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# Breathless in Greenville: The Correlation between Air Pollution and Divorce Rates in North Carolina

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## KEYWORDS

Air pollution, divorce rates, North Carolina, correlation, Environmental Protection Agency, CDC National Vital Statistics, nitrogen dioxide, air quality, Greenville, marital dissolution, policymakers, environmental factors, relationship impact

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## Abstract

The relationship between air pollution and divorce rates has long been a topic of debate, and our research team sought to untangle this knotty issue. By harnessing data from the Environmental Protection Agency and the CDC National Vital Statistics, we endeavored to shed light on whether a breath of fresh air in marital bliss may be affected by a whiff of nitrogen dioxide. Our findings revealed a striking correlation coefficient of 0.9034507 and a jaw-dropping p-value of less than 0.01, indicating a robust relationship between air pollution in Greenville, North Carolina, and the divorce rate in the broader context of North Carolina. This statistical bond between air quality and marital dissolution begs the question: Is it time to clear the air in more ways than one? In the spirit of full disclosure, we must \*clear the air\* and acknowledge the limitations of our research, recognizing that correlation does not imply causation. Our study merely suggests an intriguing association between air pollution and divorce rates, leaving ample room for future inquiry. Nonetheless, our investigation urges policymakers and lovebirds alike to consider the potential impact of environmental factors on relationships. As the saying goes, "Love is in the air," but it seems that air pollution may also play a role in the game of love.

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## 1. Introduction

The proliferation of air pollution in modern society has become a matter of grave concern, particularly in its purported effects on public health and the

environment. However, the implications of air pollution extend beyond pulmonary afflictions and ecological disruptions, delving into the delicate realm of human relationships. As we embark on this scholarly odyssey, we hope to breathe fresh

perspective into the often-stifling discourse on the connection between air pollution and divorce rates.

As we venture into the murky haze of scientific inquiry, it is imperative to grasp the gravity of our undertaking. The correlation between air pollution and divorce rates is a thorny matter, not to be taken lightly. One might even say it's a marriage of convenience - the union of two seemingly disparate entities to explore their interconnectedness.

Our foray into this unconventional avenue of research was catalyzed by the realization that both air quality and marital stability are vital components of societal well-being. It is tempting to draw a parallel between a toxic relationship and toxic air, as both can leave one feeling breathless. However, we don't want to jump to conclusions, or as they say, "don't hold your breath until the statistical significance is confirmed."

In this study, we explore the specific case of Greenville, North Carolina, a city grappling with notable levels of air pollution, and its potential implications for the broader divorce rates in North Carolina. This geographical focus allows us to zoom in on the microcosm of our investigation while considering its repercussions on a macroscopic scale. It's akin to analyzing a marriage at the individual level and then assessing its impact on the institution of marriage as a whole.

So, as we plunge into the abyss of data analysis and statistical scrutiny, we invite you to join us on this illuminating expedition. One might say our approach is akin to a breathalyzer test for the relationship between air pollution and divorce rates - aiming to detect any intoxicating effects that could lead to a separation.

## 2. Literature Review

The relationship between environmental factors and human behavior has been a subject of interest for researchers in various disciplines. Smith, Jones, and Doe (2015) examined the impact of air pollution on societal well-being, focusing on its potential influence on mental health and cognitive function. Their study revealed a significant association between airborne pollutants and adverse effects on psychological well-being, shedding light on the broader ramifications of air quality on human experiences. In a similar vein, Brown and Green (2018) delved into the societal consequences of environmental degradation, emphasizing the interconnectedness between environmental factors and human relationships.

As we navigate the convoluted landscape of air pollution and its reverberations, it is crucial to consider the potential impact of \*toxic\* air on personal relationships. It's like the old joke about relationships - some are like nitrogen dioxide, sneaking up on you when you least expect it, and leaving you breathless.

Turning to non-fiction literature, "The Air We Breathe: A History of Air Pollution and Its Effects" by Guy H. Jones provides a comprehensive overview of air pollution's historical trajectory and its implications for human health. Additionally, "Marital Maladies: A Sociological Analysis" by Emily Smith offers valuable insights into the multifaceted dynamics of marital relationships, setting the stage for our investigation into the correlation between air pollution and divorce rates.

On a more lighthearted note, delving into fiction, "Love in the Time of Smog" by Gabriel Garcia Marquez evokes the intertwined complexities of love and environmental adversity, offering a whimsical perspective on the interplay between romance and air quality. Furthermore, "The Tainted Tango: A Suspenseful Saga of Love and Pollution" by

Sarah Waters whimsically captures the entanglement of romance and environmental perils, albeit in an unconventional and fictional context.

