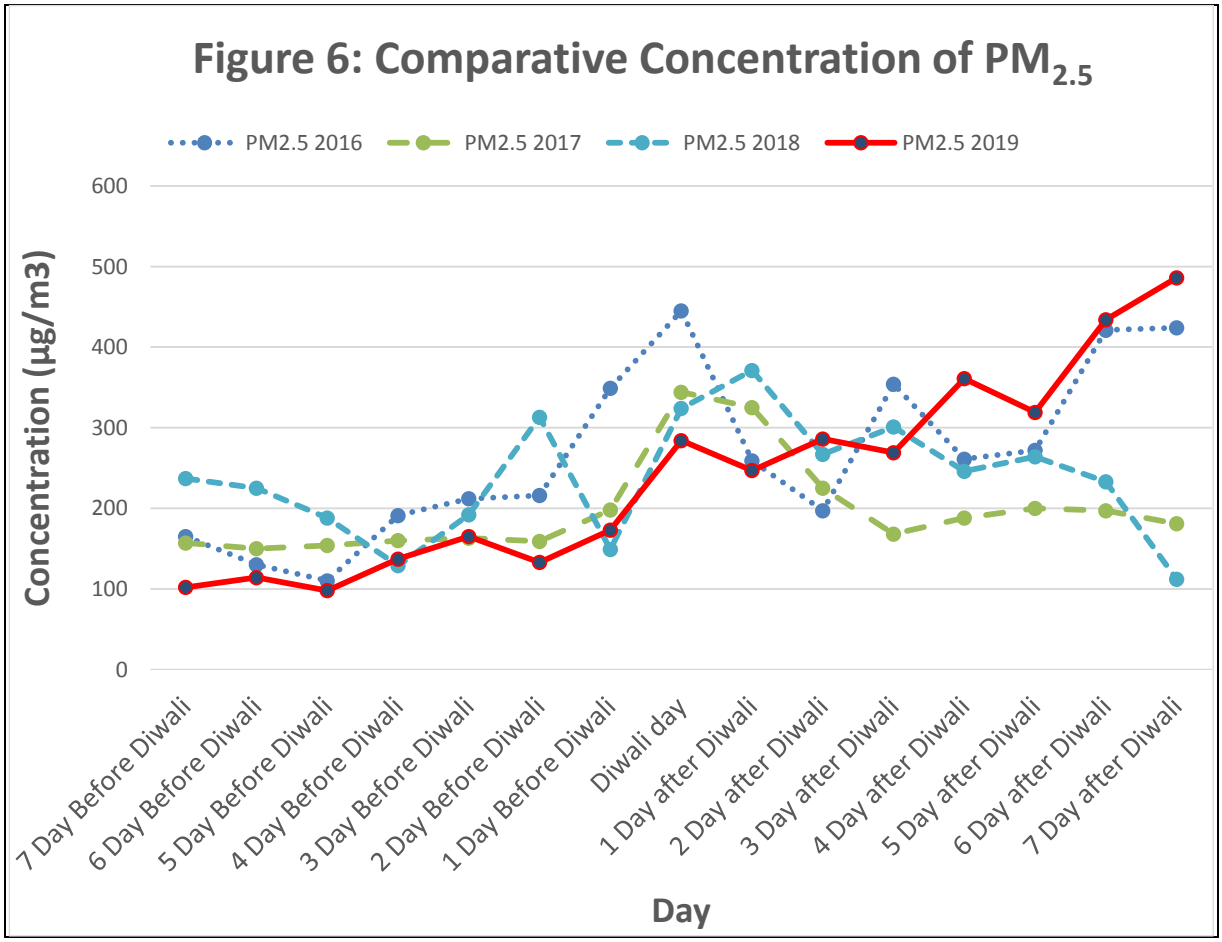


Table 5: Comparative Concentration of $PM_{2.5}$ & PM_{10} (Based on Real time data) During Deepawali days (2016, 2017, 2018 & 2019)

