

Ramírez, I.J. and S. Grady, 2016: El Niño, Climate and Cholera Associations in Piura, Peru, 1991-2001: A Wavelet Analysis. *EcoHealth*, first online, 29, January 2016. DOI: 10.1007/s10393-015-1095-3. <http://link.springer.com/article/10.1007%2Fs10393-015-1095-3>.

## **El Niño, Climate and Cholera Associations in Piura, Peru, 1991-2001: A Wavelet Analysis**

**Corresponding Author:** Ramírez, Iván J. [ramirezi@newschool.edu](mailto:ramirezi@newschool.edu), The New School, Interdisciplinary Science Program, 65 W 11<sup>th</sup> Street, New York, NY 10011.

### **ABSTRACT**

In Peru, it was hypothesized that epidemic cholera in 1991 was linked to El Niño, the warm phase of El Niño-Southern Oscillation. While previous studies demonstrated an association in 1997-98, using cross-sectional data, they did not assess the consistency of this relationship across the decade. Thus, how strong or variable an El Niño-cholera relationship was in Peru or whether El Niño triggered epidemic cholera early in the decade remains unknown. In this study, wavelet and mediation analyses were used to: characterize temporal patterns among El Niño, local climate variables (rainfall, river discharge, and air temperature), and cholera incidence in Piura, Peru from 1991-2001; and estimate the mediating effects of local climate on El Niño-cholera relationships. The study hypothesis is that El Niño-related connections with cholera in Piura were transient, and interconnected via local climate pathways. Overall, our findings provide evidence that a strong El Niño-cholera link, mediated by local hydrology, existed in the latter part of the 1990s, but found no evidence of an El Niño association in the earlier part of the decade, suggesting that El Niño may not have precipitated cholera emergence in Piura. Further examinations of cholera epicenters in Peru are recommended to support these results in Piura. For public health planning, the results may improve existing efforts that utilize El Niño monitoring for preparedness during future climate-related extremes in the region.