

# **Southeast-Rio Vista YMCA**

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## **AirAware Air Quality Monitoring Quarterly Report (11/2024 – 01/2025)**



Photo of the Southeast-Rio Vista YMCA

Prepared by the  
**AirAware Team**

# Southeast-Rio Vista YMCA

## AirAware Air Quality Monitoring Quarterly Report - # 1

November 2024 - January 2025

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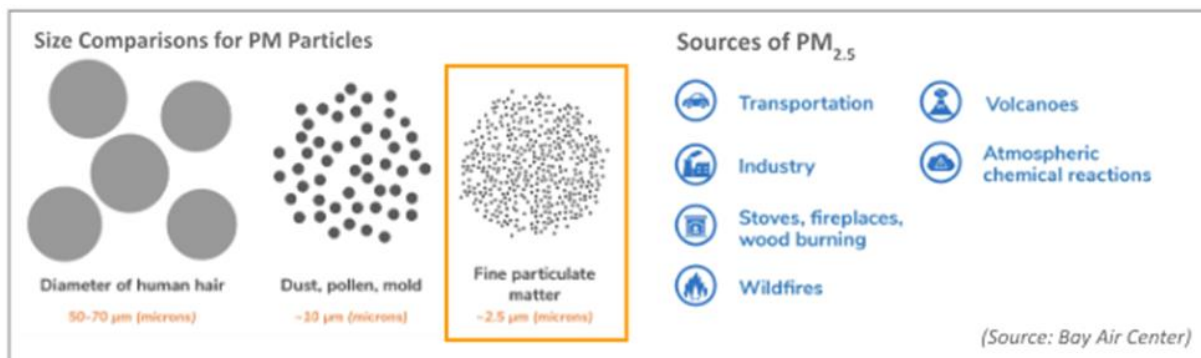
This report summarizes the recent air quality trends observed at your YMCA, focusing on the differences between indoor and outdoor fine particulate matter (PM<sub>2.5</sub>).

### Key Takeaways

- PM<sub>2.5</sub> levels varied across time with the majority of indoor levels in the Good and Moderate AQI range, with some days indoors reaching Unhealthy for Sensitive Groups and above during higher outdoor pollution conditions.
- The poor air quality conditions during the Eaton and Palisades wildfires severely impacted indoor air quality, leading to levels indoors that were unhealthy for sensitive groups.
- During three other unhealthy outdoor days caused by common outdoor pollution resulting from stagnant winter weather, indoor air quality was also impacted but to a lesser extent, highlighting the importance of sustained and effective air filtration in maintaining healthy indoor air quality conditions year round.
- Indoor levels during higher outdoor pollution days were 56% lower than outdoors. With the future HVAC upgrade, we'd expect indoor levels to be at least 80% lower than outdoors.

