

PM2.5, Health & Correlation

Did you know that there from 1999 to 2009 there is almost complete correlation between US spending on science, space and technology and suicides by hanging, strangulation and suffocation? Correlation is a statistical measure that shows how strongly or not two variables relate to each other. It can be a very useful tool to indicate fruitful areas of research, and helps in crafting scientific theories, but is stretched too far, when some take that correlation to be causation, and say that one event is caused by another. In fact, they could be unrelated, as the example in the first sentence; they could both have the same cause, but not be causing each other; or one may be caused by a subset of the correlated event. In the case of PM2.5, there have been some correlative studies that show bad health effects in certain communities, but the direct link to allow anyone to say that PM2.5 is a major cause of those effects is stretching the bounds of those studies.

Let me give you some real-world examples of health and correlation. Malaria, a word taken from the Latin for “bad air”, names a disease that has killed, according to some, half the people who have ever lived, having been with us for the full extent of known human history. It was historically linked to air and water, and was found to be correlated to swampy areas. One of the largest medical discoveries ever made was in 1898 when Ronald Ross proved that malaria was spread by mosquitoes. So removing swampy areas removed mosquitoes, but as you can imagine, this is seldom a practical solution. The knowledge of the actual cause of the disease allowed the development of effective solutions like DDT that killed mosquitoes and to date has saved many millions of lives.

Another example of correlation is exemplified in the gluten-free diets that many in the U.S. are now on. A large and increasing amount of people over the last few decades have found that abstaining from gluten products has substantially stopped a multitude of symptoms they were experiencing. Between these anecdotal stories, and studies that have been done because of them, it has been shown that there is a strong correlation between gluten and their symptoms. Of course the question always arises: how can something that humanity has been consuming since time immemorial suddenly be the cause of these problems? Well, recently it was brought to light that the majority of wheat farms in the U.S. are using herbicide to kill the wheat before they harvest it, since it makes the wheat easier to harvest, and also produces more seed. So the idea that is currently spreading is that it is the herbicide which can never be completely cleaned out of the wheat that is causing the medical problems and not the gluten itself. Note, I’m not saying that there are not those with inherited or acquired gluten allergies. This discovery allows a more targeted solution of using truly organic wheat instead of non-gluten alternatives, and has been found to work for some, thereby allowing them more flexibility in their diets.

Scientists recognize the problems with correlation and do their best to implement controls in their study to factor out other causes, but perfection can’t be achieved in the real world. There could be quite a few other possibilities when trying to determine the link between PM2.5 and health. You could have another component not considered in the PM2.5 output be the causative factor, or it could just be one

sub-component like the Sulfates, Nitrates or Carbon. Let's also remember that symptoms it is blamed for like asthma attacks, can also be caused by cold air, mold, dust mites, sickness, indoor air pollution, tobacco smoke, pet dander, as well as food additives and fragrances.

Modern citizenry has been subjected to many agendas designed to implement control measures based upon perceived or real correlation. This has led to many be skeptical of any statistics or emotional appeal based upon correlative studies. I see this is a healthy outlook, as we should always be striving to determine exact causes, so that we can implement precise solutions. While it's one thing to identify the problem, it is quite another to identify a workable, and cost-effective solution.