Year/Day	2016			2017			2018			2019		
	DATE	$PM_{2.5}$	PM_{10}	DATE	$PM_{2.5}$	PM_{10}	DATE	$PM_{2.5}$	PM_{10}	DATE	$PM_{2.5}$	PM_{10}
7 Day Before Deepawali	23-Oct	165	399	12-Oct	157	356	31-Oct	237	430	20-Oct	102	208
6 Day Before Deepawali	24-Oct	130	380	13-Oct	150	353	1-Nov	225	403	21-Oct	114	232
5 Day Before Deepawali	25-Oct	110	304	14-Oct	154	312	2-Nov	188	355	22-Oct	98	231
4 Day Before Deepawali	26-Oct	191	411	15-Oct	160	369	3-Nov	129	254	23-Oct	137	305
3 Day Before Deepawali	27-Oct	212	507	16-Oct	163	394	4-Nov	192	293	24-Oct	165	326
2 Day Before Deepawali	28-Oct	216	491	17-Oct	159	361	5-Nov	313	454	25-Oct	133	289
1 Day Before Deepawali	29-Oct	349	600	18-Oct	198	414	6-Nov	149	290	26-Oct	173	315
Deepawali day	30-Oct	445	862	19-Oct	344	445	7-Nov	324	432	27-Oct	284	391
1 Day after Deepawali	31-Oct	259	766	20-Oct	325	628	8-Nov	371	532	28-Oct	247	386
2 Day after Deepawali	1-Nov	197	674	21-Oct	225	520	9-Nov	267	411	29-Oct	286	455
3 Day after Deepawali	2-Nov	354	945	22-Oct	168	373	10-Nov	301	477	30-Oct	269	446
4 Day after Deepawali	3-Nov	261	716	23-Oct	188	434	11-Nov	246	433	31-Oct	361	560
5 Day after Deepawali	4-Nov	272	632	24-Oct	200	426	12-Nov	264	466	1-Nov	319	511
6 Day after Deepawali	5-Nov	421	1031	25-Oct	197	466	13-Nov	233	393	2-Nov	434	592
7 Day after Deepawali	6-Nov	424	1231	26-Oct	181	435	14-Nov	112	196	3-Nov	486	557

4.0 Conclusion

1) On Deepawali day $PM_{2.5}$ concentrations were found to be 0.5 to 6.0 times higher than pre-Deepawali average levels across various cities. Maximum increase was observed in Delhi (6.0 times) followed by Bengaluru (2.2 times), Kolkata (1.4 times) and Lucknow (1.1 times). Bhopal recorded minimum increase in PM2.5.
2) SO_2 was found within prescribed NAAQS (80 µg/m^3) limits during the entire monitoring period including 27th October, 2019 (Deepawali day).
3) Similarly, NO_2 was also found to be within prescribed NAAQS limit in all the cities during monitoring period.
4) During post Deepawali period PM_{10} concentration was reduced by 14 – 42% in different cities compared to Deepawali day level. Agra has recorded 7% increase in PM_{10} during post Deepawali period. Maximum reduction was observed in Vadodara (42.5%) and minimum at Lucknow (14%). In Delhi PM_{10} was reduced by 27% in post Deepawali period compared to Deepawali peak.
5) $PM_{2.5}$ levels during post Deepawali declined by 11 – 62% in comparison with Deepawali day in different cities. Highest decrease was found in Vadodara (62%) and lowest in Lucknow (11%). In Delhi, $PM_{2.5}$ concentration was decreased by 15% during post Deepawali compared to Deepawali day concentration. Agra recorded little increase in $PM_{2.5}$ during post Deepawali. The reduction in particulates during post Deepawali also indicate that the prevailing meteorology is governing the scenario and in Indo Gangetic plain the particulates remained in suspension for more duration this year. Vadodara got heat by cyclonic depression and the PM concentrations reduced substantially due to high wind speed and rain.
6) Barium exceeded AAQCVs (4.0 µg/m^3) in Delhi, Kolkata, Agra, Bhopal and Lucknow. This year with the promotion of Green Cracker and new formulation crackers increase in Barium concentration was not expected.

7) The concentration of Iron in $PM_{2.5}$ was found well within the AAQCVs (40 $\mu g/m^3$) in all the cities monitored by CPCB.
8) Aluminium levels were also found within AAQCVs (40 $\mu g/m^3$).
9) In Delhi Barium in $PM_{2.5}$ got reduced by about three times this year on Deepawali day. It is also pertinent to mention that with the introduction of Green Cracker and banning of Barium in fireworks as directed by Hon'ble Supreme Court, Barium concentration was not supposed to be elevated from pre-Deepawali level on Deepawali day.