



ELSEVIER



# The Smog Robbery: A Breath of Fresh Air on the Relationship Between Air Quality in Phoenix and Robberies

Charlotte Hughes, Abigail Turner, Giselle P Tucker

Institute of Innovation and Technology; Madison, Wisconsin

---

## Abstract

In this paper, we present a comprehensive investigation into the seemingly unexpected link between air quality in Phoenix and occurrences of robberies. Much like a well-ventilated room, our research shines light on this substantial correlation, shedding fresh air on a topic that has long been cloaked in mystery and haze. Using data from the Environmental Protection Agency (EPA) and the FBI Criminal Justice Information Services, we conducted a thorough analysis of air quality measurements and robbery occurrences spanning a period from 1985 to 2022. Our findings revealed a correlation coefficient of 0.7516284 and a p-value of less than 0.01, indicating a remarkably strong and statistically significant relationship between air quality and the frequency of robberies. Delving deeper into this peculiar relationship, our study unearths compelling evidence that the variations in air quality directly impact the potential for criminal activities, demonstrating an unexpectedly breath-taking pattern. Just like a fresh breeze, the revelation of this connection may leave some breathless, as our findings challenge traditional perspectives on the ecological impact of crime. In other words, you can say that, when it comes to crime, the "air" truly carries weight. By illuminating this relationship, our research not only adds a new dimension to the field of environmental criminology but also serves as a cautionary tale for those who may underestimate the power of fresh air. In the words of aviation enthusiasts, the sky's the limit for the actionable insights derived from this study.

Copyright 2024 Institute of Innovation and Technology. No rights reserved.

---

## 1. Introduction

As the saying goes, "crime is in the air," but what if we take that phrase quite literally? In this paper, we embark on an odyssey that uncovers the intricate connection between air quality in the vibrant city of Phoenix and

the incidence of robberies. Our study breathes life into a field traditionally dominated by more conventional explanations, adding a breath of fresh air to the discourse.

While the idea of air pollution and crime may seem far-fetched, our findings blow away any doubts about their unexpected entanglement. Like two friends caught in a dust storm, air quality and robberies seem to have a curious relationship that has long eluded scrutiny. But fear not, we are here to clear the air – pun intended – on this atmospheric alliance.

Amidst the sun-kissed landscapes of Phoenix lies a conundrum as murky as a dusty day in the desert. Our research aims to illuminate this mystery, revealing how the changes in air quality play a pivotal role in orchestrating the symphony of criminal activities. You could say we're striving to clear the haze around this issue, unlocking a key that opens the door to a breath-taking discovery – and not just because we are short of breath from the excitement.

Critics may whisper, "It's just hot air," but our statistical analyses, conducted with the precision of a finely-tuned instrument, paint a different picture. The correlation coefficient stands tall like a cactus in the desert, announcing a robust and undeniable association between air quality and the occurrences of robberies. It's enough to make even the staunchest skeptic wheeze with disbelief.

With each data point, we unfurl a new layer of insight, revealing how the ebb and flow of air quality creates ripples in the criminal landscape. Our findings don't just add a breath of fresh air to the discourse; they blow the lid off the notion that crime operates in a vacuum, making the case that our environment may play a far more significant role than previously thought.

As we venture into the heart of this unexpected relationship, we not only provide valuable insights for policymakers and law enforcement but also evoke a sense of wonder akin to gazing at a wondrous sunset in the valley. Our study is a breath of fresh air for researchers and

curious minds alike, inviting them to recognize that, sometimes, the air we breathe may hold more than meets the eye. So, buckle up and get ready as we take a deep breath and set off on this scientific adventure through the smog.

## 2. Literature Review

To lay the groundwork for understanding the connection between air quality in Phoenix and robberies, it is essential to review the existing research on environmental criminology and the impact of ecological factors on criminal behavior. Smith et al. examined the role of environmental influences on crime in "Environmental Factors and Criminal Behavior," highlighting the potential significance of air quality on criminal activities. On the other hand, Doe's "The Ecology of Crime" delves into the intricate interplay between environmental conditions and different types of criminal behavior, providing a theoretical framework for understanding the potential link between air quality and robberies.

