



A Trend Analysis of Ambient Air Quality During Deepabali Festival



Compiled & Developed by

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Introduction

Diwali or Deepabali is one of the most popular Hindu festivals which spiritually signify the victory of light over darkness, good over evil, knowledge over ignorance, and hope over despair. Generally it is celebrated in all over the world though the major part is celebrated in India. Nearly in every year, Diwali is being celebrated with one thing in common: fireworks. Typically thought of as a festive and interactive way to celebrate the occasion, fireworks can actually be very detrimental to our health. One of the ways that fireworks can be very damaging and dangerous is with the amount of air pollution they produce.

Air pollutants are often unevenly dispersed in the environment. In many cases, areas with higher concentrations are near emission sources. Transport and dispersion of air pollutants in the atmosphere are influenced by numerous complex factors – proximity of emission sources, local meteorology, and local topography – being the primary factors. All of these can influence ambient air quality.

Ambient Air Quality monitoring is one technique used to measure and assess the status of ambient air quality. In an area with multiple emission sources, short-term variability of emissions in both time and space – as well as variations in winds, temperature, precipitation, and atmospheric circulation. Monitoring results only represent only the point and time where and when the sample was taken or the measurement was made.

Some of the most prominent health risks and concerns associated with increased levels of air pollution include respiratory infections, heart disease, stroke, and lung cancer. Because the body has to work harder to process the air it intakes and the fact that toxins are being breathed in, preliminary effects often include wheezing, difficulty breathing, coughing etc.

In addition, the toxins are then absorbed into the bloodstream which affects cardiovascular health. Individuals suffering from existing respiratory and cardiac conditions often report that their symptoms are greatly exacerbated after exposure. Children under the age of five are the most at risk for experiencing the negative side effects of air pollution. While Diwali can be a fun and celebratory occasion, precautions should be taken enough to live in an area that detonates large quantities of fireworks and/or an area that already has significant air pollution problems.

Objective

Air pollution levels in big cities are a growing cause for concern in recent years. The Particulate Matter (PM), dust, fumes, smokes, and gases are the way above permissible limits in many of our big cities. These levels show a quantum jump during festive seasons where the main culprits being crackers, inflammable substances, and artificial colors. Fireworks contain chemical species such as sodium oxalate, aluminium, arsenic, sulphur, manganese, iron dust powder, potassium perchlorate, strontium nitrate and barium nitrate etc. which after burning produces gaseous pollutants such as SO₂ and NO₂, and produce huge amount of ambient particulates into the atmosphere that generates dense clouds of smoke.

The main objectives of Air Quality Monitoring are:

- To compare measured parameters against ambient Air standards and to assess the extent of violation.
- To compare the measured air data between normal day and Deepabali day.
- To identify a trend of Ambient Air Quality measured in various stations in three years (2015-2017)

Monitoring stations

To assess the air quality during Deepabali festival the air quality monitoring have been done in the following locations covering Agartala, Udaipur, Ambassa and Dharmanagar.

Table: Air Quality Monitoring Stations

Sl. No.	Monitoring Locations	Longitude (E)	Latitude (N)
1.	Kunjaban at TSPCB Office Complex	91°16'509"E	23°51'117"N
2.	Sukanta Academy, Agartala	91°16'522"E	23°49'595"N
3.	Nagar Panchayet Office, Udaipur	91°29'321"E	23°32'279"N
4.	Ambassa, Dhalai	91°51'050"E	23°55'230"N
5.	Dharmanagar Motor stand, Dharmanagar	92°09'705"E	24°22'808"N

The maps showing the monitoring points are as follows:



Map showing all the five Ambient Air Quality Monitoring Stations in the State

Adverse Effect Due To Bursting Of Firecrackers

- Apart from the mild burns and accidents the children also breathe the toxic air and suffer from nasal irritation and throat congestion.
- The smoke also irritates the eyes causing tears and redness. Sometimes the sound makes the ears go dumb and also cause deafness.
- Bursting crackers may increase blood pressure and aggravate heart disease. Nausea, headache and giddiness are common effects of bursting crackers.
- Lung infections such as coughing, sneezing and Respiratory disorders like asthma, wheezing often get severe during Deepawali festival. The pollution hazards such as the toxic smoke causes a lot of discomfort in breathing.
- The poisonous gas can also affect pregnant women adversely. It may also affect the mentally ill patients leading to depression, fear and stress.

Types of Air Pollutants

Air pollutants are all very different in terms of chemical composition, reaction properties, emission sources, and fate and transport in the environment. Three ambient air pollutant types were analyzed in this study based upon available data from Laboratory Section of Tripura State Pollution Control Board:

- ✓ Nitrogen dioxide (NO₂)
- ✓ Sulphur dioxide (SO₂)
- ✓ Particulate matter with aerodynamic diameter $\leq 2.5 \mu\text{m}$ (PM_{2.5})
- ✓ Particulate matter with aerodynamic diameter $\leq 10 \mu\text{m}$ (PM₁₀)

Trend Analysis of Ambient Air Quality During Deepabali Festival

Air quality assessment has been made to identify whether the pollution are actually violate the standards or in the stage of likely to be violate the standards in the future if pollution condition to change at the current level.

A Trend analysis well known as comparative analysis of air pollution has been depicted in this report. The trends of individual pollutant in the city a whole has been carried out and trend analysis for each pollutants at various sites for the above period has been analyzed. For this purpose the data of air pollution on normal day and Deepabali day during Deepabali Festival of the year 2015, 2016, 2017 has been taken into consideration. Three years is enough to identify current and future movement of pollution level. The process may involve comparing past and current levels of pollution as they are related to various sites. This type of information is extremely helpful to make decisions and future predictions.

Observations on Air Quality on normal Day during Deepabali Festival

The Ambient Air Quality Monitoring was carried out at 5 locations covering Agartala, Udaipur, Dharmanagar & Ambassa on Normal Day and on Deepabali Day in each of the year 2015, 2016, 2017. Altogether 4 (four) parameters are considered and analyzed in this report. The yearly trend analysis of each parameter for each station has graphically represented in the report, showing figures **Fig.1-5**. Moreover a table has prepared with percentage increased or decreased of all above said four parameters to get a clear idea of variation and to establish a future prediction. The table has been denoted as **Table.1**. The table indicates the variations of air quality parameters on normal day during Deepabali Festival.

