

Winter air really is worse in south, west Phoenix. Here's why

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Columba Sainz used to spend more time outside with her two young daughters. When her husband got home from work in the evenings, the four of them would go directly to the nearby park in their neighborhood in Tempe. Sometimes they'd be there until 9 or 10 at night.

“I don't want my children to be inside the house, watching TV all day long,” Sainz said. “I want them to be outside, to keep their minds busy.”

After about a year and a half in Tempe, Sainz was pregnant with a third child. Her husband's commute from downtown Phoenix seemed to be getting longer. With a new baby on the way and two toddlers, she wanted the growing family to live closer to his work.

They moved to a neighborhood south of downtown. The house seemed perfect—it was across the street from a park and near a daycare. But then Sainz's toddler started wheezing and coughing at night.

“It was something that we'd never seen before,” Sainz said. “We were really panicked. We took her to the hospital the next day and the first question they asked me was, 'Does she have asthma or respiratory issues?' And I said no. They never linked it to the quality of the air.”

South and west Phoenix have the worst air quality in the Valley. Maricopa County Air Quality Department uses monitors throughout the county to measure particulate matter, or PM, fine particles that are produced by vehicles, construction, industry, fireworks and wood burning.

PM 2.5 are airborne particles small enough to enter the lungs and can trigger asthma attacks. Young children whose lungs are still developing, and elderly people with weakened lungs, are most at risk for health problems caused by PM 2.5. This dangerous fine particle pollution tends to increase during the holiday season as more people burn wood in fireplaces and outdoor pits, and set off fireworks to celebrate the new year.

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When her daughter started wheezing, Sainz stopped taking her to the park. After spending as many as four hours outside playing, Sainz cut the time down to a half hour, then 15 minutes. Her daughter kept wheezing. Sainz downloaded air quality apps on her phone and signed up for alerts from Maricopa County, which issues no-burn days, and the Arizona Department of

Environmental Quality (ADEQ), which puts out high pollution advisories. Enforcement by the county is often lax.

“My life just changed right there,” Sainz said, her eyes filling with tears. “How do you limit a kid from four hours to 15 minutes outside? My life depended on checking on apps before having my children go outside. The house becomes your safe zone from the outside. But at the same time, you see all these other children outside and it’s like how do you communicate to them that this could happen to them as well?”

Why pollution is worse in the winter

This time of year, early morning commuters may notice the sunrise muddied by a brown haze on the horizon. That’s pollution, primarily particulate matter.

For most of the year, the sun heats the ground enough to warm the air just above it. That warm air gradually rises throughout the day, allowing pollution to disperse in a larger area.

Because the sun is weaker in the winter, cold air sits lower to the colder ground. Warmer air above it rises, but the cold air stays near the ground and doesn't mix with the rest of the atmosphere. The result is a line of brown haze trapped below the warm layer.



These airborne particles are small enough to enter the body's airways, causing asthma flare-ups.

Local winds are a factor too, shifting pollution to different parts of the Valley throughout the day and night, said ADEQ meteorologist Matthew Pace.

In the afternoon, the wind generally moves up the mountains surrounding Phoenix, pulling the air from the west and southwest toward the east and northeast. At night, cold air drains back to the south and southwest, eventually settling in the lowest point of the valley — near the Salt River in south and west Phoenix.

“Any of those pollutants that you create, whether it’s PM 2.5, which is smoke, or PM 10, which is dust, that will all drain slowly down into the south part of the valley,” Pace said.

Only rain or wind can disperse the cold air layer near the ground and allow the pollution to diffuse. Christmas Eve and Christmas Day were some of the cleanest days on record because of the rain and storm system that kept smoke from building up.

South and west Phoenix are denser areas and tend to have more older homes with wood-burning fireplaces, another reason for higher particulate matter

counts in those areas, said Ron Pope, an atmospheric scientist with Maricopa County. It's also a more industrial area than other parts of the city.

It's difficult to quantify how much smoke from local burning in northern Phoenix is transferred to the south and west. Pope tracked pollution throughout a 24-hour period on a high pollution day in 2018 and found that the wind patterns had filtered most of the pollution from east and central Phoenix by midnight, but pollution remained high in west Phoenix.

“That’s probably the transport issue,” Pope said. “You tend to have this airflow, especially after midnight, where the air will start to settle in the southwest. So you've got a lot of local burning in south and west Phoenix with fireplaces and bonfires and so forth, which makes pretty high concentrations that we see early in the evening. Then later on in the evenings, those concentrations will start to increase and that's because they're being compounded with transported smoke. A lot of the fires are out, but you have the firework smoke, the lingering smoke from the fireplaces, and it all starts to settle, especially in the southwest.”

