# Expanding the use of social vulnerability assessments to identify hotspots for disease risk

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A newly published research study by U.S. Forest Service researchers demonstrates that the social vulnerability indices used in climate change and natural hazards research can also be used in other contexts such as disease outbreaks. Authors of the article include Forest Service Southern Research Station (SRS) researchers John Stanturf, Scott Goodrick, Mel Warren, and Christie Stegall, and Susan Charnley from the Forest Service Pacific Northwest Research Station.

Published in the online journal *PLOS ONE*, the study illustrates how census and household survey data, when mapped at the district level, can help highlight the locations of households and populations most vulnerable to disease outbreaks such as the Ebola virus disease. The results can be used to identify vulnerability hotspots where resources could be allocated to address issues such as water quality, food insecurity, and access to medical care that make it harder for communities to deal with disease outbreaks and other disasters.

"It might seem strange that a group of Forest Service researchers are writing about Ebola," says Stanturf, senior scientist with the SRS Center for Forest Disturbance Science. "We developed the social vulnerability index for a USAID climate change vulnerability assessment of Liberia, so we had the data and were interested in seeing whether it could be helpful when the Ebola epidemic struck in 2014."

Assessing social vulnerability to the potential effects of disease epidemics and other stressors is particularly challenging in Sub-Saharan African countries such as Liberia because social and economic data below the national or regional levels are typically very limited. In Liberia the civil war that lasted from 1989 to 2003 resulted in the destruction of both data and the infrastructure to collect it. At the same time, social vulnerability assessments are needed to guide government and international agencies in efforts to reduce vulnerability to disease epidemics and other stressors and to strengthen the ability of communities to adapt.

To build the social vulnerability index, the researchers used 18 variables from Liberia's 2008 census to serve as potential indicators of five dimensions of poverty - economic, health, political, sociocultural and protective. "We know that vulnerability and poverty are not the same, but the two are often highly correlated," says Stanturf. "Poverty reduces people's ability to cope with, recover from, or adapt to external stresses that affect their livelihood and well-being, thus increasing their social vulnerability."

The researchers mapped social vulnerability at the district level, clustering Liberia's districts and ranking them from most to least vulnerable. They found that the three clusters of most vulnerable districts contain 40 percent of the country's rural population, well over 1 million people. Correlating their findings with data from the World Health Organization on the incidence of Ebola cases, the researchers were able to identify "vulnerability hotspots" where social vulnerability combined with lack of access to medical care led to Ebola infections and death that might have been prevented if more resources had been available.

"Despite the limitations we cite in the article, we believe that the classification and map we produced represent a first step in better understanding the relationship between social vulnerability and disease

in Liberia, pinpointing where specific improvements in livelihoods and living conditions may be most needed," says Stanturf. "In the broader sense, we've demonstrated how our approach, which has mainly been used in the context of climate change and natural hazards, can be adopted in situations such as disease outbreaks where there's a need for rapid, quantitative social vulnerability assessments at multiple scales."

**More information:** Access the full text of the article: www.srs.fs.usda.gov/pubs/49174

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