Delhi's early winter pollution worsens in 2026

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A new Centre for Science and Environment (CSE) analysis reveals that early winter air pollution (October to mid-November) has worsened in 2026.

"Diwali pollution is an annual tipping point, but elevated particulate levels before the festival this year show that baseline pollution is higher than in previous years," says Anumita Roychowdhury, Executive Director, Research and Advocacy, CSE. "Year-round emission control across key sources remains inadequate. Had air quality been cleaner leading into winter, and episodic spikes from farm fires and firecrackers kept in check, seasonal weather shifts would not have triggered such severe pollution."

Among local sources, transport remains the largest contributor. While the share of stubble smoke rose during this period, severe pollution episodes continued even when farm fire contributions dropped. Traffic congestion analysis confirms that vehicular emissions heavily drive daily toxic exposure. Furthermore, emergency restrictions barring pre-BS VI vehicles have failed to significantly reduce traffic volumes, Roychowdhury adds.

These trends have emerged from the detailed analysis of air quality data from the portal of the Central Pollution Control Board, the hourly dynamic estimation of contribution of pollion sources by the Indian Institute of Tropical Meteorology, and the traffic data from Tom Tom.

Key findings

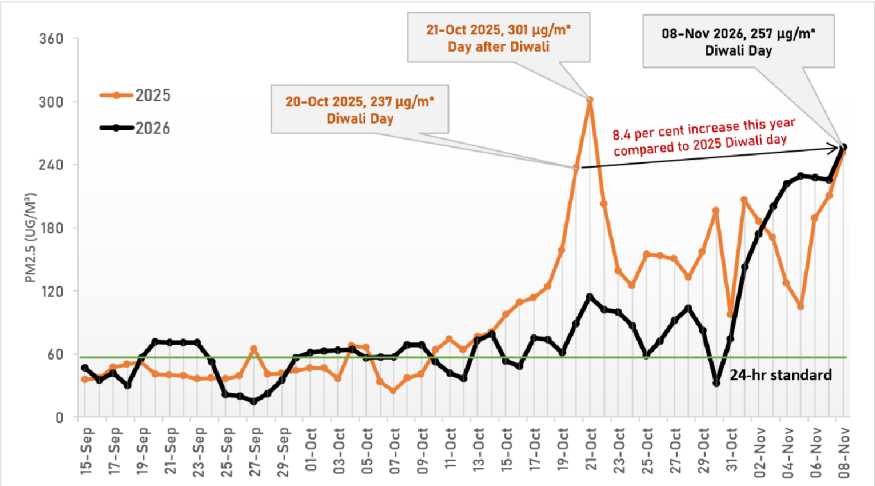
Early-winter pollution (October to mid-November) worsens in 2026, with a sharper build-up ahead of Diwali

"Delhi’s pre-winter pollution in 2026 was generally higher than in 2025, except for a brief late-September drop caused by rain," says Sharanjeet Kaur, Deputy Programme Manager, CSE. "In both years, pollution surged in the days leading up to Diwali. However, the overall toxic burden during this pre-festive week was significantly worse in 2026 than in previous years."

The week preceding Diwali in 2026 recorded an average PM2.5concentration of 236 µg/m³—a three-year high. This marks a 97 per cent increase over the 120 µg/m³ recorded in 2025 and a 32 per cent jump over the 179 µg/m³ seen in 2024, highlighting a significantly steeper pre-festive pollution surge this year.

(See Graph 1: Daily PM2.5 trends during the pre-winter period in Delhi, 2025 and 2026).

Graph 1: Daily PM2.5 trends during the pre-winter period in Delhi, 2025 and 2026



Note: Average PM2.5 concentration is based on mean of daily values recorded at CAAQM stations.
Source: CSE analysis of CPCB real-time data

