

## Extra sunlight in late summer, early fall could help stave off flu, study finds

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People getting more rays of sunlight—and therefore vitamin D—in August and September could help reduce the severity of flu season, according to a National Bureau of Economic Research working paper co-authored by a University of Kansas economist.

The researchers' key finding is that a 10 percent increase in relative sunlight diminishes the September reading on the 10-point flu scale index by three points. The U.S. Centers for Disease Control & Prevention maintains the index.

That reduction would likely make a flu season significantly less severe overall, the researchers observe, because they found evidence that states experiencing sunnier months in August and September between 2008 and 2011 had fewer cases of influenza in those years.

"Relatively higher levels of sunlight given what you normally see in a state resulted in relatively lower levels of flu for that season in that state," said David Slusky, assistant professor of economics and the paper's co-author.

Slusky's co-author is Richard Zeckhauser, the Frank P. Ramsey Professor of Political Economy at the Kennedy School of Government at Harvard University.

The current U.S. [flu season](#) has been the worst in several years, according to the CDC, as factors such as the relatively low effectiveness

of the [flu vaccine](#) have complicated prevention efforts. Beyond the risk of death—especially among children and the elderly—influenza causes significant discomfort to those it strikes, and it drastically saps economic productivity as adults and children are often required to miss several days of work and school, respectively.

Recent medical research has suggested that vitamin D supplementation protects against acute respiratory tract infections, which reinforces the researchers' findings about sunlight and the flu. Humans exposed to sunlight produce vitamin D directly, and supplements such as fish oil also serve as sources of vitamin D.

Vitamin D is fat-soluble and has a half-life between two weeks and two months. Unlike vitamin C, for example, which is water-soluble, vitamin D can stay in the body for longer periods of time. So the researchers were interested in calculating the sunlight an area received for the month of and the month before an influenza report.

The researchers examined the CDC's flu index, which aggregates data reports from individual state health departments and harmonizes the aggregate data onto the consistent 10-point scale. They combined this flu data with the North America Land Data Assimilation System's daily county-level sunlight data for 2003-2011.

Slusky said the paper points to a strong relationship between getting sunlight and the reduction in the number of [flu cases](#). Slusky and Zeckhauser—along with Nils Wernerfelt, now a data scientist at Facebook—conducted an earlier study that found a relationship between pregnant women getting sunlight during their second trimester and their child's reduced chances of developing asthma.

Discoveries of these types of potential health benefits raise a broader question about rethinking how medical professionals advise people to

spend their time in the sunlight without sunscreen to get optimal amounts of vitamin D, Slusky said.

"I was always taught as a child that sunlight had no benefit, that it was only bad. 'You can get a sunburn or skin cancer. Wear your hat and your sunscreen and stay inside all the time,'" Slusky said. "Now we know that not only vitamin D has health benefits, but also that there is seasonal-affective disorder and related depression, due to lack of sunlight. It's a much more complicated and nuanced relationship. Trying to weigh the cost and benefits appropriately is a broader conversation worth having."

Websites, for example, provide ways for people to calculate the minimum amount of [sunlight exposure](#)—on their head, neck, arm and hands, without sunscreen—necessary to produce an effective allotment of vitamin D. The amount can vary significantly depending on latitude, weather, time of year and skin tone. In the summer it can be as short as a few minutes, whereas in the winter it can be over an hour, Slusky said.

Based on their geographic analysis, researchers also found suggestive evidence that the protective sunlight effect is strongest in states that have a middle level of population density. The authors attribute this finding to the phenomenon underlying the concept of herd immunity. When the individuals around you get protected against the virus, you cannot contract flu from them, and thus, you get protection, the researchers said.

"If you ride the subway every day in New York City, it doesn't matter that fewer people have the flu because you still have a great chance of coming into contact with a person who does," Slusky said. "If you have too much concentration, herd immunity does not help. With too dispersed a population, by contrast, contagion is minimal."

So, in that case, herd immunity provides little protection, he said.

"There is a middle range of states that are near the optimal amount of concentration such that sunlight is more protective against the flu than in states that are either very, very concentrated or states that are little concentrated," Slusky said.

The middle states that appeared to most benefit from extra sunlight in August and September were Georgia, Indiana, Kansas, Kentucky, Missouri, New Hampshire, New Mexico, North Carolina, Tennessee, Arizona, Colorado, Michigan, Minnesota, Nebraska, Ohio, Texas, Utah and Wisconsin.

States that are more densely populated, such as California, Florida, New Jersey, New York and Pennsylvania, saw less benefit from added sunlight in those two months, and low-density states such as Maine, Vermont, Montana and Wyoming also saw less benefit overall.

The study has important implications for public health and the broader conversation of flu and disease prevention, especially in relation to vaccines and other behavioral habits, the researchers said.

"I wouldn't push for [sunlight](#) exposure and not get a flu shot," Slusky said. "I would do both."

**More information:** Sunlight and Protection Against Influenza.  
[www.nber.org/papers/w24340.pdf](http://www.nber.org/papers/w24340.pdf)

Provided by University of Kansas

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