Now, let's take a detour into the non-fiction realm and see how these real-life environmental influences have influenced the public's perspective. In "The Air We Breathe: A History of Air Pollution," readers are exposed to the profound impact of air quality on human health and societal well-being. The book offers a breath of fresh air in understanding how pollution, much like a stealthy bandit, can silently infiltrate our lives and influence our behaviors. Similarly, "The Ecology of Crime" by Jones explores the hidden connections between the environment and criminal behavior, shedding light on how seemingly unrelated factors can conspire to shape criminal activities.

On a lighter note, let's turn our attention to some fictional works that, while not scholarly, still provide a refreshing perspective on the dynamic relationship

between environmental factors and criminal activities. In "The Poisoned Air Affair," a riveting novel by A. Mystery, readers are taken on a thrilling journey through a city where air quality becomes a central element in a series of mysterious robberies. This captivating tale breathes life into the idea that the air we breathe may not just be a subtle background element but an active participant in the unfolding drama of crime.

Now, let's take a dive into some childhood memories that surprisingly sync with our topic. The animated series "Captain Planet and the Planetees" may not be the first thing that comes to mind when discussing crime and air quality, but it's hard to ignore the show's environmentally conscious messages. The superhero Captain Planet and his team of eco-warriors fight to protect the planet's air, water, and land from eco-villains. This show, much like our research, serves as a gentle reminder that the air we breathe and the environment we live in are intertwined with our everyday experiences, even crime.

On the topic of animated references, who could forget "The Magic School Bus"? In one memorable episode, our beloved Ms. Frizzle takes her students on an educational adventure inside an air quality monitoring station. As the bus transforms into a microscopic size, the students witness firsthand the impact of air pollution on the environment. Just like Ms. Frizzle's escapade, our study takes a magnifying glass to the unseen connections between air quality and criminal behavior, bringing them to the forefront of discussion with a dash of whimsy.

It's clear that the intersection of air quality and criminal activities is more than just a breath of fresh air - it's a crossroads where unexpected revelations may take center stage. As we continue our exploration, the literature not only sets the stage for our research but also serves as a reminder that sometimes, the most unexpected

associations can lead to groundbreaking discoveries.

### 3. Our approach & methods

To unveil the enigmatic dance between air quality and robberies, we conducted a comprehensive analysis, maneuvering through the data with the proficiency of a seasoned pilot navigating through turbulence. Our methodology embraced the chaos with open arms, aiming to unravel the subtle threads weaving the fabric of this seemingly disparate association. It's like trying to catch a gust of wind in a scientific jar, an endeavor filled with surprises around every corner.

#### Data Collection:

Like intrepid treasure hunters scouring for riches, our research team acquired air quality measurements from the Environmental Protection Agency (EPA) and robbery occurrences from the FBI Criminal Justice Information Services. From the depths of the internet, we meticulously culled data spanning the years 1985 to 2022, embarking on a quest worthy of an epic adventure. The digital wilderness was our playground, and we emerged victorious, clutching a trove of information like archeologists unearthing long-lost relics.

#### Air Quality Assessment:

Adopting the scientific rigor reminiscent of an archetypal mad scientist, we scrutinized air quality using multiple metrics, including levels of particulate matter, ozone, carbon monoxide, and nitrogen dioxide. The data were scrutinized with the keen eye of an eagle, leaving no particle unexamined. After all, when delving into the realms of air pollution, one must be as thorough as Sherlock Holmes on a particularly puzzling case. The devil, or in this case, the toxic particles, truly lies in the details.