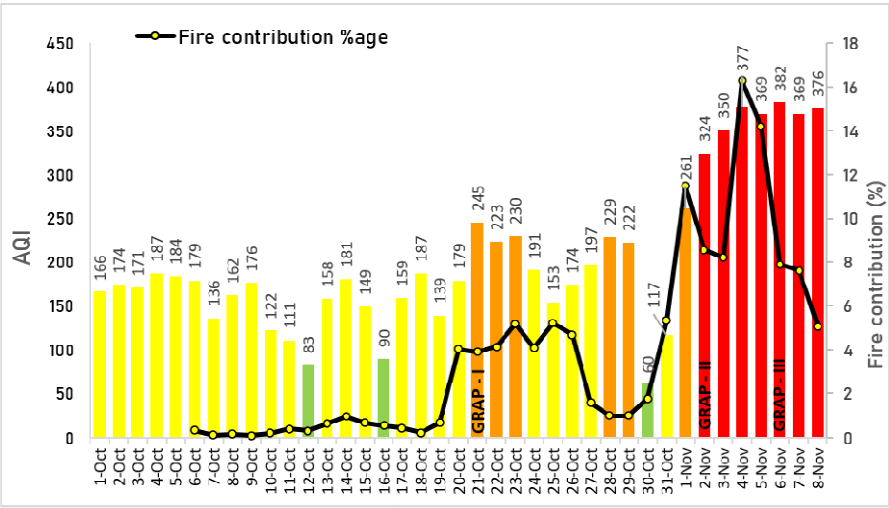
Delhi's air quality worsens despite declining farm-fire contribution

Delhi's air quality deteriorated sharply in late October, plunging into the 'very poor' category on November 2. The contribution of stubble burning to citywide PM2.5 was a modest 3.9 per cent during GRAP Stage I enforcement, rose to 11.5 per cent on November 1 (ahead of GRAP Stage II invocation), and eased to 8.6 per cent on November 2.

Farm fire smoke peaked at a season high of 16.2 per cent on November 4. Yet by November 6, when GRAP Stage III was triggered, Delhi's AQI deteriorated to 382 even as stubble smoke fell to around 8 per cent—proving that severe pollution episodes persist independently of declining farm fires, driven instead by intense local emissions.

(See Graph 2: Daily AQI trends and contribution of stubble burning to Delhi's PM2.5 pollution, October–November 2026).

Graph 2: Daily AQI trends and contribution of stubble burning to Delhi's PM2.5 pollution, October–November 2026



Source: CSE analysis of CPCB'S AQI data and Farm fire contribution is based on data from SAFAR.

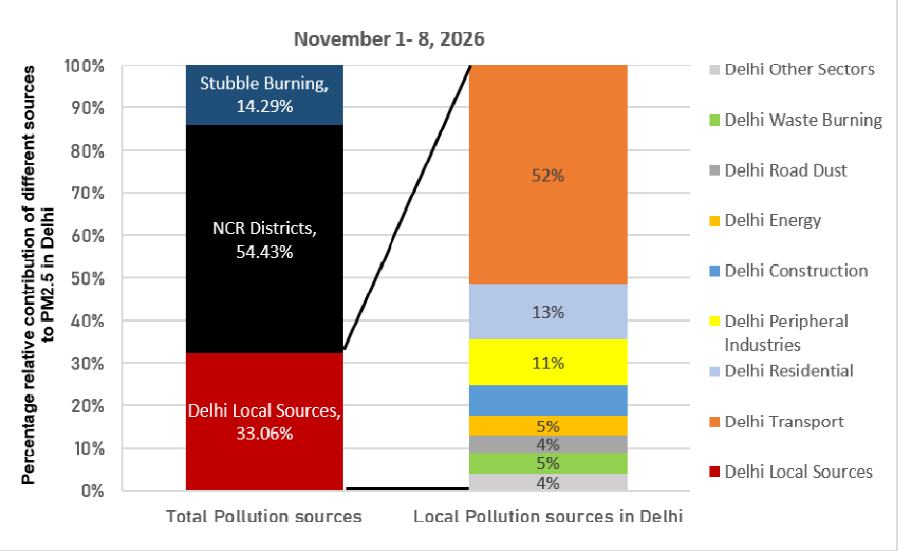
Beyond Farm Fires: Vehicles and Regional Inflow Dominate Delhi's Early Winter Smog

An analysis of IITM's Decision Support System (DSS) data for November 1–8, 2026, shows that pollution transported from neighbouring NCR districts accounted for 54.43 per cent of Delhi's PM2.5, followed by local sources at 33.06 per cent and stubble burning at 14.29 per cent.

Among Delhi's local pollution sources, vehicular transport was the dominant polluter at 52 per cent, well ahead of residential activities (13 per cent) and Delhi-peripheral industries (11 per cent). Construction contributed 7 per cent, energy use and waste burning generated 5 per cent each, and road dust and other sectors accounted for 4 per cent each.