It is observed that in the Air Quality Monitoring Station **Kunjaban, Agartala** PM10, SO₂, NO₂, PM2.5 are gradually decreasing from the year 2015 to 2017 (**Fig. 1**) than the previous year. In another way, in this station, PM10 decreased 11.31% in the year 2016 and 11.03 in the year 2017, SO₂ decreased 26.14% in the year 2016 and 30.06% in the year 2017, NO₂ decreased 19.19% in the year 2016 and 18.33% in the year 2017, PM2.5 decreased 58.03% in the year 2016 and 32.01% in the year 2017 than the previous year on normal day during Deepabali Festival.

In case of the Air Quality Monitoring **Station Sukanta Academy, Agartala** different pictures are found where PM10 was increased gradually in the year 2016 and 2017 than the previous year, SO₂ decreased in the year 2016 and increased in the year 2017 than the previous year, NO₂ decreased in the year 2016 and increased in the year 2017 than previous year, (**Fig. 2**) and PM2.5 also decreased in the year 2016 and increased in the year 2017. In another way, in this station, PM10 increased 6.38% in the year 2016 and 15.91% in the year 2017, SO₂ decreased 25.98% in the year 2016 and increased 49.19% in the year 2017, NO₂ decreased 16.53% in the year 2016 and increased 70.10% in the year 2017, PM2.5 decreased 39.66% in the year 2016 and increased 21.70% in the year 2017 on normal day during Deepabali Festival.

It is observed that in the Air Quality Monitoring Station **Nagar Panchayet, Udaipur** PM10 was increased in the year 2016 and decreased in the year 2017 than the previous year, SO₂ decreased in the year 2016 and increased in the year 2017 than the previous year, NO₂ decreased in the year 2016 and increased in the year 2017 than previous year, (**Fig. 3**) and PM2.5 was gradually decreased in the year 2016 and 2017 than previous year. In another way, in this station, PM10 increased 12.12% in the year 2016 and decreased 26.27% in the year 2017, SO₂ decreased 18.29% in the year 2016 and increased 19.70% in the year 2017, NO₂ decreased 16.67% in the year 2016 and increased 62.20% in the year 2017, PM2.5 decreased 46.51% in the year 2016 and 19.03% in the year 2017 on normal day during Deepabali Festival.

It is observed that in the Air Quality Monitoring Station **Ambassa Bazar, Dhalai** PM10, SO₂, NO₂, PM2.5 are gradually decreasing from the year 2015 to 2017 (**Fig. 4**). In another way, in this station, PM10 decreased 24.39% in the year 2016 and 14.84% in the year 2017, SO₂ decreased 23.47% in the year 2016 and 31.79% in the year 2017, NO₂ decreased 15.65% in the year 2016 and 21.87% in the

year 2017, PM_{2.5} decreased 42.92% in the year 2016 and 32.43% in the year 2017 on normal day during Deepabali Festival.

It is observed that in the Air Quality Monitoring Station **Dharmanagar Motorstand** PM₁₀ gradually decreased in the year 2016 and 2017 than the previous year, SO₂ decreased in the year 2016 but increased in the year 2017 than the previous year, NO₂ decreased in the year 2016 but increased in the year 2017 than previous year, (**Fig. 3**) and PM_{2.5} gradually decreased in the year 2016 and 2017 than previous year. In another way, in this station, PM₁₀ decreased 4.28% in the year 2016 and 21.08% in the year 2017, SO₂ decreased 11.79% in the year 2016 and increased 8.14% in the year 2017, NO₂ decreased 24.05% in the year 2016 and increased 37.03% in the year 2017, PM_{2.5} decreased 54.16% in the year 2016 and 63.82% in the year 2017 on normal day during Deepabali Festival.

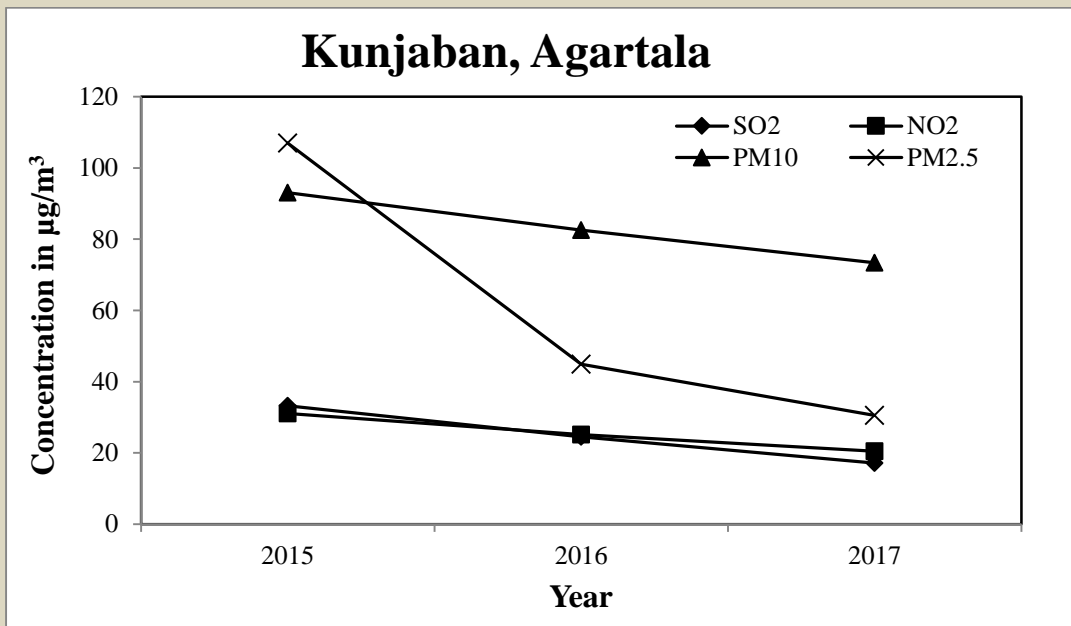


Fig 1: Variations of Ambient Air Quality parameters at **Kunjaban, Agartala** on normal day during Deepabali Festival

