Corona-Norco Family YMCA

AirAware
Air Quality Monitoring
Quarterly Report
(10/2025 – 12/2025)

Photo of the Corona-Norco Family YMCA

Prepared by the
AirAware Team

Corona-Norco Family YMCA

AirAware Air Quality Monitoring Quarterly Report - #4

October 2025 - December 2025

Prepared by the AirAware team

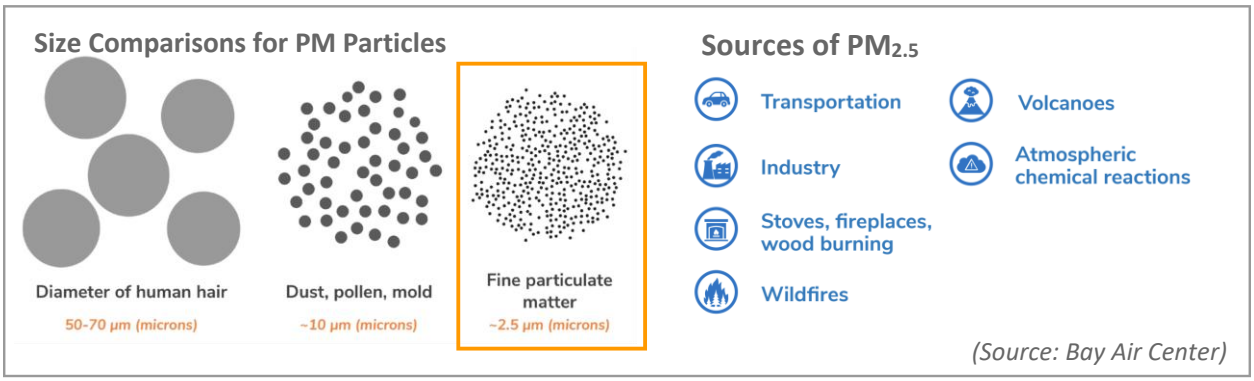
This report summarizes the recent air quality trends observed at the Corona-Norco Family YMCA, focusing on the differences between indoor and outdoor fine particulate matter ($PM_{2.5}$).

Key Takeaways

- $PM_{2.5}$ levels varied across time with the majority of indoor levels in the Good AQI range, while outdoor levels rose into Unhealthy AQI levels. Pollution from wood-burning sources and stagnant winter weather impacted outdoor air quality the most in this period.
- Indoor levels during higher outdoor pollution days showed very good HVAC filtration of outdoor particles with Good and Moderate AQI indoors during Unhealthy for Sensitive Groups AQI outdoors. This demonstrates the substantial positive impact of upgrading the standard MERV-8 to IQAir's hospital-grade NanoMax MERV-16 filters; the upgrade was predicted to reduce indoor $PM_{2.5}$ levels by at least 80%, and results after the upgrade so far exceed these estimates with average $PM_{2.5}$ reductions of up to 85%. We are still working to ascertain which HVAC unit services each of the monitored rooms to understand if there is a correlation between the $PM_{2.5}$ reductions and the Post-Intervention airborne particle counts performed at each HVAC.
- Periodic indoor spikes in the Break Room representative of indoor sources of $PM_{2.5}$ also occur during this period. These trends are worth investigating, as the HVAC filtration upgrade does not fully help address poor indoor air quality conditions from indoor pollution sources.