These findings underscore that even during peak stubble-burning season, Delhi's toxic air is primarily sustained by regional drift and everyday urban emissions. *(See Graph 3: Average fractional contribution of regional and local sources to Delhi's PM2.5, November 1–8, 2026)*

Graph 3: Average fractional contribution of regional and local sources to Delhi's PM2.5, Nov 1–8, 2026



Note: Data is based on mean of the daily average contribution for period Nov 1-8, 2026
Source: Based on the CSE's analysis of DSS data by IITM

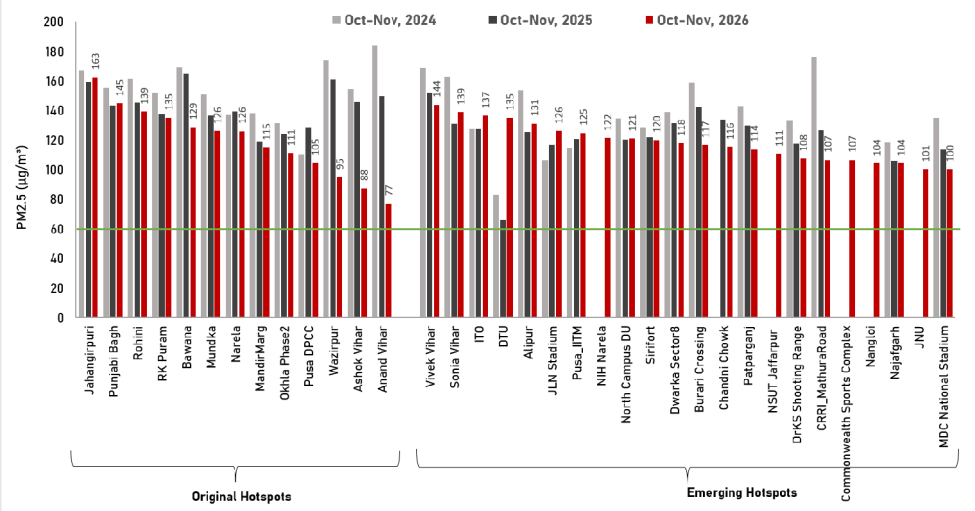
Delhi's original hotspots improve, but emerging hotspots spark fresh concern

Delhi's 13 officially designated pollution hotspots showed widespread improvement during October 1–November 8, 2026, compared to the same period in 2025. Eleven hotspots recorded lower PM2.5 concentrations, led by major drops at Anand Vihar (49 per cent), Wazirpur (41 per cent), Ashok Vihar (40 per cent), and Bawana (22 per cent).

Bucking the trend, Jahangirpuri and Punjabi Bagh logged marginal increases of 2 per cent and 1 per cent, respectively, keeping Jahangirpuri the city's most polluted designated hotspot at 163 µg/m³.

Meanwhile, several emerging, non-designated hotspots have begun outpacing older danger zones. Vivek Vihar (144 µg/m³), Sonia Vihar (139 µg/m³), ITO (137 µg/m³), and DTU (135 µg/m³) recorded intense pollution burdens, while NIH Narela (122 µg/m³) and NSUT Jaffarpur (111 µg/m³) also posted elevated levels. Consequently, areas like Vivek Vihar and DTU now endure significantly higher PM2.5 loads than several traditional hotspots that saw steep reductions. *(See Graph 4: PM2.5 trends across original and emerging pollution hotspots in Delhi, October–November 2024–2026).*

Graph 4: PM2.5 trends across original and emerging pollution hotspots in Delhi, Oct-Nov, 2024–2026

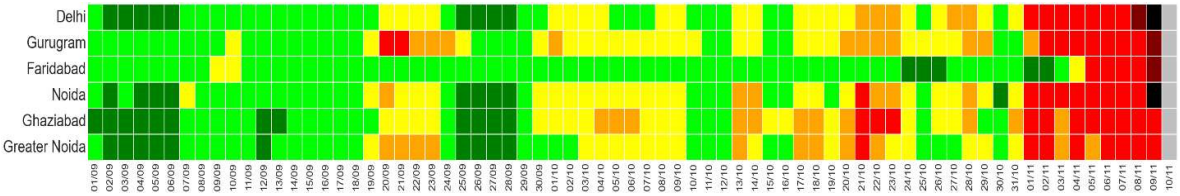


Note: Average PM2.5 concentration is based on mean of daily values recorded at 13 official hotspots in the city and the emerging hotspots. Data is from Oct 1 – Nov 8 for all years.
Source: CSE analysis of CPCB's real time air quality data

NCR-wide pollution build up

Deteriorating air quality extended well beyond Delhi's local hotspots to engulf the broader National Capital Region. The daily PM2.5 heatmap reflects relatively low pollution throughout September, followed by a steady climb in October and an aggressive, region-wide spike in early November across Delhi, Gurugram, Faridabad, Noida, Ghaziabad, and Greater Noida.*(See Graph 5: Air quality calendar of Delhi NCR during October – November, 2026).*

Graph 5: Air quality calendar of Delhi NCR during October – November, 2026



Note: PM2.5 level is based on average of stations. Cell color is based on the official color-scheme of AQI sub-categories.
Source: CSE analysis of CPCB real-time data.