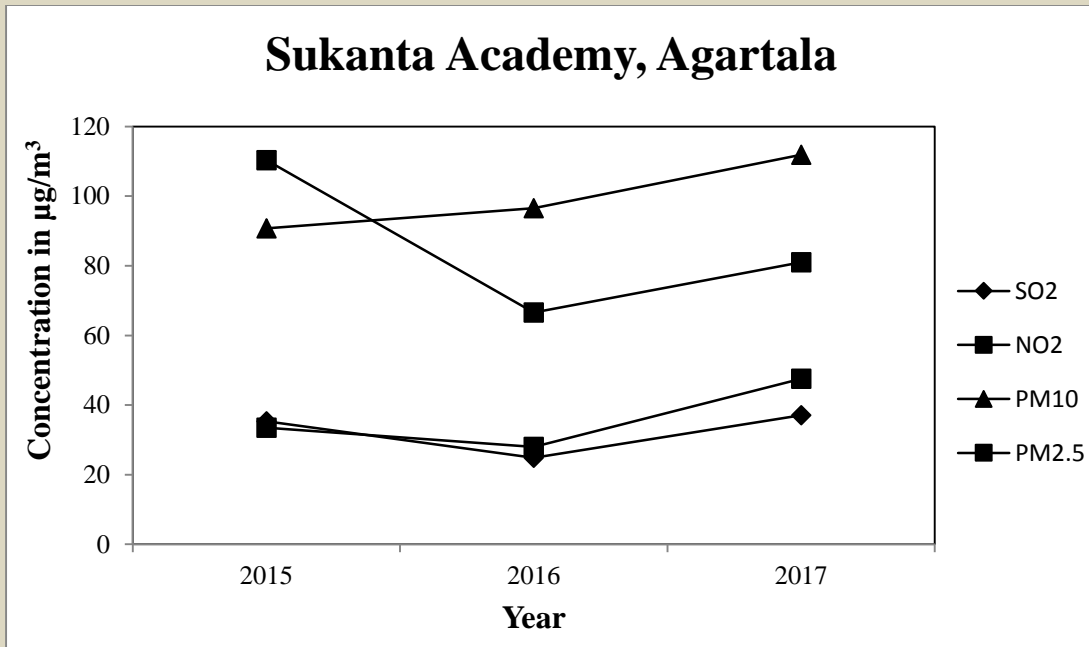


Fig 2: Variations of Ambient Air Quality parameters at **Sukanta Academy, Agartala** on normal day during Deepabali Festival

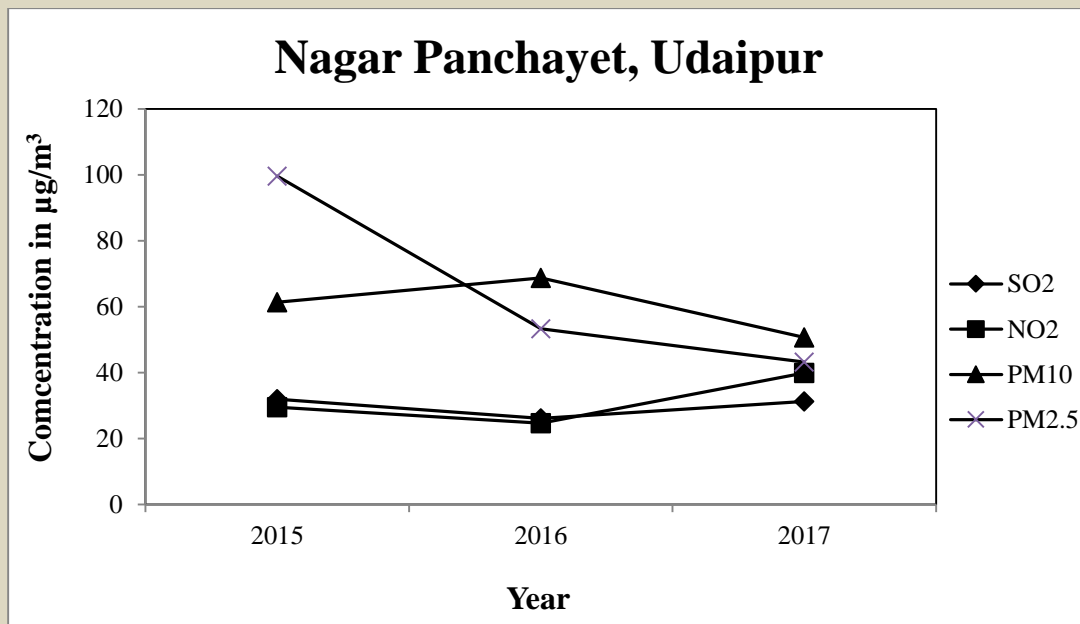


Fig 3: Variations of Ambient Air Quality parameters at **Nagar Panchayet, Udaipur** on normal day during Deepabali Festival

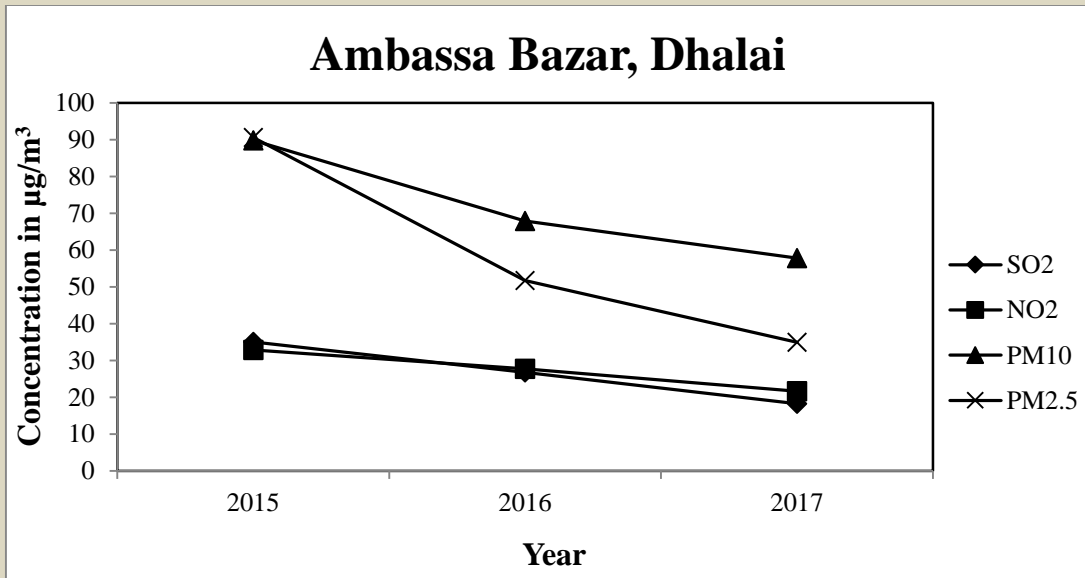


Fig 4: Variations of Ambient Air Quality parameters at **Ambassa Bazar, Dhalai** on normal day during Deepabali Festival