Background

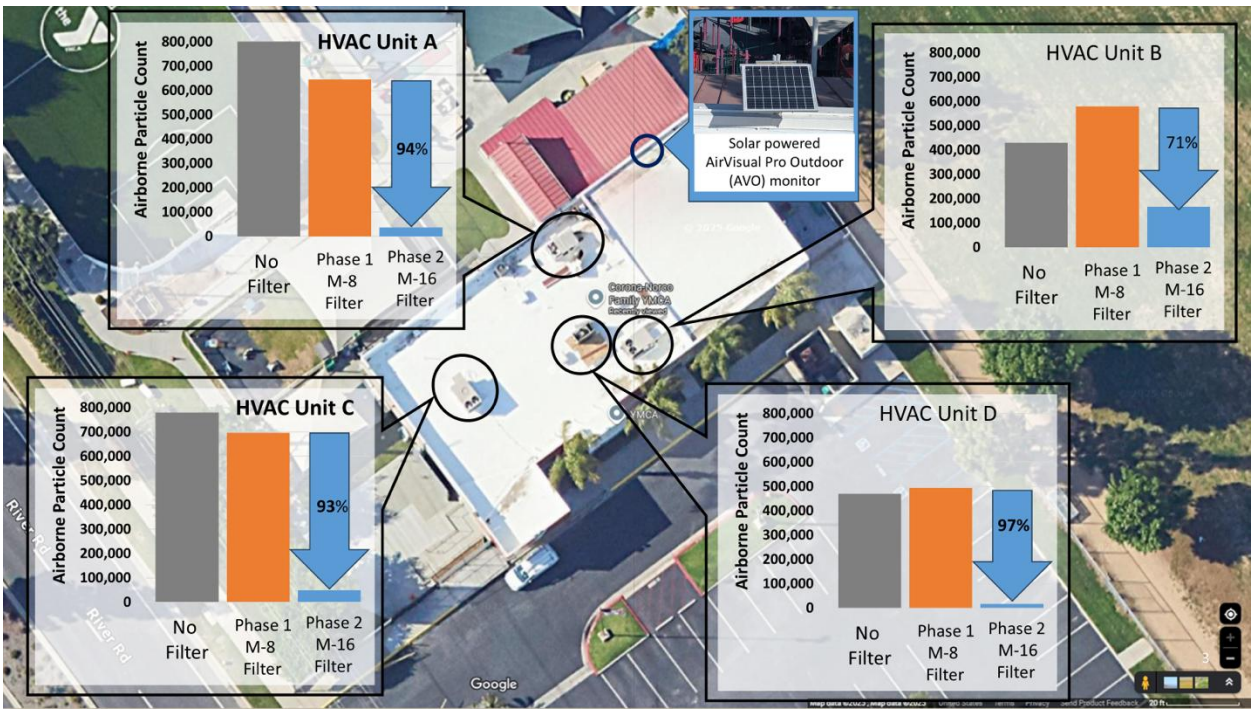
Particulate matter is an air pollutant made of tiny liquid and solid airborne particles that vary in size. Fine particulate matter ($PM_{2.5}$), which is the focus of the AirAware project, describes an important subset of particulate matter that is 2.5 microns and smaller in size (~30x smaller than the diameter of a human hair) and predominantly comes from sources of combustion (burning of fuels), such as wildfires, residential wood burning, transportation, and industry.



Exposure to $PM_{2.5}$ has various detrimental health effects, such as aggravated asthma, decrease in lung function, increase in respiratory symptoms, and nonfatal heart attacks or premature deaths in people with heart and lung disease. It also impacts the environment through reduced visibility, damaged vegetation, and reduced soil nutrients, among many other impacts.

HVAC Intervention Summary

On the morning of September 4, 2025, Corona-Norco YMCA's standard MERV-8 HVAC filters were upgraded to IQAir's hospital-grade NanoMax MERV-16 filters. The figures below illustrate the immediate particle filtration impact of implementing this intervention.



Airborne particle count readings taken on the morning of September 4, 2025 between 8:45AM and 9:16AM at Corona-Norco YMCA's four HVAC units before and after the HVAC intervention.