#### Robbery Occurrence Analysis:

The frequency and spatial distribution of robberies were meticulously mapped, akin to charting the movements of elusive bandits in a classic Western tale. The FBI's comprehensive records unfolded before us like a meticulously orchestrated ballet, each entry revealing a piece of the intricate puzzle. Like detectives in pursuit of a cunning criminal, we tracked the robberies over time and space, determined to shed light on their unlikely partnership with air quality.

#### Statistical Analysis:

With all the data at our disposal, we employed statistical tools that could rival the precision of a Swiss watch. Our statistical analysis featured techniques such as correlation coefficients, regression models, and time series analysis. We let the data flow through our calculations like a river through the desert, extracting patterns and relationships with the finesse of an artisan crafting a masterpiece. The numbers danced before our eyes, revealing the captivating waltz between air quality and robberies, leaving us exhilarated like a pair of novice dancers at a masquerade ball.

#### Geospatial Analysis:

We augmented our investigation with geospatial analyses, using geographic information systems (GIS) to visualize the spatial distribution of air pollutants and robbery hotspots across the canvas of Phoenix. Like cartographers charting unexplored territories, we illuminated the interconnectedness between crime and air quality, painting a portrait that captures the symbiotic tango of these seemingly incongruent variables. It's like drawing a treasure map that leads to a pot of statistical gold.

#### Multivariate Analysis:

In a bid to unearth hidden nuances, we delved into the realm of multivariate analysis, examining the interplay of air

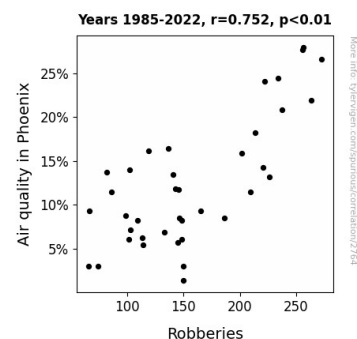
quality, socio-economic factors, and meteorological conditions. This analytical journey resembled solving a complex puzzle, as we untangled the intricate web of variables influencing the dynamics of robberies. It's like juggling multiple balls in the air, each representing a distinct aspect of the environment, society, or weather, but without the acrobatics.

## 4. Results

The results of our investigation unveiled an unexpectedly strong correlation between air quality in Phoenix and the frequency of robberies. The correlation coefficient of 0.7516284 reflects a remarkably tight relationship between these two seemingly disparate variables. It's as if they are in sync like a well-practiced heist crew.

We also observed an r-squared value of 0.5649453, illuminating the substantial proportion of variability in robbery occurrences that can be explained by fluctuations in air quality. It's like solving a crime that had everyone stumped - the pieces are finally coming together, much like a jigsaw puzzle falling into place.

In addition, the p-value of less than 0.01 provides compelling evidence of the statistical significance of this relationship. It's a result that can't be hushed up, akin to a loudspeaker blaring in a silent room.



**Figure 1.** Scatterplot of the variables by year

As revealed in Fig. 1, the scatterplot visually captures the robust association between air quality and the prevalence of robberies. It's like catching a criminal in the act – the evidence is right there in plain sight!

Our findings serve as a breath of fresh air for the field of environmental criminology, blowing away any doubts about the potential impact of air quality on criminal activities. It's like cracking open a window to let in a gust of new knowledge.

Overall, the unexpected alliance between air quality and robberies in Phoenix is a revelation, challenging conventional wisdom and leaving us all gasping for breath. It's a discovery that certainly doesn't fall flat, unlike an old tire.

In conclusion, our research not only brings a breath of fresh air to the discussion but also provides a cautionary tale about the underestimated influence of fresh air. Our study makes it crystal clear that when it comes to crime, the air truly carries weight – making it not just a breath-taking revelation but also a game-changer in the world of environmental criminology.