ADEQ issued a high pollution advisory for New Years Eve this year. On New Years Day 2018, PM 2.5 levels exceeded national standards, and were the highest they'd been since the county started tracking particulate matter. On Christmas Day in 2017 and 2018, PM 2.5 levels also exceeded national standards.

“Everyone's gotta do their part at this point to protect the entire population,” said Pace. “Even if you're not sensitive to it, that smoke in your neighborhood is draining into someone else's neighborhood.”

MORE: No burning allowed on New Year's Eve or New Year's Day in Maricopa County

High-poverty areas

Air pollution exposure is closely linked to race and socioeconomic status. The north and northeast parts of metro Phoenix tend to be wealthier and whiter, with better air quality. The southern and western part of Phoenix tends to be poorer, predominantly minorities and has worse air quality, according to soon-to-be-published research by Darshan Karwat, an aerospace engineer and assistant professor in the School for the Future of Innovation in Society and the Polytechnic School at Arizona State University.

Karwat layered demographics, air quality and transportation data on top of one another to understand the overlap between air pollution, socioeconomic status, race and age across the city. He gave each census tract an air pollution “score” by combining distribution levels for certain pollutants governed by the U.S. Environmental Protection Agency's National Ambient Air Quality Standards: ozone, PM 10 and PM 2.5. Then he created color-coded maps to show the distribution.



The research was fueled by a desire to identify the places that face both poverty and poor air quality and then make contact with those people. He presented his findings at several community meetings in south and west Phoenix.

“Like in most cities, poor people, browner people are exposed to more air pollution in Phoenix,” Karwat said. “A lot of the air quality work has remained in the academic sphere and what we want to do is provide more access to this kind of knowledge to people who are affected by it.”

Asthma rates are some of the highest in the county in south and west Phoenix zip codes, according to 2017 data from the Maricopa County Department of Public Health.

Topography isn't the only reason why air in south and west Phoenix is particularly bad during the winter. History sheds a light on why these areas are more polluted, poorer and primarily home to minorities.

In the late 1860s, white settlers established what would become modern Phoenix as an agricultural center by the Salt River. They used the remnants of the centuries-old canal system built by the Hohokam people to bring water to the arid region. At that time, Mexicans were largely excluded from jobs other than working as field hands. When the railroad was built in southern Phoenix, factories sprouted near the tracks and people of color lived nearby for work, as they were barred from other economic opportunity because of racist policies.

Depression-era districting and zoning laws kept land values low in south Phoenix, allowing more industry to move in. After World War II, people of color were denied federal loan programs for low-interest mortgages. Thus, white people were able to move north, away from the factories, creating a growing suburban middle class in the northeast of the city, according to a paper published by Arizona State University researchers in 2005.

BETTER BUSES: These student runners train in 'nasty air.' They're working to clean it up

In the 1960s, the freeway system was built parallel to the railroad corridor, followed by the construction and later expansion of Sky Harbor airport in the 1970s and 1980s. The environmental justice movement, which began in the 1980s, brought many of these issues to light as local activists protested for their rights.

Today, the legacy of that history remains. Beatriz Beltran lives in south Phoenix, near the 17 freeway. Her daughter developed asthma when they moved from east Phoenix to south Phoenix.

“Sometimes we smell gas, paint, oil,” Beltran said. “I hear a lot about allergies and asthma attacks. This is an issue that a lot of the Latino community has.”

Sainz’s old house was under the flight path from Sky Harbor airport. Her family eventually moved out of that area, but her daughter still wheezes when the air is bad.

“Not everyone has the privilege to move — what happens to the people who stay there?” Sainz said. “Something happened that now I don't let my children go outside. As a mom, it’s hard. I try to put them in activities, and all the activities are so expensive. So, who are the ones that get to do that? We go through so many things the wealthy don’t even know.”



Sainz has always been active in her community, but after her daughter started wheezing, she joined Moms Clean Air Force and Ecomadres. As part of those organizations, she hosts “cafecitos,” information sessions at schools and daycares about the climate crisis, air quality and other environmental issues. She helps plant trees in south Phoenix neighborhoods and advocates for clean climate policies at a local, state, and federal level.

“We have so many other issues we have to fight every day with racism, with immigration,” Sainz said. “I see my community struggle. It comes to an environmental injustice. It's a fight that we're fighting right now.”

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