Does Climate Control Valley Fever Incidence in California?

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Coccidioidomycosis (valley fever) is a systemic infection caused by inhalation of airborne spores from *Coccidioides immitis*, a soil-dwelling fungus found in the southwestern United States, parts of Mexico, and Central and South America. Dust storms help disperse *C. immitis* so risk factors for valley fever include conditions favorable for fungal growth (moist, warm soil) and for aeolian soil erosion (dry soil and strong winds). Understanding the role of climate as a valley fever control is timely and important since many Californian counties are currently experiencing the highest valley fever incidence rates since the epidemic of 1991–1995. We analyze and intercompare the seasonal and interannual behavior of valley fever incidence and climate risk factors for the period 1980–2002 in Kern County, California, the US county with highest reported incidence.

We find weak but statistically significant links between disease incidence and antecedent climate conditions. Precipitation anomalies eight and twenty months antecedent explain only up to 4% of monthly variability in subsequent valley fever incidence during the 23 year period tested. This is consistent with previous studies suggesting that *C. immitis* tolerates hot, dry periods better than competing soil organisms, and, as a result, thrives during wet periods following droughts. Furthermore, the relatively small correlation with climate suggests that the causes of valley fever could be largely anthropogenic in Kern County.

Seasonal climate predictors of valley fever in Kern County are similar to, but much weaker than those in Arizona, where previous studies find precipitation explains up to 75% of incidence. Hypotheses for the discrepancy between climate associations with valley fever in California and Arizona will be discussed. Finally, Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4) climate simulations will be used to diagnose potential future changes in regions endemic for valley fever through the end of the 21st century.