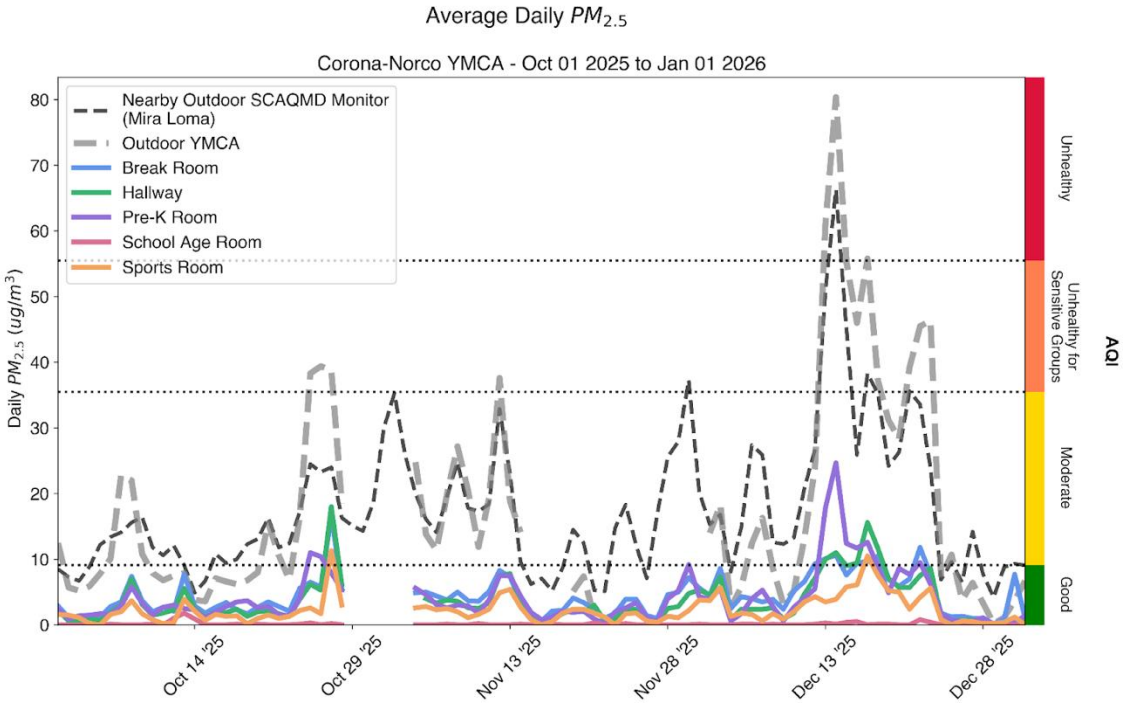
Three particle counts were taken at each HVAC unit by IQAir technicians using an IQAir ParticleScan handheld particle counter: 1) with the pre-intervention (Phase 1) MERV-8 filters in place, after they were removed to show particle levels moving into the system with no filter in place, and after the Post-Invervention (Phase 2) NanoMax MERV-16 filters were installed. Three out of the four units (Units A, C, and D) showed a greater than 90% reduction compared to Phase 1 particle counts.

One of the HVAC systems (HVAC B) was observed to be especially dirty; the MERV-8 filters that were removed from this unit were noticeably darker in color than the filters that were removed from the other three units. While the three other HVAC units showed a 93-97% Post-Intervention (Phase 2) reduction in particles when compared to the Pre-Intervention MERV-8 (Phase 1) particle counts, Unit B showed only a 71% reduction in particles. This further indicated the HVAC unit itself, along with its air ducts, may need to be cleaned in order to see the full potential of the NanoMax filters. Unit B is also the closest HVAC unit to the kitchen (possibly servicing the kitchen) which would explain the increased particle buildup inside this unit.

Airborne particle counts will be rechecked at the 6-month mark at each HVAC to ensure the filters are still performing optimally. These HVAC measurements will also be compared to trends seen across the monitored indoor spaces to understand the full impacts on indoor air quality conditions.

Trends in Fine Particulate Matter ($PM_{2.5}$)

Indoor and outdoor air quality monitoring at the Corona-Norco Family YMCA has been underway since late Fall 2024. This section explores the trends across time and space during fall and early winter of 2025 (October-December).



This plot shows average daily $PM_{2.5}$ levels across time for both the indoor (solid color lines) and outdoor (dashed grey line) AirAware monitors from the beginning of October 2025 to the end of December 2025. Data from a nearby regulatory monitor from the South Coast Air Quality Management District (SCAQMD) is also included (dashed black line). The Air Quality Index (AQI) categories coinciding with $PM_{2.5}$ concentrations are shown on the right with bounds shown across the plot in dashed black lines, helping to provide health context. The YMCA-wide data gap in late October/early November was due to routine project maintenance (6-month collocation). The outdoor monitor also experienced a data gap in mid November due to power/solar battery charging issues caused by lack of sun during winter rains.

What does this plot tell us?