### Background

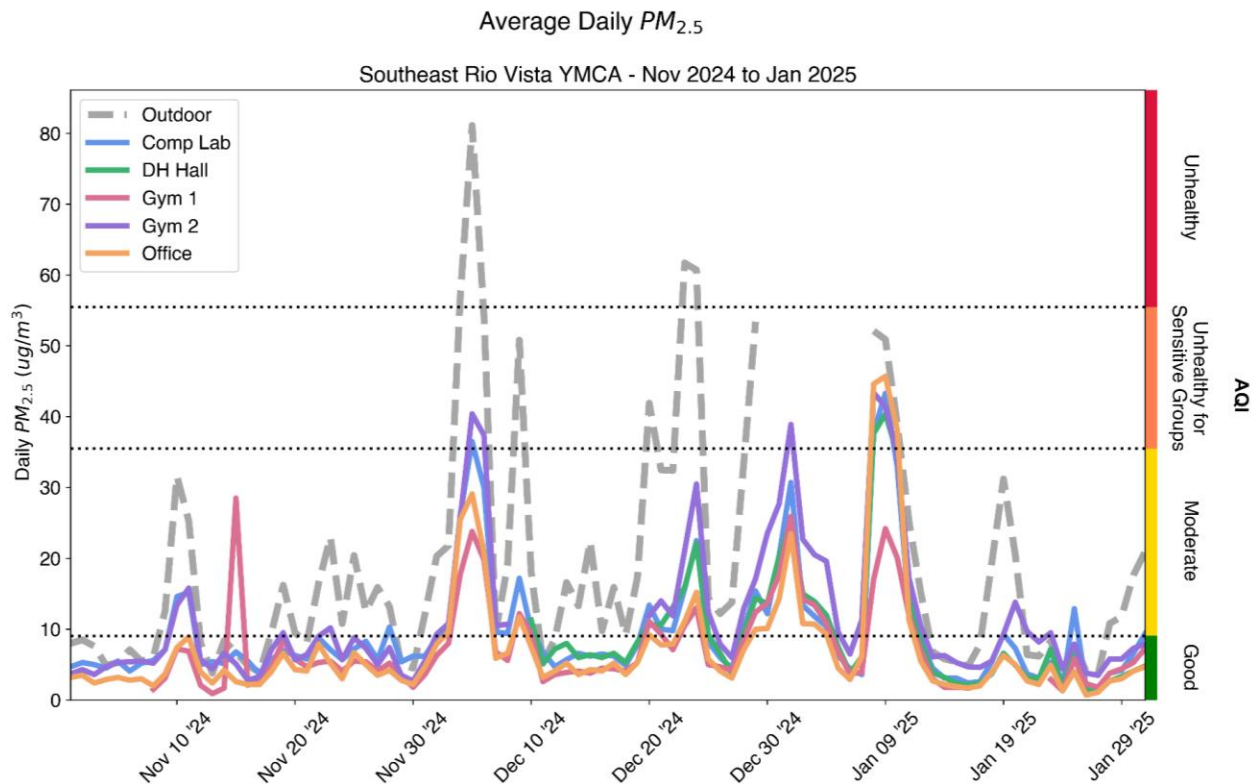
Particulate matter is an air pollutant made of tiny liquid and solid airborne particles that vary in size. Fine particulate matter (PM<sub>2.5</sub>), which is the focus of the AirAware project, describes an important subset of particulate matter that is 2.5 microns and smaller in size (~30x smaller than the diameter of a human hair) and predominantly come 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 and 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.

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

Indoor and outdoor air quality monitoring at the Southeast Rio Vista YMCA has been underway since late Fall 2024. This section explores the trends across time and space over these first three months of monitoring.



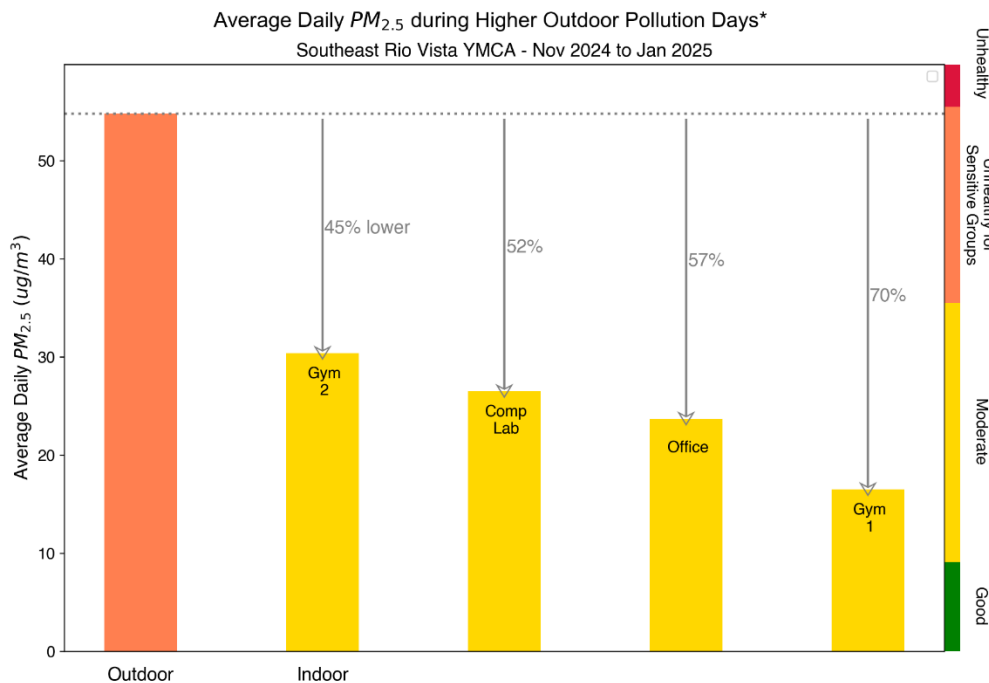
*This plot shows average daily  $PM_{2.5}$  levels across time for both the indoor (solid color lines) and outdoor (dashed grey lines) monitors from the beginning of November 2024 to the end of January 2025. The Air Quality Index (AQI) categories coinciding with  $PM_{2.5}$  concentrations are shown on the right with bounds shown across the plot in dashed black lines, helping to provide health context. Any gaps in the data are due to issues in power or WiFi/cellular connectivity.*