Congestion enhances exposures

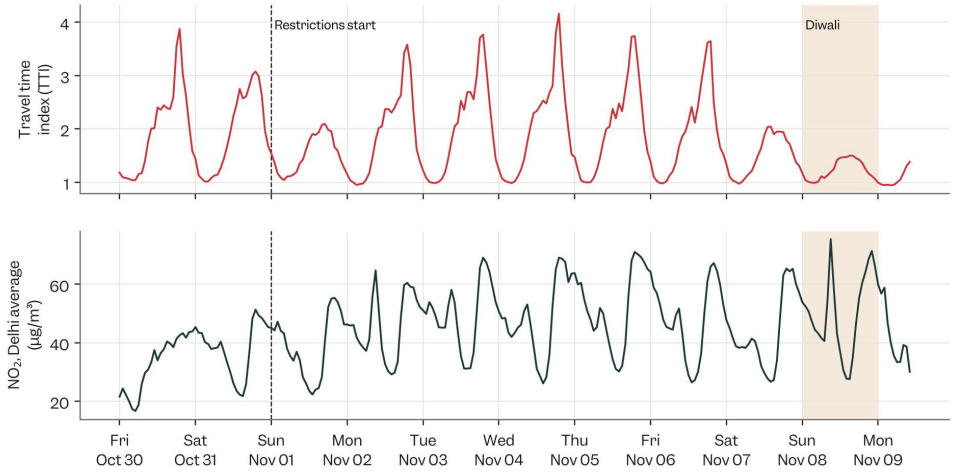
NO_2 trends moved only partly with congestion, and mostly within the day. Graph 6 sets hourly congestion against hourly NO_2, averaged across the city's monitoring stations, for Oct 30 to Nov 9 2026. Within a weekday, the two are linked but out of step (see Graph 7). NO_2 has a first peak at 9 am (56 µg/m³), as the morning traffic builds under a shallow, still layer of air. It then falls to its lowest at 2 pm (29 µg/m³), even though congestion is high, because the air mixes upward in the afternoon sun. From 5 pm, NO_2 rises with the evening peak to 67 µg/m³ at 7 pm and stays above 55 µg/m³ until midnight, long after traffic clears. Hour against hour, the two hardly match (correlation 0.12). With NO_2 taken five to six hours later, the match rises to 0.45 to 0.47. In effect, the evening rush loads the air and the still night air keeps it there.

From day to day, NO_2 followed the weather, not traffic. The daily average rose from 33 to 39 µg/m³ on Oct 30 to Nov 1 2026 to 46 to 52 µg/m³ on Nov 2 to 6 2026, an increase of about a third, while

congestion on weekdays did not change. Diwali was the clearest break: the least congested day of the period (TTI 1.32) had one of the highest NO_2 averages (50 µg/m³), with a spike of 75 µg/m³ at 9 am and 71 µg/m³ at 10 pm, the hours of firecrackers. Leaving Diwali out, daily congestion and NO_2 show only a weak link (correlation 0.33), and with Diwali in, none at all (0.03).

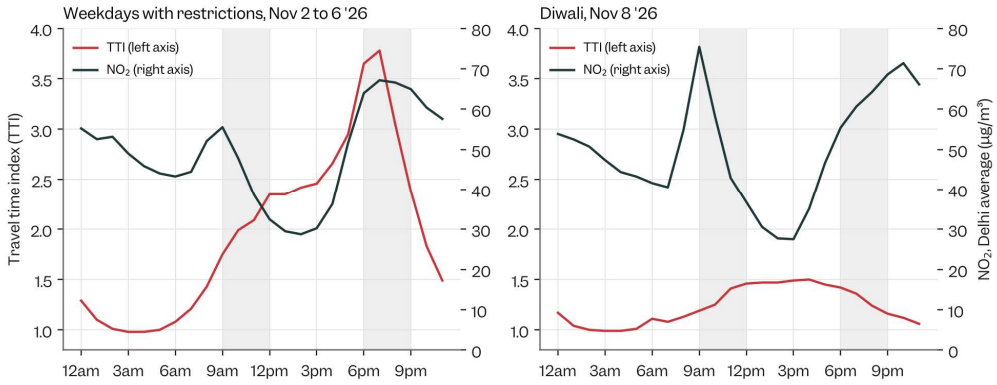
Taken together, traffic shapes when in the day NO_2 builds up, but the level on any given day is set by weather and, on Diwali, by firecrackers. A week of restrictions that left congestion unchanged could not be expected to lower NO_2, and it did not.

