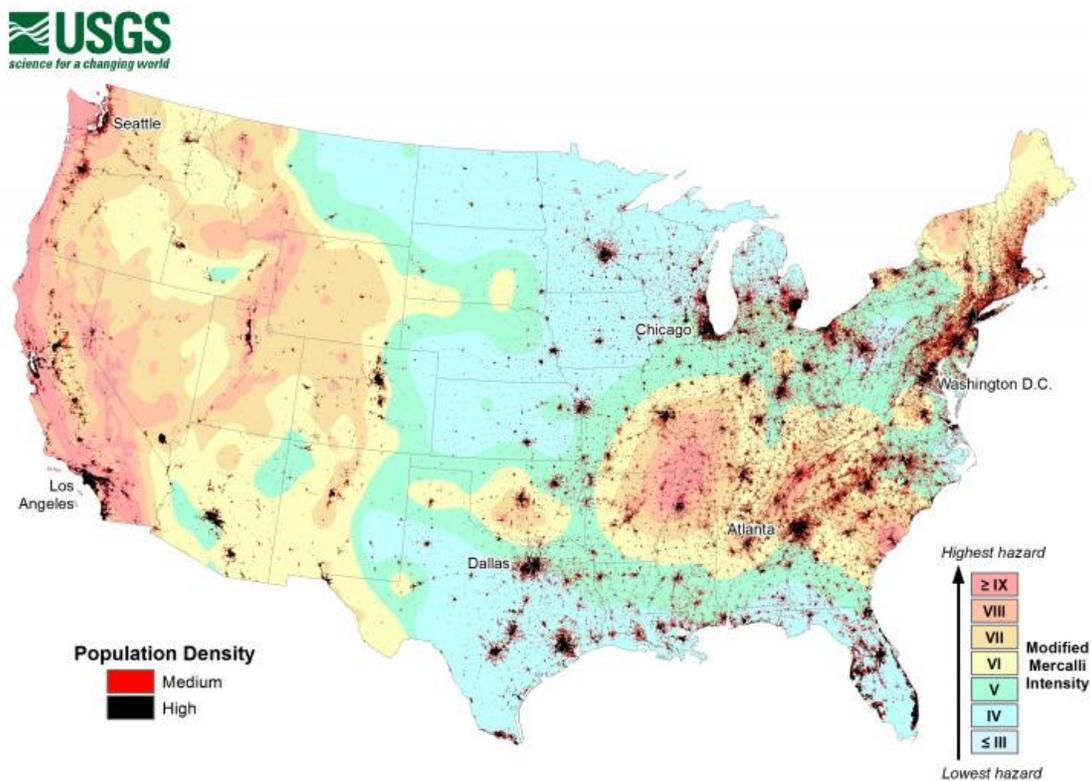


Nearly half of americans exposed to potentially damaging earthquakes

August 12 2015



USGS map showing (1) the locations of major populations and (2) the intensity of potential earthquake ground shaking that has a 2% chance of occurring in 50 years

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More than 143 million Americans living in the 48 contiguous states are exposed to potentially damaging ground shaking from earthquakes. When the people living in the earthquake-prone areas of Alaska, Hawaii and U.S. territories are added, this number rises to nearly half of all Americans.