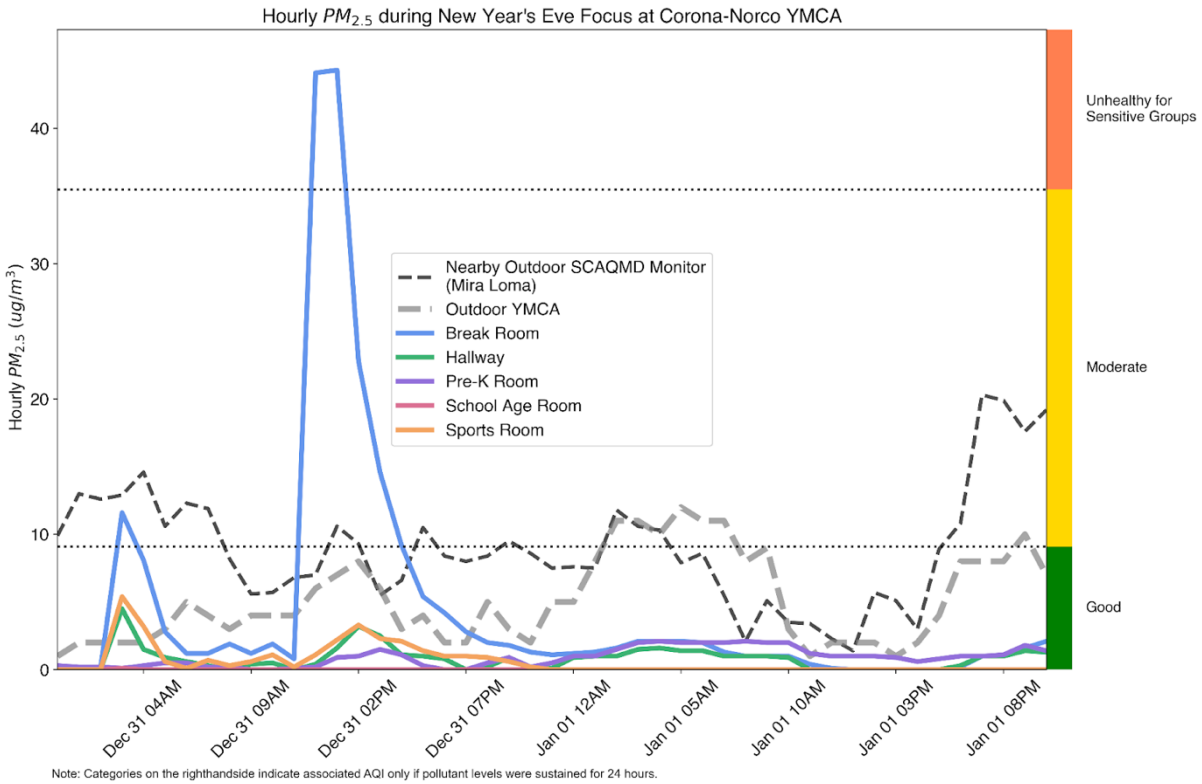
- From October 2025 to December 2025, $PM_{2.5}$ levels varied across time, and largely stayed within the Moderate AQI range outdoors. Indoor levels followed the rise and fall in outdoor air pollution, but at lower concentrations, staying predominantly in the Good AQI range.
- Higher $PM_{2.5}$ outdoor concentrations in the Unhealthy AQI group occurred briefly in the middle of December. These poor outdoor air quality days were likely due to pollution

from stagnant winter weather, not wildfires, and highlight the importance of sustained and effective air filtration in maintaining healthy indoor air quality conditions year round.

- The outdoor YMCA monitor often showed fairly similar to or slightly higher $PM_{2.5}$ levels than the nearest regulatory monitor from the South Coast Air Quality Management District (SCAQMD) 8 miles Northeast from the YMCA.[1]

Impacts of Fourth of July Fireworks

The plot below zooms in on the hourly data and further shows how fireworks impacted air quality both outdoors and indoors.



This plot shows average hourly $PM_{2.5}$ levels across time for both the indoor (solid color lines) and outdoor (dashed grey line) AirAware monitors from December 31st 2025 to January 1st 2026. Data from a nearby regulatory monitor from the South Coast Air Quality Management District (SCAQMD) is also included (dashed black line). The Air Quality Index (AQI) categories coinciding with $PM_{2.5}$ concentrations are shown on the right with bounds shown across the plot in dashed black lines, to provide health context, with the caveat that levels would need to be sustained for 24 hours to translate to the shown AQI. Times are shown in Standard Time (i.e. one hour behind Daylight Savings Time).

- Outdoor and indoor $PM_{2.5}$ was minimally impacted by firework-related emissions during New Year's Eve celebrations, remaining in the Good AQI category for the majority of the December 31, 2025 evening to January 1, 2026 morning. These cleaner air quality conditions were likely caused by rainfall during New Years through both the particle

[1] The outdoor YMCA monitor has not been directly evaluated against the SCAQMD monitor, so we cannot draw conclusions about any differences between the two.