Graph 6: Congestion and nitrogen dioxide (NO_2), hour by hour, Oct 30 to Nov 9 2026



Source: CSE analysis of Google Maps travel time data collected hourly across Delhi, and hourly NO_2 for Delhi
Note: NO_2 is the all-station average of 59 reporting stations, to Nov 9 2026 10 am.

Graph 7: When in the day congestion and NO_2 rise



Source: CSE analysis of Google Maps travel time data collected hourly across Delhi, and hourly NO_2 for Delhi
Note: Grey bands: peak hours.

Delhi's traffic around Diwali 2026: What the restrictions changed, and what they did not

Starting November 1, 2026, Delhi banned non-BS-VI vehicles registered outside the city, advised offices to operate with 50 per cent work-from-home staff, and doubled parking charges at authorized sites. An additional analysis has been carried out to track traffic trends over the following week, on Diwali day (November 8, 2026), and on the morning after. It benchmarks these patterns against: A typical weekday from January to April 2026; The run-up to Holi (March 4, 2026) when the baseline traffic was low, and Diwali 2025 (October 20, 2025), when no emergency curbs were in place. These

trends are also paired with hourly nitrogen dioxide (NO_2) data to examine whether air pollution aligned directly with road congestion. Nearly 80 per cent of NO_2 are emitted by vehicles and is an appropriate marker for vehicular pollution

Metrics Used-- Travel Time Index (TTI)*:* Trip time in actual traffic divided by free-flow travel time on empty roads (measured between 2:00 AM and 4:00 AM). A TTI of 2.4 means a trip took 2.4 times longer than free flow (a 140 per cent increase in travel time).

Planning Time Index (PTI): The TTI threshold that 95 per cent of trips stayed within, indicating how much total buffer time a commuter needed to budget.

Peak Hours: Morning (9:00 AM–12:00 PM) and evening (6:00 PM–9:00 PM).

Key highlights

Restrictions did not ease weekday traffic: Based on the analysis Shubham Srivastav, Deputy Programme Manger observes, “Under the restrictions, weekdays (November 2–6, 2026) averaged a daily TTI of 2.40 and an evening peak TTI of 3.49. This was virtually unchanged from Friday, October 30, 2026—the last working day before enforcement—which posted a daily TTI of 2.38 and an evening peak of 3.48.”

Roads remained more congested than routine months: During the restriction week, daily trips took 13 per cent longer than on typical weekdays between January and April 2026 (matching the 13 per cent elevation seen on October 30). During evening peak hours, trips took 13 to 31 per cent longer than baseline.

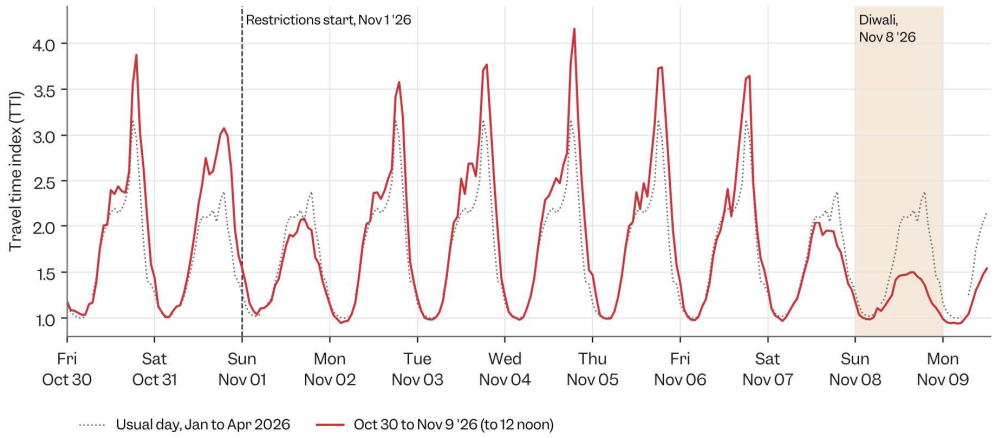
Pre-Diwali traffic surge was milder than in 2025: Three to five days before Diwali, trips were roughly 5 per cent faster than during the equivalent period in 2025 (average TTI of 2.45 versus 2.58 without restrictions). Compared to each year's normal baseline, trips on these days took 18 to 21 per cent longer in 2026, versus 24 to 34 per cent longer in 2025. While consistent with a slight curbs-driven dampening, broader annual differences could also account for the shift.