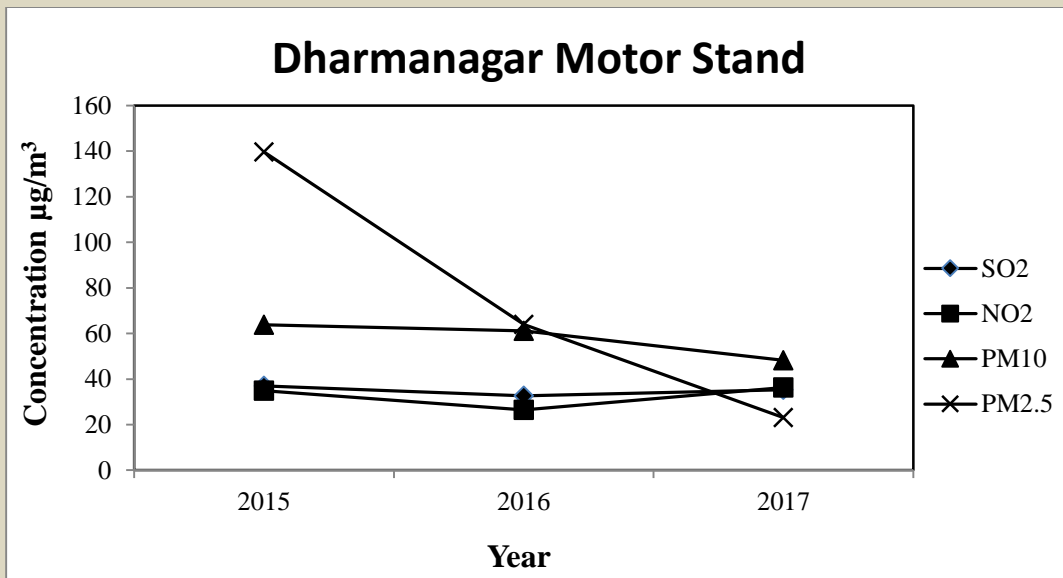


Fig 5: Variations of Ambient Air Quality parameters at **Dharmanagar Motorstand** on normal day during Deepabali Festival

Table 1: Table showing the increased or decreased percentage of Air Quality Parameters on Normal Day during Deepabali Festival (2015-2017)

Station Name	SO ₂ Concentration in µg/m ³	Increased/Decreased (%)	Increased/Decrease d (%)	NO ₂ Concentration in µg/m ³	Increased/Decrease d (%)	Increased/Decrease d (%)	PM ₁₀ Concentration in µg/m ³	Increased/Decrease d (%)	Increased/Decrease d (%)	PM _{2.5} Concentration in µg/m ³	Increased/Decrease d (%)	Increased/Decrease d (%)
	2015	2016	2017	2015	2016	2017	2015	2016	2017	2015	2016	2017
Kunjaban , Agartala	33.2	(-) 26.1 4	(-) 30.06	31.05	(-) 19.19	(-) 18.33	93.05	(-) 11.31	(-) 11.03	107.03	(-) 58.03	(-) 32.01
Sukanta Academy, Agartala	35.3	(-) 29.5 8	(+) 49.19	33.46	(-) 16.53	(+) 70.10	90.77	(+) 6.38	(+) 15.91	110.36	(-) 39.66	(+) 21.70
Nagar Panchayet, Udaipur	31.93	(-) 18.2 9	(+) 19.70	29.52	(-) 16.67	(+) 62.20	61.32	(+) 12.12	(-) 26.27	99.63	(-) 46.51	(-) 19.03
Ambassa Bazar,Dhalai	35.02	(-) 23.4 7	(-) 31.79	32.9	(-) 15.65	(-) 21.87	89.85	(-) 24.39	(-) 14.84	90.59	(-) 42.92	(-) 32.43
Dharmanaga r Motorstand	37.06	(-) 11.7 9	(+) 8.14	34.92	(-) 24.05	(+) 37.03	63.82	(-) 4.28	(-) 21.08	139.63	(-) 54.16	(-) 63.82

(-) **Sign** indicates decreasing; (+) **Sign** indicates increasing

Observations on Air Quality on Deepabali Day during Deepabali Festival

The Ambient Air Quality Monitoring was carried out at 5 locations covering Agartala, Udaipur, Dharmanagar & Ambassa on Normal Day and on Deepabali Day in each of the year 2015, 2016, 2017. Altogether 4 (four) parameters are considered and analyzed in this report. The yearly trend analysis of each parameter for each station has graphically represented in the report, showing figures **Fig.1-5**. Moreover a table has prepared with percentage increased or decreased of all above said four parameters to get a clear idea of variation and to establish a future prediction. The table has been denoted as **Table.1**. The table indicates the variations of air quality parameters on normal day during Deepabali Festival.

It is observed that in the Air Quality Monitoring Station **Kunjaban, Agartala** PM10, SO₂, NO₂, PM2.5 are gradually decreasing from the year 2015 to 2017 (**Fig. 1**) than the previous year. In another way, in this station, PM10 decreased 11.31% in the year 2016 and 11.03 in the year 2017, SO₂ decreased 26.14% in the year 2016 and 30.06% in the year 2017, NO₂ decreased 19.19% in the year 2016 and 18.33% in the year 2017, PM2.5 decreased 58.03% in the year 2016 and 32.01% in the year 2017 than the previous year on normal day during Deepabali Festival.