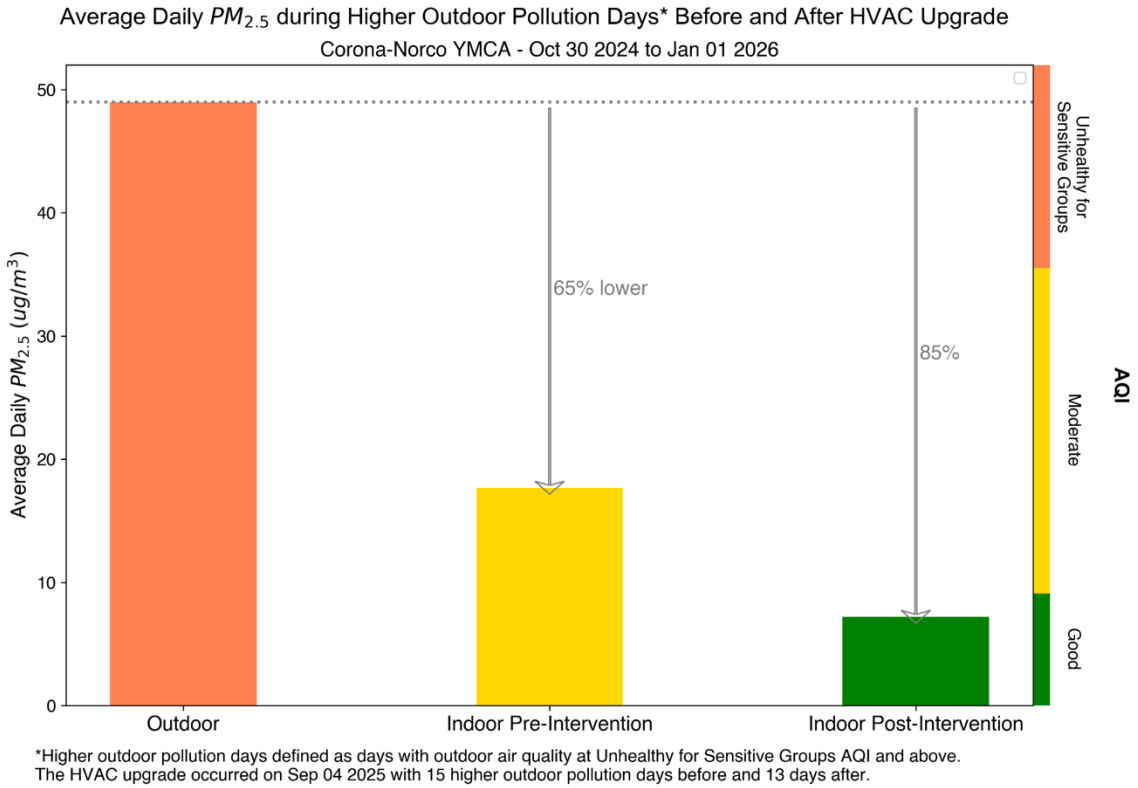
removal from precipitation, as well as its impact on planned celebrations (e.g., reduced fireworks).[2] Many firework celebrations in the surrounding areas were also canceled this year as a response to the January 2025 Eaton and Palisades wildfires.

- These hourly levels were significantly lower compared to the previous year, where outdoor levels rose over 100 ug/m^3 with indoor roughly 50% lower. Other pollution conditions apart from New Year's Eve fireworks were occurring last year at the same time that likely impacted these levels as well (stagnant air, woodsmoke).
- $PM_{2.5}$ levels in the Break Room rose much higher than outdoor and other indoor spaces earlier in the day on December 31, 2025, but do not seem related to New Year's Eve fireworks and are discussed later in Questions about Indoor $PM_{2.5}$ section below.

[2] National Weather Service Climatological Data for RIVERSIDE MUNICIPAL AP, CA - December 2025 showed 0.3 inches of rain.

Comparison of Indoor and Outdoor $PM_{2.5}$

The relationship between indoor and outdoor $PM_{2.5}$ is important to explore as it can tell us how effective your YMCA's HVAC system is currently at filtering out particulate matter from outdoor sources and can help highlight indoor air quality concerns and any needs for HVAC improvement.