### What does this plot tell us?

- From November 2024 to January 2025, PM<sub>2.5</sub> levels varied across time. Indoor levels followed the rise and fall in outdoor air pollution, but at lower concentrations, with the majority of PM<sub>2.5</sub> indoor levels in the Good and Moderate AQI range.
- The highest PM<sub>2.5</sub> levels both indoors and outdoors occurred between early December and early January, with levels rising into the Unhealthy for Sensitive Groups AQI indoors and Unhealthy outdoors.
- The high early January levels, caused by wildfire smoke from the Eaton and Palisade wildfires, heavily impacted indoor air quality conditions (indoor AQI was the same as outdoors), and more than during earlier polluted outdoor days. This relationship between indoor and outdoor levels is explored in more detail in the next section.
- Notably, not all poor outdoor air quality days were due to wildfire smoke. Higher levels in early and late December were likely caused by outdoor pollution from stagnant winter weather and were similar to or greater than levels seen during wildfire smoke-impacted days. This highlights the importance of sustained and effective air filtration in maintaining healthy indoor air quality conditions year round, not just during wildfire smoke conditions.
- While indoor levels were most influenced by outdoor conditions during this period, the data also indicate the presence of indoor sources of PM<sub>2.5</sub>, which can sometimes cause indoor levels to be higher than outdoor levels. This occurred on November 15, 2024 in Gym 1 and mildly on January 25, 2025 in the Comp Lab. Further analysis showed that both these daily averages were impacted specifically by higher morning hourly peaks, possibly from activities occurring in the rooms. Currently these observations are not recurring, but future data review will keep an eye out for any emerging patterns that could indicate routine influences of indoor sources.

## Comparison of Indoor and Outdoor PM<sub>2.5</sub>

The relationship between indoor and outdoor PM<sub>2.5</sub> is important to explore as it can tell us how effective your YMCA is at currently filtering out particulate matter from outdoor sources and can help highlight indoor air quality concerns and any needs for HVAC improvement.



\*Higher outdoor pollution days defined as days with outdoor air quality at Unhealthy for Sensitive Groups AQI and above (11 days). DH Hall was excluded from analysis due to insufficient data (<75%).

This bar chart compares average daily outdoor (left) and indoor (right) PM<sub>2.5</sub> levels during higher outdoor pollution days. 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.

### What does this chart tell us?

- In general, we would expect indoor levels to be between 30% and 80% lower than outdoor levels on average, depending on currently installed HVAC filtration. For this first quarter, all average indoor levels during higher pollution days were within this expected range, but levels did vary across some of the different monitored rooms and spaces.
- Gym 1 measured the cleanest on average air (70% lower than outdoors), though still in the Moderate AQI, and showed statistically lower levels than both the Gym 2 and the Comp Lab, but overlapped with the Office. Many factors may be causing these differences, such as building and HVAC design. **Do you have any ideas why Gym 1 has cleaner indoor air?** Statistical analysis showed that Gym 2, the Comp Lab, and Office averages likely overlapped.
- With the future HVAC upgrade, we expect indoor levels to be significantly lower than outdoor, reaching 80% reduction. We were also informed that the YMCA's HVAC filters were updated on January 21, 2025, and a future quarterly report will be able to compare data before and after to assess whether this change has had an impact on indoor levels.