Diwali Day emptied roads to Match 2025 Levels: On Diwali day, the citywide daily TTI dropped to 1.32 in both 2025 and 2026. By comparison, Holi emptied roads significantly more, recording a TTI of 1.15 without any preceding pre-festival shopping rush.

NO_2 Spikes mirrors day-to-day congestion: Daily NO_2 concentrations surged by one-third starting November 2, 2026, even as traffic congestion remained flat. Furthermore, NO_2 levels peaked on Diwali day, despite it being the least congested day of the week. On an hourly basis, NO_2 rose sharply during the evening rush and remained elevated through midnight—persisting for hours after road traffic had dispersed.

Before, on, and after Diwali: The study tracked congestion, every hour starting at 12:00 AM on October 30, 2026. Every weekday followed an identical pattern: traffic climbed from 7:00 AM, plateaued around a Travel Time Index (TTI) of 2.3 through the afternoon, and surged into a sharp evening peak between 6:00 PM and 8:00 PM, when trips took 3.6 to 4.2 times longer than at night. The single most congested hour of the entire period occurred between 7:00 PM and 8:00 PM on Thursday, November 5, 2026, reaching a peak TTI of 4.2.

Graph 8: Hour by hour, how much longer a trip in Delhi took than on an empty road (TTI), Oct 30 to Nov 9 2026



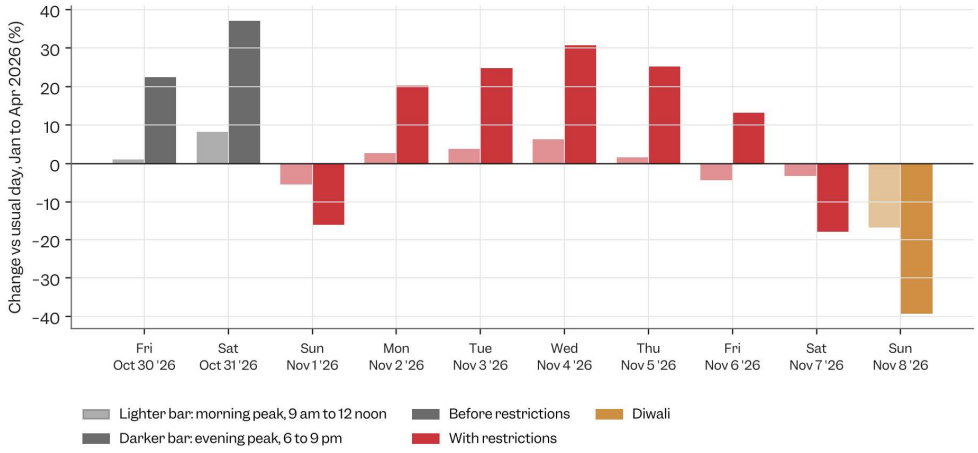
Source: CSE analysis of Google Maps travel time data collected hourly across Delhi

Diwali broke the usual traffic pattern. On November 8, 2026, the evening rush hour never materialized: the Travel Time Index (TTI) stayed below 1.5 all day, and an average trip was delayed by just 2.7 minutes, compared to 11.3 extra minutes on a restriction-bound weekday.

Compared to a typical Sunday between January and April 2026, Diwali was 26 per cent less congested across the day and 39 per cent less congested during the evening peak (see Graph 9). Traffic began thinning ahead of the festival, with Saturday, November 7 (Choti Diwali), already recording 8 per cent lower congestion than a typical weekend day.

Post-Diwali calm lingered onto the roads the next morning. On Monday, November 9, 2026, the morning peak Travel Time Index (TTI) dropped to 1.39—27 per cent below a typical weekday morning and significantly lower than the 1.95 recorded the previous Monday. (see Graph 9).