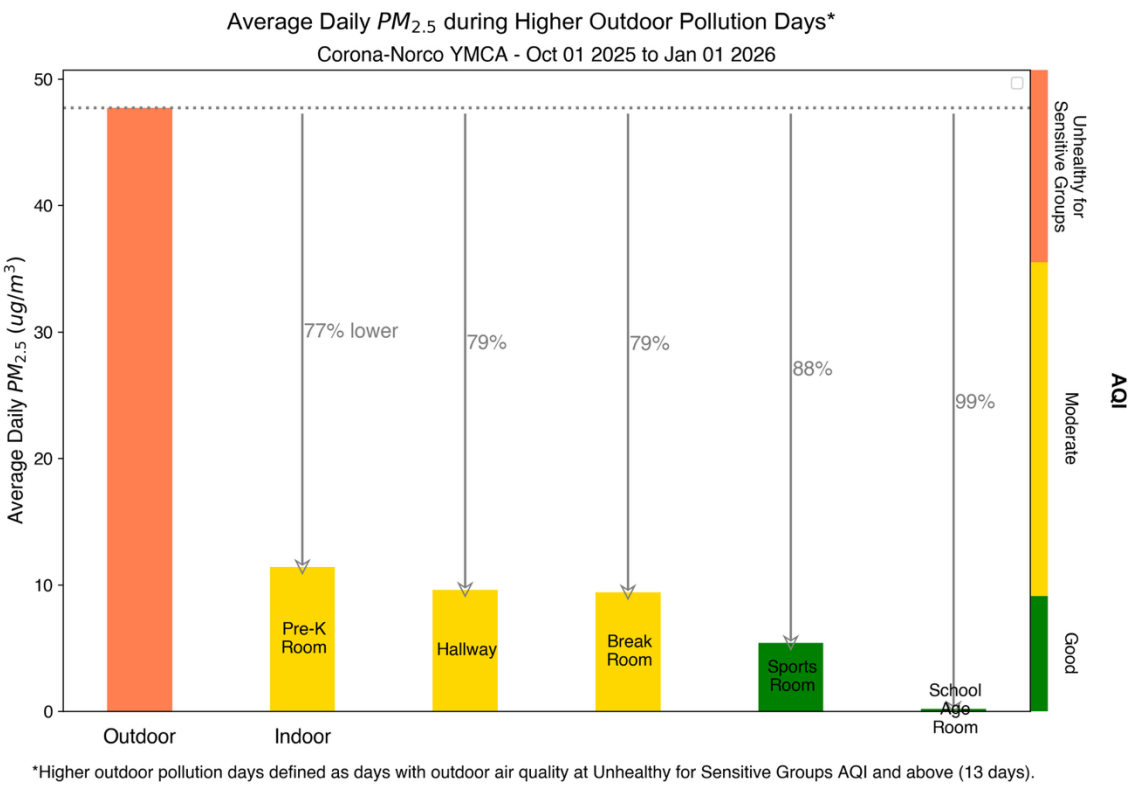


This bar chart compares average daily outdoor (left) and indoor (right) $PM_{2.5}$ levels during higher outdoor pollution days before and after the HVAC upgrade. The color of each bar chart coincides with an AQI category, and the arrows from the grey dashed line and coinciding percentages indicate how much lower average indoor levels are.

What does this chart tell us?

- This comparison of indoor levels before and after the Phase 2 intervention on September 4th, in which the HVAC systems were upgraded from MERV-8 to hospital-grade MERV-16 NanoMax filters, indicates the significant impact the new filters have in reducing indoor $PM_{2.5}$. The HVAC upgrade was predicted to reduce indoor $PM_{2.5}$ levels by at least 80%, and results after the upgrade so far exceed these estimates with average $PM_{2.5}$ reductions of up to 85%.
- After the intervention, when outdoor air quality was in the Unhealthy for Sensitive Groups AQI, all indoor spaces were on average in the Good AQI, highlighting that the current HVAC system is effectively filtering outdoor particles from indoor air, in comparison to previous HVAC conditions. These improvements are not the same across all indoor spaces, which is illustrated in the bar chart below.