In case of the Air Quality Monitoring Station **Sukanta Academy, Agartala** different pictures are found where PM10 was increased gradually in the year 2016 and 2017 than the previous year, SO₂ decreased in the year 2016 and increased in the year 2017 than the previous year, NO₂ decreased in the year 2016 and increased in the year 2017 than previous year, (**Fig. 2**) and PM2.5 also decreased in the year 2016 and increased in the year 2017. In another way, in this station, PM10 increased 6.38% in the year 2016 and 15.91% in the year 2017, SO₂ decreased 25.98% in the year 2016 and increased 49.19% in the year 2017, NO₂ decreased 16.53% in the year 2016 and increased 70.10% in the year 2017, PM2.5 decreased 39.66% in the year 2016 and increased 21.70% in the year 2017 on normal day during Deepabali Festival.

It is observed that in the Air Quality Monitoring Station **Nagar Panchayet, Udaipur** PM10 was increased in the year 2016 and decreased in the year 2017 than the previous year, SO₂ decreased in the year 2016 and increased in the year 2017 than the previous year, NO₂ decreased in the year 2016 and increased in the year 2017 than previous year, (**Fig. 3**) and PM2.5 was gradually decreased in the year 2016 and 2017 than previous year. In another way, in this station, PM10 increased 12.12% in the year 2016 and decreased 26.27% in the year 2017, SO₂ decreased 18.29% in the year 2016 and increased 19.70% in the year 2017, NO₂ decreased 16.67% in the year 2016 and increased 62.20% in the year 2017, PM2.5 decreased 46.51% in the year 2016 and 19.03% in the year 2017 on normal day during Deepabali Festival.

It is observed that in the Air Quality Monitoring Station **Ambassa Bazar, Dhalai** PM10, SO₂, NO₂, PM2.5 are gradually decreasing from the year 2015 to 2017 (**Fig. 4**). In another way, in this station, PM10 decreased 24.39% in the year 2016 and 14.84% in the year 2017, SO₂ decreased 23.47% in the year 2016 and 31.79% in the year 2017, NO₂ decreased 15.65% in the year 2016 and 21.87% in the year 2017, PM2.5 decreased 42.92% in the year 2016 and 32.43% in the year 2017 on normal day during Deepabali Festival.

It is observed that in the Air Quality Monitoring Station **Dharmanagar Motorstand** PM10 gradually decreased in the year 2016 and 2017 than the previous year, SO₂ decreased in the year 2016 but increased in the year 2017 than the previous year, NO₂ decreased in the year 2016 but increased in the year 2017 than previous year, (**Fig. 3**) and PM2.5 gradually decreased in the year 2016 and 2017 than previous year. In another way, in this station, PM10 decreased 4.28% in the year 2016 and 21.08% in the year 2017, SO₂ decreased 11.79% in the year 2016 and increased 8.14% in the year 2017, NO₂ decreased 24.05% in the year 2016 and increased 37.03% in the year 2017, PM2.5 decreased 54.16% in the year 2016 and 63.82% in the year 2017 on normal day during Deepabali Festival.

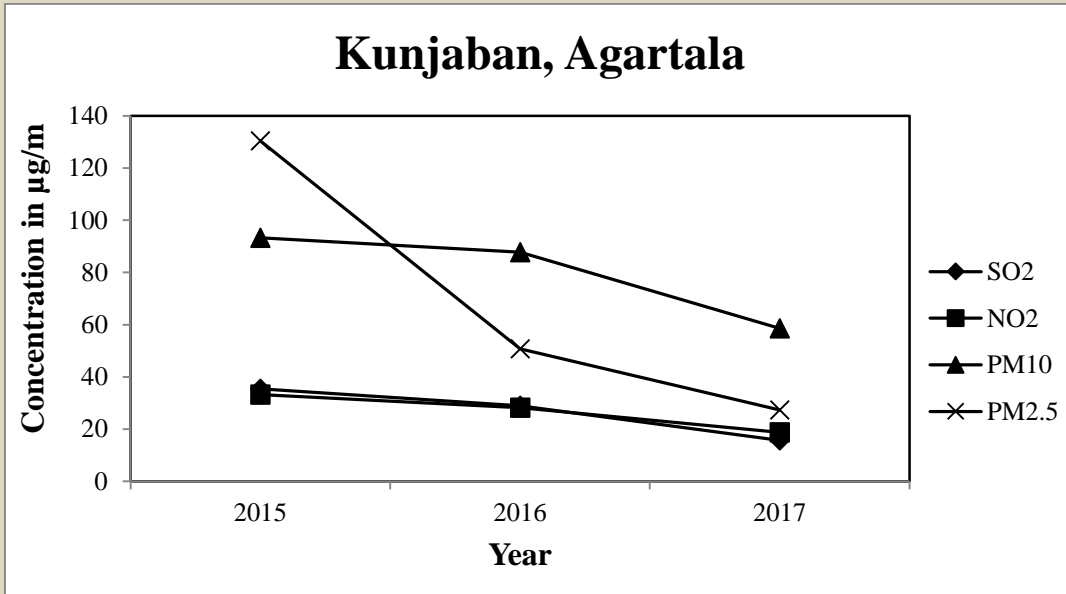


Fig 6: Variations of Ambient Air Quality parameters at **Kunjaban, Agartala** on Deepabali day during Deepabali Festival