Graph 9: Peak-hour TTI each day, compared with a usual weekday or weekend day in Jan to Apr 2026



Source: CSE analysis of Google Maps travel time data collected hourly across Delhi
Note: Morning peak 9 am to 12 noon; evening peak 6 to 9 pm.

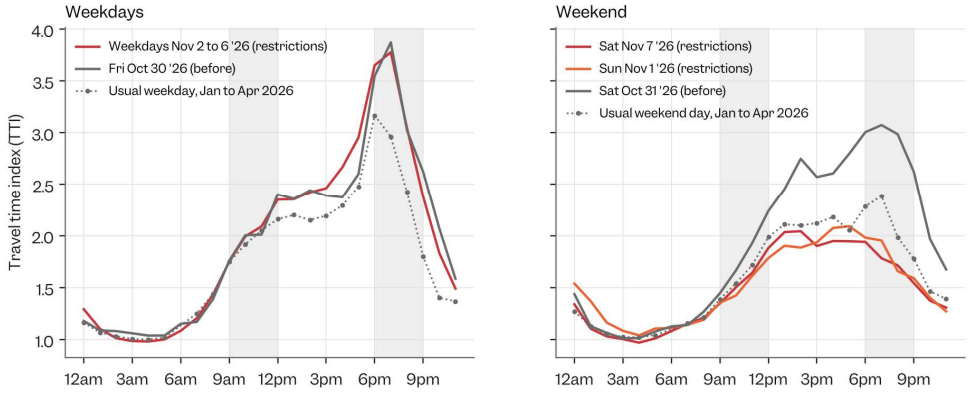
First week traffic changes after GRAP restrictions

Emergency restrictions brought negligible relief to weekday traffic. The hourly congestion curve for November 2–6, 2026, tracked almost identically with Friday, October 30, 2026—the last working day before the rules took effect (see Graph 10). The morning peak was 1 per cent slower, the evening peak remained unchanged, and the Planning Time Index (PTI) for the evening rush only marginally improved from 6.36 to 6.16—meaning worst-case trip delays eased only slightly. Despite policies promoting work-from-home and staggered office hours, the data showed no flattening of the evening peak.

Compared to routine weekday baselines from January to April 2026, roads remained consistently congested throughout the week. Friday, October 30 was 13 per cent busier than a normal weekday. The five weekdays under restrictions matched that exact average of 13 per cent higher congestion, spanning from 7 per cent above normal on Friday, November 6 (Dhanteras) to 17 per cent above normal on Tuesday, November 3 and Wednesday, November 4. Rather than restoring normal traffic flow, the restrictions at best merely capped the festive rush from expanding further.

Weekends showed a marked downturn, though this cannot be credited to vehicle restrictions alone. Saturday, October 31 (pre-curbs) was 22 per cent busier than a typical weekend day, with an evening peak running 37 per cent above normal. By contrast, both weekend days under the restrictions fell 8 per cent below baseline: Sunday, November 1 and Saturday, November 7. While Sunday's dip directly reflected the entry ban (with offices closed), the drop on Saturday, November 7 coincided with Choti Diwali, when substantial numbers of residents had already exited the city or stayed indoors.

Graph 10: The hourly pattern before and with the restrictions



Source: CSE analysis of Google Maps travel time data collected hourly across Delhi
Note: Grey bands: peak hours. Jan to Apr 2026 hours with too few readings (6 am) are left out.