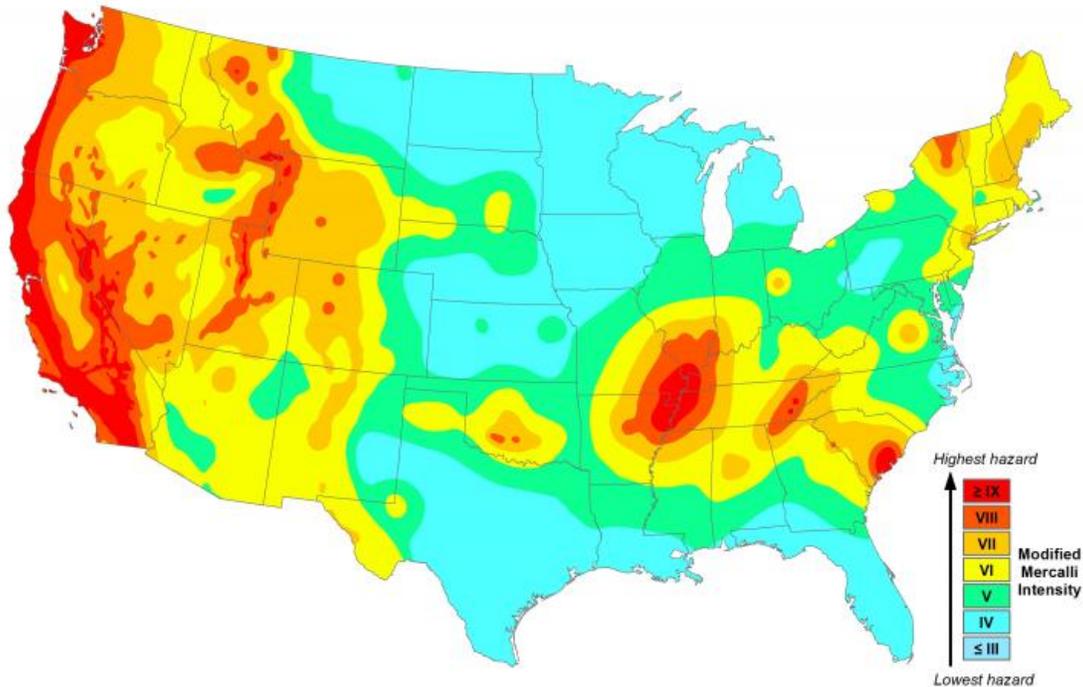
Scientists with the USGS published this research online today in the journal *Earthquake Spectra*.

"The new exposure estimate is nearly double the previous 2006 estimate of 75 million Americans in 39 states, and is attributed to both population growth and advances in science," said William Leith, who is the USGS senior science advisor for earthquake and geologic hazards and a co-author of this study. "Populations have grown significantly in areas prone to earthquakes, and USGS scientists have improved data and methodologies that allow for more accurate estimates of earthquake hazards and ground shaking."

High versus some potential for damage

About 143 million people live and work in areas with some potential for damaging shaking, a level that could at least lead to damage in structures. Approximately 57 million people are in areas with a moderate chance of such shaking, and 28 million people in areas that have a high potential to experience damaging shaking.

The USGS shaking calculations consider the chance of an earthquake occurring in a 50-year time frame, as that is the typical lifetime of a building. This time frame is thought to be reasonable for life-safety considerations when designing buildings and other structures.



USGS map showing the intensity of potential earthquake ground shaking that has a 2% chance of occurring in 50 years

USGS map showing the intensity of potential earthquake ground shaking that has a 2% chance of occurring in 50 years.

Which states have the strongest shaking potential?

When one considers very strong ground shaking levels, the 10 states with the highest populations exposed (in descending order) are California, Washington, Utah, Tennessee, Oregon, South Carolina, Nevada, Arkansas, Missouri and Illinois. Although this level of shaking is estimated to occur relatively infrequently, it could cause significant damage and casualties. The difference between those areas at risk from

moderate versus strong shaking depends on a variety of factors, including the location of fault lines and the seismicity rates of the area.

Start with science

These new estimates are derived from the recently updated U.S. National Seismic Hazard Maps, which identify where future earthquakes will occur, how often they will occur, and how strongly the ground will likely shake as a result. Researchers analyzed high-resolution population data and infrastructure data to determine populations exposed to specific levels of earthquake hazard. The population data are from LandScan, and the infrastructure data are from the Homeland Security Infrastructure Program (HSIP) database.

"This new research helps us better understand the scale of earthquake hazards and ultimately strengthen the nation's ability to protect Americans against future events," said Kishor Jaiswal, a USGS research structural engineer as well as the lead author of the study. "Of particular concern is the significant amount of critical infrastructure located in high earthquake-hazard areas, ranging from private and public schools to health care facilities and fire stations. The USGS is dedicated to continuously updating research on population and infrastructure exposure as communities change and new science is available on earthquake behavior."