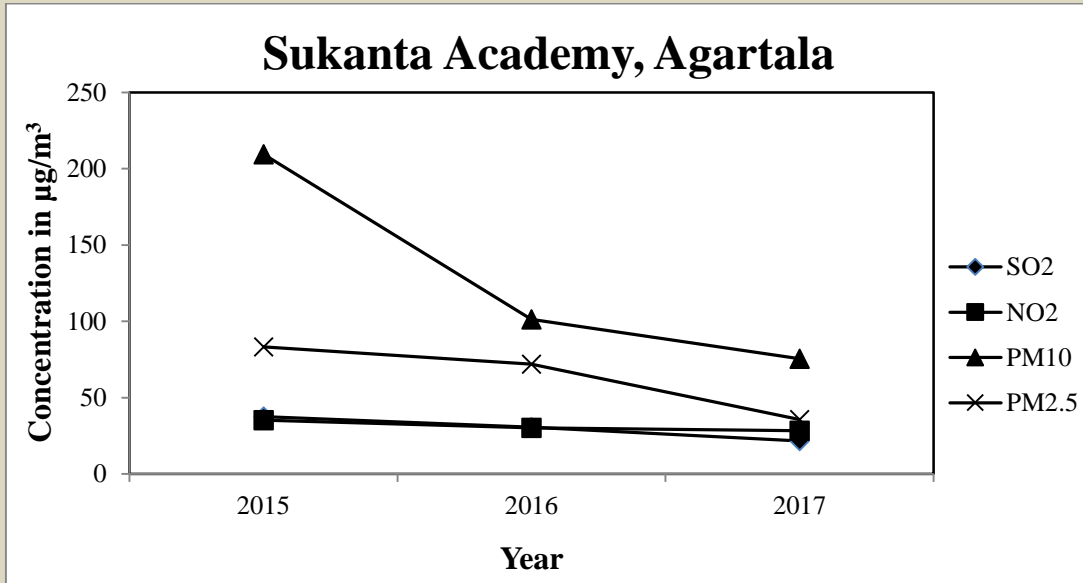


Fig 7: Variations of Ambient Air Quality parameters at **Sukanta Academy, Agartala** on Deepabali day during Deepabali Festival

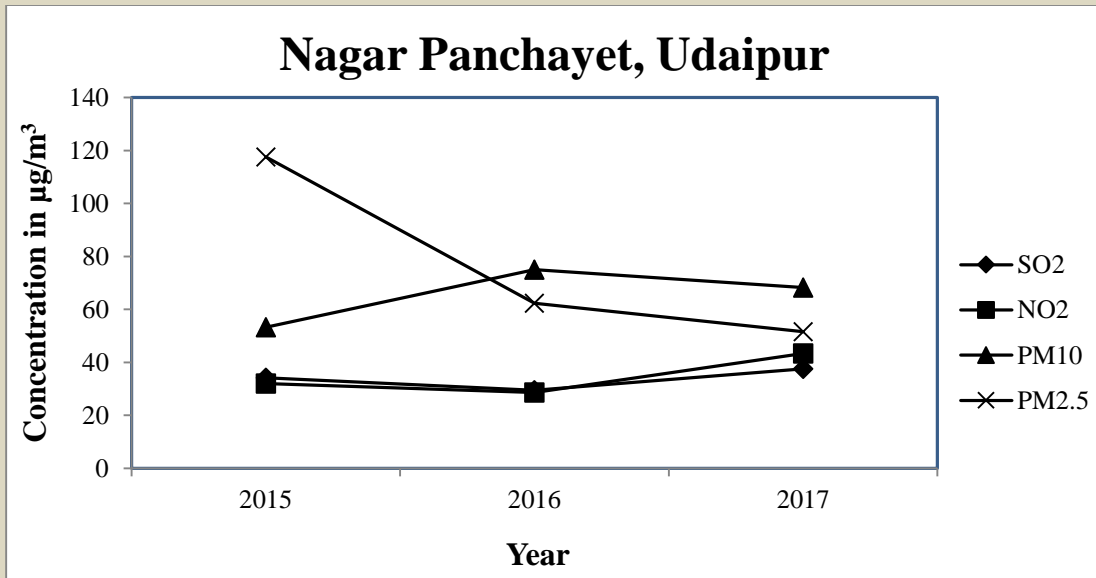


Fig 8: Variations of Ambient Air Quality parameters at **Nagar Panchayet, Udaipur** on Deepabali day during Deepabali Festival

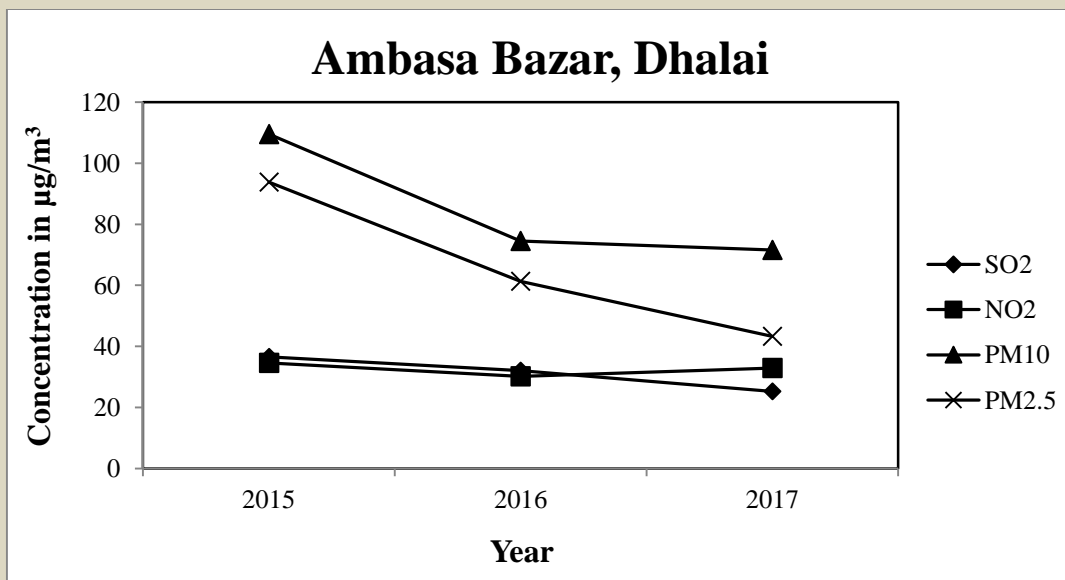


Fig 9: Variations of Ambient Air Quality parameters at **Ambassa Bazar, Dhalai** on Deepabali day during Deepabali Festival