Post-HVAC Intervention



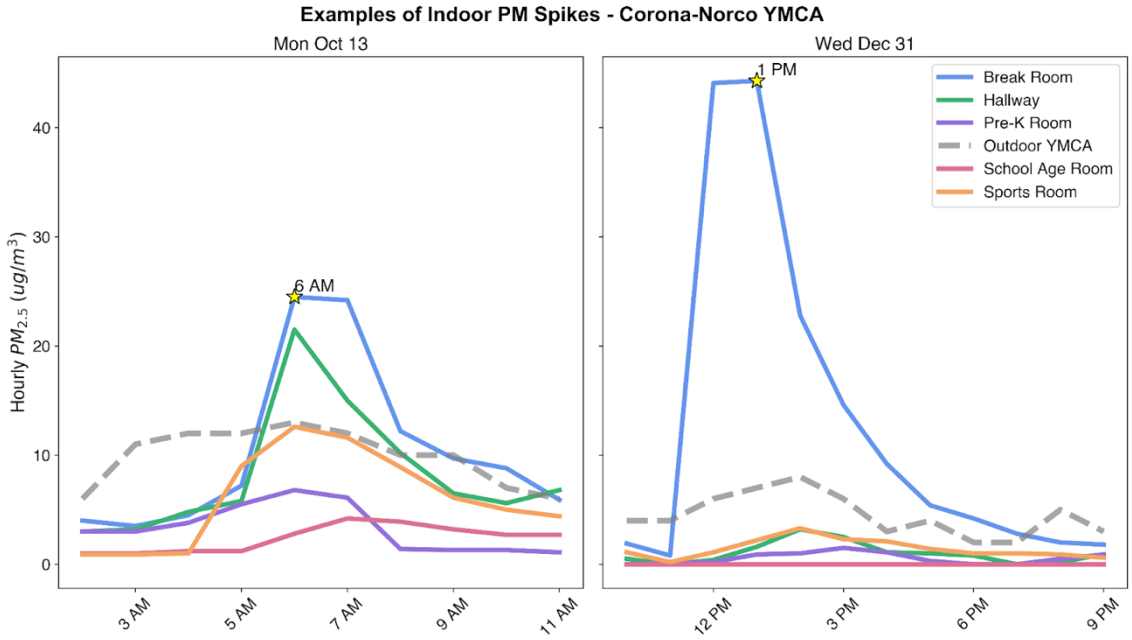
These bar charts compare average daily outdoor (left) and indoor (right) $PM_{2.5}$ levels during higher outdoor pollution days before and after the September 4, 2025 HVAC intervention till January 1, 2026. The color of each bar chart coincides with an AQI category, and the arrows from the grey dashed line and coinciding percentages indicate how much lower average indoor levels are per room compared to outdoor. The indoor spaces are ordered from most to least similar to outdoor levels. Note: Outdoor levels in the Unhealthy for Sensitive Groups AQI and above after the intervention only occurred from October 2025 onward ($PM_{2.5}$ levels in September 2025 did not reach these higher levels).

What do these charts tell us?

- When outdoor air quality was in the Unhealthy for Sensitive Groups AQI and above, the Sports Room and School Age Room were on average two AQI levels lower in the Good AQI, while the Pre-K Room, Hallway, and Breakroom were comparable and remained in the Moderate AQI.
- Since the HVAC upgrade, the School Age Room has seen the lowest $PM_{2.5}$ out of all the indoor spaces (while the average is 100% reduction, levels do fluctuate on the daily level, as seen in the time series in the first section). **What is different about this room compared to the others that could be causing these cleaner conditions?**

Questions about Indoor $PM_{2.5}$

Indoor sources and activities can also contribute to higher indoor air quality levels, and exploring these trends can help identify contributing indoor activities or behaviors and provide insight on possible changes to improve indoor air quality.



This plot shows examples of hourly indoor (solid color lines) and outdoor (dashed grey lines) $PM_{2.5}$ levels at the YMCA that are characteristic of indoor sources or activities that contribute to higher indoor air quality. All times are shown in Standard Time (i.e. one hour behind Daylight Savings Time).

What does this chart tell us?

Across this period, the Break Room continues to show periodic spikes in indoor $PM_{2.5}$ above outdoor levels to varying degrees. The October 13, 2025 peak occurred during morning hours. During this period, elevated levels were seen across all indoor spaces, with the highest levels in the Break Room and Hallway. On December 31, 2025, one distinct peak in indoor $PM_{2.5}$ occurred in the Break Room in the early afternoon. No other indoor spaces rose above outdoor levels on this day. Many indoor activities could lead to these high $PM_{2.5}$ levels, such as the use of a microwave in the Break Room.