State Population Levels Exposed to Potential Earthquake Ground Shaking

Data are based on ground shaking that has a 2% chance of occurring in 50 years

* Alaska, Hawaii and the U.S. territories are not included

State *	Total Population 2013	Population Exposed to Potentially Damaging Ground Shaking (0.1 g)	Population Exposed to Very Strong Ground Shaking (0.4 g)
Alabama	4,870,872	2,946,821	
Arizona	6,409,636	2,181,934	
Arkansas	2,902,138	1,918,993	374,401
California	38,154,948	38,148,001	30,646,165
Colorado	5,193,774	4,441,107	18,857
Connecticut	3,612,377	3,031,560	
Delaware	946,135	183,092	
District of Columbia	840,299		
Florida	19,217,959		
Georgia	9,910,768	4,517,387	
Idaho	1,630,074	1,477,049	14,036
Illinois	12,945,444	1,522,342	215,514
Indiana	6,667,733	1,595,896	
Iowa	3,152,129		
Kansas	2,878,242		
Kentucky	4,357,933	1,527,762	211,651
Louisiana	4,646,238		
Maine	1,394,095	1,394,095	
Maryland	5,914,342	16,585	
Massachusetts	6,858,124	5,713,347	
Michigan	10,031,670		
Minnesota	5,511,532		
Mississippi	2,991,964	1,102,354	141,887
Missouri	6,066,361	3,056,429	321,159
Montana	1,029,442	639,536	53,281
Nebraska	1,899,320	13,568	
Nevada	2,830,256	2,830,256	618,756
New Hampshire	1,321,764	1,321,574	
New Jersey	9,139,447	7,445,043	
New Mexico	2,055,857	1,577,788	
New York	19,704,093	14,472,574	
North Carolina	9,801,779	2,904,404	1,516
North Dakota	751,561		
Ohio	11,660,036	367,517	
Oklahoma	3,817,578	2,019,243	7,482
Oregon	3,953,102	3,953,102	1,427,547
Pennsylvania	12,919,992	4,149,921	
Rhode Island	1,042,597	1,010,722	
South Carolina	4,752,617	4,752,617	757,780
South Dakota	864,053	28,867	
Tennessee	6,437,198	6,422,565	2,005,566
Texas	26,157,587	1,173,162	
Utah	2,895,157	2,884,547	2,344,240
Vermont	644,210	602,498	
Virginia	7,816,595	2,316,984	
Washington	6,927,274	6,927,274	4,889,322
West Virginia	1,879,716	295,602	
Wisconsin	5,956,438		
Wyoming	604,496	479,063	38,921
TOTAL	313,966,952	143,363,181	44,088,081

USGS table showing state population levels exposed to potential earthquake ground shaking.

Additional details

Earthquakes due to human activity—or induced seismicity—were not accounted for in these estimations. USGS scientists are currently researching ways to understand potential ground shaking from induced earthquakes and incorporate that knowledge in U.S. National Seismic Hazard Maps.

Similarly, the amplification of ground shaking due to different soil types was not considered, which could lead to a further increase in the number of people exposed to stronger shaking.

USGS earthquake research

The USGS conducts research necessary to monitor earthquakes, characterize and identify earthquake hazards, assess earthquake risks and maintain suitable seismic hazard maps in support of building codes. USGS scientists also continue to work with user communities throughout the nation to ensure that USGS earthquake hazard information and products are readily available, easily understood and appropriately used for [earthquake](#) mitigation and response planning.

More information: Earthquake Shaking Hazard Estimates and Exposure Changes in the Conterminous United States. *Earthquake Spectra* In-Press. doi: [dx.doi.org/10.1193/111814EQS195M](https://doi.org/10.1193/111814EQS195M)

Provided by United States Geological Survey

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