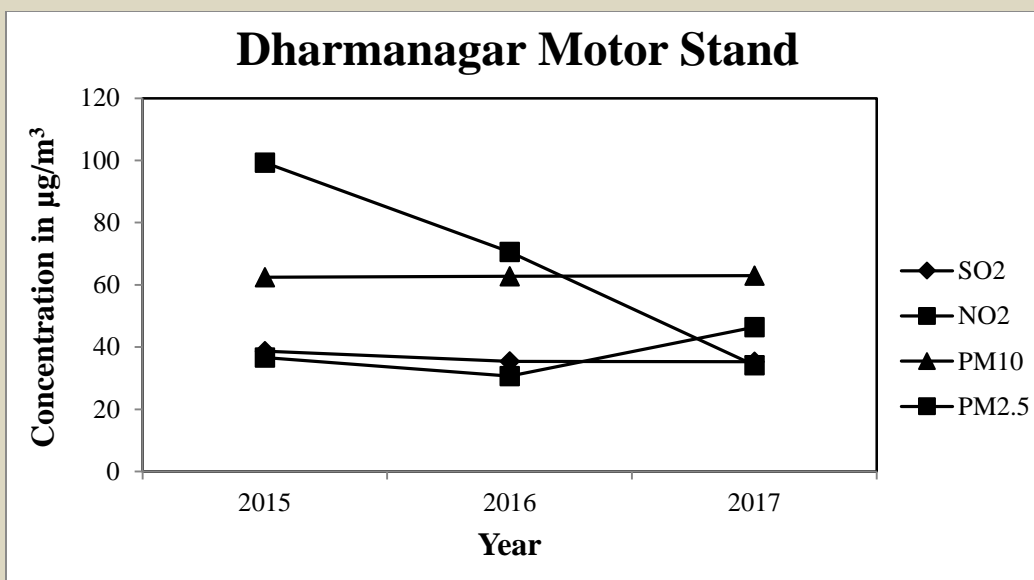


Fig 10: Variations of Ambient Air Quality parameters at **Dharmanagar Motor Stand on Deepabali day** during Deepabali Festival

Table 2: Table showing the increased or decreased percentage of Air Quality Parameters on Deepabali Day during Deepabali Festival (2015-2017)

Station Name	SO ₂	Increased/Decreased (%)		NO ₂	Increased/Decreased (%)		PM ₁₀	Increased/Decreased (%)		PM _{2.5}	Increased/Decreased (%)								
	Concentration in µg/m ³	2015	2016	2017	Concentration in µg/m ³	2015	2016	2017	Concentration in µg/m ³	2015	2016	2017							
Kunjaban , Agartala	35.42	(-)	18.32	(-)	45.73	33.30	(-)	(-)	33.57	93.33	(-)	(-)	33.32	130.36	(-)	(-)	61.07	46.09	
Sukanta Academy, Agartala	37.5	(-)	18.08	(-)	29.85	35.30	(-)	(-)	6.03	209.58	(-)	(-)	51.70	25.39	83.24	(-)	(-)	13.65	50.46
Nagar Panchayet, Udaipur	34.22	(-)	14.08	(-)	-27.65	31.99	(-)	(-)	10.66	53.20	(+)	(-)	9.04	117.51	(-)	(-)	47.01	17.15	
Ambassa Bazar, Dhalai	36.6	(-)	12.35	(-)	21.23	34.52	(-)	(-)	-9.02	109.51	(-)	(-)	3.90	93.85	(-)	(-)	34.65	29.41	
Dharmanagar Motorstand	38.69	(-)	8.348	(-)	0.310	36.61	(-)	(-)	-51.42	62.43	(+)	(+)	0.38	99.26	(-)	(-)	28.90	51.61	

Summary:

The Tripureswari temple of Tripura is one of the 51 pithasthans and well renowned for Deepabali festival hence, during this festival the whole state becomes a place of enjoyment, gathering, charming, delightedness, orchestra, dance program and many more. Side by side, in almost every year bursting of firecrackers became a part of enjoyment and also a way to praise the God. As a result the whole environment is getting polluted during Deepabali festival. During bursting of firecrackers many harmful toxic gases are emitted in the atmosphere which may lead a serious health hazard to all ages of people in our society. Considering the importance awareness of Air Pollution and Looking after this situation TSPCB is monitoring Ambient Air Quality parameters in all important stations around the major cities in Tripura.

In this report the measured Air Quality level during the years 2015-2017 at the major cities (Agartala, Udaipur, Dharmanagar, Ambassa) during Deepabali and Pre-deepabali are summarized and also yearly increased and decreased percentage of different air quality parameters have been tried to figure out. As there were lot of toxic emission from fire crackers, human interference, vehicular interaction was observed, so there may be bad effect of air pollution on human health so a trend analysis is done to find out the yearly fluctuation of air quality level at different stations around the major cities.

The report says that, the level of SO₂ and NO₂ is below than prescribed CPCB standard limit in all the monitoring stations on **Normal day during Deepabali** festival in three years. On the contrary, the level of PM₁₀ was found more in Sukanta Academy, Agartala in the year 2017 but it was below than standard limit in all three years. On the other side, the level of PM_{2.5} is more than the standard limit in the year 2015 in all stations and was also found more in Sukanta Academy, Agartala in rest two years but in other stations PM_{2.5} was below prescribed standard limit and also **showing a decreasing trend from the year 2015-2017**. In a word all of the five monitoring stations are showing pollution free environment except one Monitoring station that is Sukanta Academy, Agartala.

The report also says that, the level of SO₂ and NO₂ is below than **CPCB standard limit** in all the monitoring stations on **Deepabali day during Deepabali** festival in three years but the level of PM₁₀ was found more in Sukanta Academy, Agartala and Ambassa Bazar in the year 2015, and also found more than the CPCB standard limi in Sukanta Academy only in the year 2016. But the **PM₁₀ level is decreasing gradually from the year 2015 to 2017** which indicates that the surroundings of monitoring station is going pollution free in upcoming days which is a good indication of a healthy environment of the monitoring site. On the other side in the year 2015, the level of PM_{2.5} is higher than the standard CPCB limit in two stations namely Kunjaban, Agartala and Nagar Panchayet, Udaipur in addition the value is also high in all four station except Kunjaban, Agartala im the year 2016 but PM_{2.5} is below standard limit in all stations in the year 2017 and yes, the **PM_{2.5} is also decreasing from the year 2015-2017 in all five stations**.