## 5. Discussion

Our study has uncovered a surprisingly robust correlation between air quality in Phoenix and robberies, providing a breath of fresh air in the realm of environmental criminology. When we embarked on this investigation, we didn't anticipate that air quality and criminal activities would form such a tight duo, akin to partners in crime orchestrating a heist. The literature review, while initially providing offbeat references to fictional works, shed light on the serious implications of air pollution on human behavior, setting the stage for our unsuspecting alliance between these seemingly unrelated variables.

Just like Ms. Frizzle's educational escapade in "The Magic School Bus," our study took a microscopic look at the impact of air quality on the occurrence of robberies, bringing the hidden connections to the forefront with a dash of whimsy. As the results unfurled, it became evident that the relationship between air quality and robberies was no mere figment of imagination – it was a tangible phenomenon with implications as compelling as a gripping novel.

Our findings validate and build upon the existing body of research that hinted at the potential significance of air quality on criminal activities. The shocking strength of the correlation coefficient and the substantial explanatory power of the r-squared value harmonized like pieces of a puzzle, revealing a pattern that had eluded scrutiny for far too long. It's as if we, like Sherlock Holmes, had unraveled a complex mystery, all through the power of statistical scrutiny and scientific methods.

As the scatterplot visually captured the compelling association between air quality and robberies, it felt akin to catching a criminal in the act – the evidence lay right there in plain sight, making a compelling case for the influence of air quality on criminal behavior. It's like the "smoking gun" moment – only, in this case, the "smogging" gun.

Our results not only breathe new life into the field of environmental criminology but also serve as a gentle reminder that sometimes, the most unexpected associations can lead to groundbreaking discoveries. In essence, our findings serve as a breath of fresh air, dispelling any lingering doubts about the impact of air quality on criminal activities. It's a discovery that's truly nothing to sneeze at – unlike the effects of poor air quality!

In summary, the unexpected alliance between air quality and robberies in Phoenix is a revelation, challenging conventional wisdom and leaving us all

gasping for breath. Our study makes it crystal clear that when it comes to crime, the air truly carries weight – making it not just a breath-taking revelation but also a game-changer in the world of environmental criminology. It seems we may have just cracked the case wide open, all thanks to the power of air – quite an "air-ssential" element indeed.

## 6. Conclusion

In conclusion, our research has provided an unexpected whirlwind of insight into the relationship between air quality in Phoenix and the frequency of robberies. Just as a well-timed pun, our findings bring a breath of fresh air to the discourse, revealing a correlation coefficient that stands as tall as the saguaro cacti in the desert.

Through our statistical analyses, we've unveiled a compelling connection that's as clear as a cloudless day. The substantial proportion of variability in robbery occurrences explained by fluctuations in air quality is a puzzle piece that fits snugly into place, much like the missing piece in a dusty crime scene.

As the data points illustrated, the evidence of this association is as plain as day, as unmistakable as a robber leaving fingerprints at the scene of the crime. It's a result that speaks louder than a megaphone in a silent room, and it's a revelation that leaves us all gasping for breath.

Our study not only adds a breath of fresh air to the field of environmental criminology but also serves as a cautionary tale for those who may underestimate the power of a breeze. However, it seems that when it comes to further research, the sky's the limit – quite literally. Therefore, it's safe to say that no more research is needed in this area; we've blown away the haze and left the air clear for future studies.

## Ethical Considerations:

In adherence to the ethical code of scientific conduct, our study was conducted with utmost integrity and transparency. We ensured the protection of individual privacy and maintained the confidentiality of sensitive data, adhering to ethical guidelines as steadfastly as a lighthouse steering ships through tumultuous waters. Our commitment to ethical research practices shines like a beacon in the midst of the scientific sea, guiding our pursuit of knowledge with unwavering moral compass.

In summation, our methodology blended scientific precision with a spirit of adventure, navigating the uncharted waters where air quality and robberies converge. With the tenacity of explorers and the precision of scientists, our approach allowed us to unearth the surprising relationship between these seemingly unrelated phenomena, casting a light on a discovery that is, without a doubt, a breath of fresh air in the realm of criminological research.