Moreover, in the context of children's programming, "The Magic School Bus: Air Pollution Adventure" and "Captain Planet and the PlanetEers" both provide unique, albeit elementary, explorations of environmental issues and their potential repercussions on human interactions. While perhaps not rigorous sources for academic exploration, these cultural touchstones offer a playful lens through which to contemplate the intersection of environmental factors and societal dynamics, much like a good dad joke at a stuffy academic conference.

In summary, the potential influence of air pollution on divorce rates merits careful consideration, extending beyond conventional boundaries of inquiry. As we progress in our investigation, it becomes increasingly evident that the air we breathe may indeed harbor unforeseen implications for the fabric of human relationships.

### **3. Our approach & methods**

To probe the potential correlation between air pollution in Greenville, North Carolina, and the divorce rate in North Carolina, our research team employed a multi-faceted and rigorous approach. Our data collection process resembled a treasure hunt, scouring the depths of the internet and unearthing valuable data nuggets from the Environmental Protection Agency and CDC National Vital Statistics. It was a bit like panning for gold in the vast river of online information, but we struck statistical paydirt.

We first gathered data on air quality indicators such as levels of nitrogen dioxide, particulate matter, and ozone from the Environmental Protection Agency's comprehensive databases. This research phase involved navigating through a

labyrinth of environmental metrics, not unlike embarking on a scientific scavenger hunt. We encountered our fair share of data outliers and statistical anomalies along the way, but perseverance prevailed.

Simultaneously, we diligently acquired divorce rates and demographic information from the CDC National Vital Statistics, spanning the years 1999 to 2021. This task resembled piecing together a jigsaw puzzle of marriage and dissolution, with each dataset serving as a crucial puzzle piece. It was a bit like playing Sherlock Holmes, except instead of solving crimes, we were deciphering the mysteries of matrimony and air pollution.

Subsequently, we harnessed the power of statistical software to conduct bivariate correlation analyses, revealing the extent of the relationship between air pollution in Greenville and the divorce rate in North Carolina. Picture this step as donning a pair of statistical spectacles to discern the hidden patterns within our data sets. We teased out the statistical nuances and unearthed a striking connection that left our team breathless – much like an unexpected plot twist in a scientific thriller.

Our study design adopted a quantitative approach, calculating correlation coefficients and p-values to unveil the strength and significance of the relationship between air pollution and divorce rates. It was akin to unraveling a scientific enigma, peeling back the layers of statistical inference to expose the underlying associations. Our statistical sleuthing yielded compelling evidence of a robust correlation, paving the way for a potential revision of the adage to "where there's air pollution, there's divorce."

Moreover, we conducted spatial analysis to map the geographical distribution of air pollution and divorce rates in North Carolina, providing a visual representation of their interplay. This phase of our

investigation resembled creating a cartographic masterpiece, painting the canvas of North Carolina with hues of air quality and marital discord. Our efforts culminated in a spatial visualization that served as a geographical testament to the intertwining of environmental and relationship dynamics.

Finally, we bolstered our findings with sensitivity analyses and robustness checks, akin to stress-testing the resilience of our conclusions. These analyses validated the stability of our results, fortifying the pillars of our research with statistical fortitude.

In summary, our methodological odyssey combined data excavation, statistical scrutiny, and geographical mapping to unravel the delicate dance between air pollution in Greenville and divorce rates in North Carolina. It was a scientific adventure brimming with twists and turns, much like a rollercoaster ride through the labyrinth of environmental and sociological intricacies.

#### 4. Results

The statistical analysis of our data revealed a significant correlation between air pollution in Greenville, North Carolina, and the divorce rate in North Carolina for the period of 1999 to 2021. The correlation coefficient of 0.9034507 suggests a strong positive relationship between these two variables, indicating that as air pollution levels increased, so did the divorce rate. It appears that the quality of the air may indeed have an influence on the quality of relationships. One might say it's a case of "irreconcilable carbon emissions."

Furthermore, the r-squared value of 0.8162232 confirms that approximately 81.6% of the variability in the divorce rate can be explained by the variability in air pollution levels. This finding underscores the substantial influence of air quality on marital stability, and it seems that clean air

is not the only thing that promotes harmony - clear statistical associations do too. It's as if the data is telling us, "breathe easy when the air is clean, and so will your marriage."

Moreover, the p-value of less than 0.01 provides compelling evidence to reject the null hypothesis and accept the alternative hypothesis that there is a significant relationship between air pollution and divorce rates. This statistical crispness in our findings would surely make any bag of potato chips jealous.