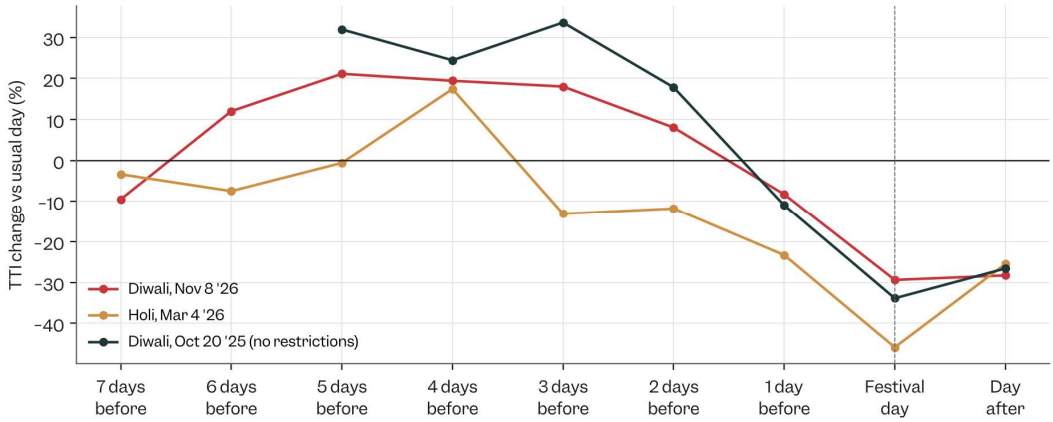
Congestion on Diwali vs Holiin 2026

Holi and Diwali cleared Delhi's roads in sharply contrasting ways. During the week before Holi, traffic stayed near or below normal levels, falling to 12 per cent below average two days prior and 23 per cent below normal on the evening before. The only high-traffic day was Saturday, February 28, 2026, which ran 17 per cent above normal. Conversely, the run-up to Diwali saw four consecutive working days running 12 to 21 per cent above baseline congestion (see Graph 11). While pre-Diwali travel surges with shopping and gifting trips, pre-Holi travel drops off early.

On festival day itself, Holi emptied the city far more thoroughly. On March 4, 2026, the Travel Time Index never exceeded 1.25 and averaged 1.15—46 per cent below a normal weekday. Diwali 2026 averaged a higher TTI of 1.32, sitting 29 per cent below a typical Sunday across the benchmarked hours, and saw an afternoon congestion plateau around 1.5 (see Graph 12). This divergence reflects different holiday routines: people spend Holi mornings celebrating at home, whereas Diwali afternoons still see last-minute shopping and social visits. By the day after each festival, travel

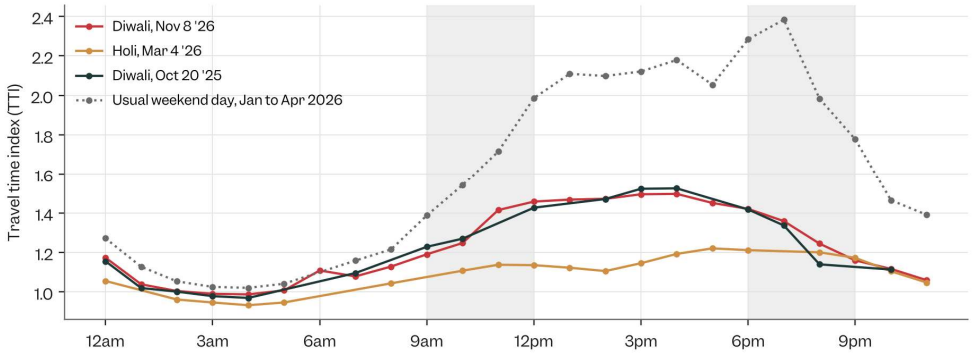
patterns converged, with congestion settling 26 to 28 per cent below a standard day across all three comparative festival instances.

Graph 11: The days around Diwali and Holi, compared with a usual day of the same type



Source: CSE analysis of Google Maps travel time data collected hourly across Delhi
Note: Usual day: Jan to Apr 2026 for 2026, Jan to mid-Mar 2025 for 2025, same weekday or weekend type.

Graph 12: Festival day, hour by hour (TTI)



Source: CSE analysis of Google Maps travel time data collected hourly across Delhi
Note: Dots mark hours with data; the 2025 and Holi days miss some hours. Grey bands: peak hours.

The key message

While episodic spikes from Diwali firecrackers and farm fires visibly trigger early-winter smog, Delhi-NCR's severe pollution crisis is rooted in weak round-the-year mitigation across all major sectors and the region. The rapid proliferation of new pollution hotspots and the aggressive build-up across NCR region confirm that baseline emissions remain unsustainably high long before adverse winter weather sets in.

Because routine baseline controls have faltered, the region is forced into an escalating dependence on emergency GRAP curbs rather than reducing reliance on crisis-mode restrictions. Short-term emergency steps cannot substitute for systemic solutions; cleaning the region's air permanently demands deep, continuous, year-round emission cuts targeted at vehicular transport, industries, construction activity, waste burning, and dispersed urban sources across the entire airshed.

Traffic gridlock at the same time is a pollution multiplier, yet current clean air action plans treat vehicular emissions primarily as a tailpipe technology or routing problem rather than an absolute volume crisis. During idling and slow crawlvehicles run at inefficient engine speeds, increasing emissions per kilometre travelled.Conventional traffic engineering and piecemeal emergency restrictions cannot absorb this overload; effective pollution control requires strategies that actively scale down vehicular volume on the streets through mass public transit, mandatory trip-reduction mandates, and stringent car-restraint measures.