TOP-TEN GASES IN AIR POLLUTION:

Any gas could qualify as pollution if it reached a high enough concentration to do harm. Theoretically, that means there are dozens of different pollution gases. In practice, about ten different substances cause most concern:

(1) Sulfur dioxide: Coal, petroleum, and other fuels are often impure and contain sulfur as well as organic (carbon-based) compounds. When sulfur (spelled "sulphur" in some countries) burns with oxygen from the air, sulfur dioxide (SO₂) is produced. Coal-fired power plants are the world's biggest source of sulfur-dioxide air pollution, which contributes to smog, acid rain, and health problems that include lung disease.

(2) Carbon monoxide: This highly dangerous gas forms when fuels have too little oxygen to burn completely. It spews out in car exhausts and it can also build up to dangerous levels inside your home if you have a poorly maintained gas boiler, stove, or fuel-burning appliance. (Always fit a carbon monoxide detector if you burn fuels indoors.)

(3) Carbon dioxide: This gas is central to everyday life and isn't normally considered a pollutant: we all produce it when we breathe out and plants such as crops and trees need to "breathe" it in to grow. However, carbon dioxide is also a greenhouse gas released by engines and power plants. Since the beginning of the Industrial Revolution, it's been building up in Earth's atmosphere and contributing to the problem of global warming and climate change.

(4) Nitrogen oxides: Nitrogen dioxide (NO₂) and nitrogen oxide (NO) are pollutants produced as an indirect result of combustion, when nitrogen and oxygen from the air react together. Nitrogen oxide pollution comes from vehicle engines and power plants, and plays an important role in the formation of acid rain, ozone and smog. Nitrogen oxides are also "indirect greenhouse gases" (they contribute to global warming by producing ozone, which is a greenhouse gas).

(5) Volatile organic compounds (VOCs): These carbon-based (organic) chemicals evaporate easily at ordinary temperatures and pressures, so they readily become gases. That's precisely why they're used as solvents in many different household chemicals such as paints, waxes, and varnishes. Unfortunately, they're also a form of air pollution: they're believed to have long-term (chronic) effects on people's health and they also play a role in the formation of ozone and smog.

(6) Particulates: These are the sooty deposits in air pollution that blacken buildings and cause breathing difficulties. Particulates of different sizes are often referred to by the letters PM followed by a number, so PM₁₀ means soot particles of less than 10 microns (10 millionths of a meter or 10 μm in diameter). In cities, most particulates come from traffic fumes.

(7) Ozone: Also called trioxygen, this is a type of oxygen gas whose molecules are made from three oxygen atoms joined together (so it has the chemical formula O₃), instead of just the two atoms in conventional oxygen (O₂). In the stratosphere (upper atmosphere), a band of ozone ("the ozone layer") protects us by screening out harmful ultraviolet radiation (high-energy blue light) beaming down from the Sun. At ground level, it's a toxic pollutant that can damage health. It forms when sunlight strikes a cocktail of other pollution and is a key ingredient of smog (see box below).

(8) Chlorofluorocarbons (CFCs): Once thought to be harmless, these gases were widely used in refrigerators and aerosol cans until it was discovered that they damaged Earth's ozone layer. We discuss this in more detail down below.

(9) Unburned hydrocarbons: Petroleum and other fuels are made of organic compounds based on chains of carbon and hydrogen atoms. When they burn properly, they're completely converted into harmless carbon dioxide and water; when they burn incompletely, they can release carbon monoxide or float into the air in their unburned form, contributing to smog.

(10) Lead and heavy metals: Lead and other toxic "heavy metals" can be spread into the air either as toxic compounds or as aerosols (when solids or liquids are dispersed through gases and carried through the air by them) in such things as exhaust fumes and the fly ash (contaminated waste dust) from incinerator smokestacks.

Ten Things you can do to REDUCE AIR POLLUTION

So now you know the problems, but what's the solution? Here are ten simple things you can do that will make a difference (however small) to the problem of air pollution.

(1) Save energy: Making electricity in conventional power plants generates pollution, so anything you can do to save energy will help to reduce pollution (and global warming as well). Switch to low-energy lamps, use a laptop computer instead of a desktop, dry your clothes outdoors, and heat insulate your home. Sounds too worthy? Just remember this: every bit of energy you save also saves you money you can spend on something better! If you're not sure how you're wasting energy, use an electricity monitor to help identify your most inefficient appliances.

(2) Save water when you can: Producing cool, clean water needs huge amounts of energy so cutting water waste is another good way to save energy and pollution.

(3) Cut the car: Sometimes we have to use cars, but often we can get a bus or a train or (for shorter distances) walk or cycle. Cars are now the biggest source of air pollution in most urban areas, so traveling some other way through a town or city helps to keep the air clean. When you have to use your car, drive efficiently to save fuel and money, and cut pollution. It's particularly important to avoid car use when smog is bad in your city.

(4) Cut out garden bonfires: Did you know that a garden bonfire can contain up to 350 times as much of the cancer-causing chemical benzpyrene as cigarette smoke? Well you do now! Having a bonfire is one of the most selfish things you can do in your local neighborhood. Compost your garden refuse, bury it, or dispose of it some other way.

(5) Never burn household waste: If you burn plastic, you release horrible toxic chemicals into the local environment, some of which will be sucked up your own nose! Recycle your trash instead.

(6) Garden organically: Would you spray pesticides on your dinner? So why spray them on your garden? You can tackle virtually all garden pests and diseases in more environmentally friendly organic ways. Buying organic food is a good option if you can't grow your own.

(7) Cut the chemicals: Do you really need to spray an air freshener to make your home feel nice? Yes, you fill your room with perfume, but you're also choking it with chemical pollution. Why not just open a window instead? How many of the chemicals you buy do you really need to use? Why not try cleaning with microfiber cloths instead of using detergents?

(8) Use water-based paints and glues: Avoid the nasty solvents in paints, varnishes, and wood preservatives. Remember that if anyone's going to suffer from the air pollution they create, you're first in line.

(9) Reduce, reuse, and recycle: Buying new stuff is fun, but reusing old things can be just as good.

(10) Don't smoke: Cigarettes contain an addictive chemical called nicotine that makes you want to go on smoking them. They cause all kinds of health problems, but they also cause very localized air pollution. Once again you're first in line.