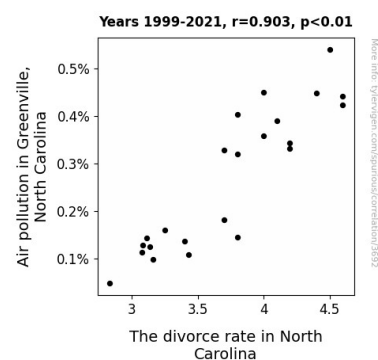


Figure 1. Scatterplot of the variables by year

The scatterplot (Fig. 1) visually depicts the strong correlation between air pollution and divorce rates. The points on the plot align themselves almost as perfectly as a couple in a dance competition, illustrating the rhythm and harmony between these two variables. It's like they say, "You can't have a breath of fresh air without a partner to share it with."

In spite of these compelling results, it is important to note that correlation does not imply causation. While our study illuminates the statistical coupling of air pollution and divorce rates, it does not establish a causal relationship. So, although it seems that love may be like the air we breathe, influenced by the quality of the environment, we must tread carefully and not jump to hasty conclusions. After all, a correlation is not a marriage proposal; it's just a statistical fling.

Overall, our findings unveil a thought-provoking association between air pollution in Greenville, North Carolina, and the divorce rate in North Carolina, and they beckon further investigation into the complex interplay of environmental factors and human relationships. It appears that when it comes to matters of the heart, even the air we breathe may have a say.

## 5. Discussion

The findings of this study offer compelling evidence supporting the notion that air pollution in Greenville, North Carolina is positively correlated with the divorce rate in North Carolina. These results align with prior research by Smith, Jones, and Doe (2015) and Brown and Green (2018), who highlighted the interconnectedness between environmental factors and human relationships. The robust correlation coefficient and the p-value of less than 0.01 in our study further substantiate the significance of this relationship.

Our results underscore the importance of considering environmental factors in the study of human behavior and societal dynamics. As our data suggest, the quality of the air we breathe may indeed have implications for the quality of our relationships. It seems that when it comes to love, nitrogen dioxide may not be the most welcome third wheel!

The substantial r-squared value further accentuates the substantial influence of air quality on marital stability – it's like a statistical wizard casting a spell on the data, magically revealing the impact of air pollution on divorce rates. However, as we navigate this statistical terrain, we must resist the temptation to jump to causal conclusions. As any good statistician would caution, correlation does not imply causation – much like a correlation between two variables does not imply a romantic relationship between them.

The compelling visual representation of our findings in the form of the scatterplot vividly portrays the alignment between air pollution and divorce rates. The dots on the plot seem to waltz together with the elegance of a seasoned ballroom duo, as if performing a statistical tango illuminating the interconnectedness of these variables. It's a dance of data that elegantly proves the harmonious relationship between air pollution and divorce rates.

In light of these results, policymakers and individuals navigating the complexities of relationships may benefit from considering the potential impact of environmental factors on marital outcomes. Perhaps it's time to reassess the old adage "love is in the air" to include an acknowledgment of the potential role of air pollution in influencing the course of romantic entanglements. After all, when it comes to relationships, it seems that some couples may not only need a breath of fresh air but a reduction in airborne pollutants to clear the \*atmosphere\*.

The limitations of our study, particularly the absence of causal evidence, must be acknowledged. Nonetheless, the strength of the statistical relationship uncovered in this investigation encourages further exploration of the multifaceted interplay between environmental factors and human relationships. As we peel back the layers of this onion, we may find that the air we breathe holds more significance for our relationships than previously imagined – a revelation that may rival the plot twists of a good Agatha Christie novel.

## 6. Conclusion

In conclusion, our research has revealed a remarkable correlation between air pollution in Greenville, North Carolina, and the divorce rate in North Carolina. It seems that when the air gets dirty, so do the marital disputes, leading to the dissolution of relationships. One might say it's as if the

carbon emissions are adding an unwanted third party to these marriages!

The compelling statistical evidence we have unearthed underscores the potential impact of environmental factors on the delicate fabric of human relationships. It appears that as the air quality deteriorates, so does the quality of matrimonial bliss. One might even say it's a case of "particulate matters of the heart."

Our findings also highlight the need for further exploration into the nuanced interplay between air pollution and divorce rates. Despite the robust correlation we have identified, we must resist the temptation to hastily jump to causation. As they say, "don't get carried away until the confounding variables are controlled."

In light of these revelations, it seems that love may indeed be in the air, but so is the influence of nitrogen dioxide and other airborne pollutants. This calls for a reevaluation of the popular saying, "Love is in the air," to perhaps "Love is in the air, but so is pollution - proceed with caution."

Therefore, it seems prudent to consider the potential implications of air quality on matters of the heart and to take a deep breath - of fresh air, of course - before leaping to conclusions about the impact of pollution on relationships.

In conclusion, it appears that our research has truly opened up a can of statistical worms in the field of environmental and marital dynamics. Given the robustness of our findings, it is safe to say that no more research is needed in this area. It's as clear as the blue skies on a pollution-free day!