

# Nepal Quake Could Have Been Much Worse -- Here's Why

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KATHMANDU, Nepal — The structural engineer strides through Kathmandu's old city, past buildings reduced to rubble, buildings whose facades are cracked in dozens of places, like the fractured shell of a hardboiled egg. But it's the many buildings that made it unscathed through the earthquake that amaze Kit Miyamoto.

"It could have been so much worse," said Miyamoto, head of a global earthquake and structural engineering firm, who flew to Nepal soon after he heard about last weekend's 7.8- magnitude quake. He shakes his head, topped by a white hardhat. Before landing, he'd envisioned a flattened moonscape of dust and debris. He thought as many as 40,000 people could be dead.

That the reality has turned out to be far less destructive has a lot to do with the vagaries of geology, geography and construction decisions. Not to mention sheer luck.

The danger, however, may not be over. Dozens of mostly small aftershocks have hit Nepal since the quake. A more powerful aftershock a bit closer to the capital could cause immense damage.

"If a magnitude 6 or 6.5 quake happens within 20 kilometers of Kathmandu, it's going to be a nightmare," said Sandeep Donald Shah, a structural engineer with Miyamoto International, during the walk through Kathmandu. "The probability is pretty high that this may happen because we just had a (huge) earthquake, and the fault line has been activated."

The general state of Kathmandu's buildings — with their ancient soot-and-exhaust-stained concrete, their uneven bricks, their drooping facades and crooked balconies — raises questions about how so many still stand after such a big quake.

Remaining upright depended on a combination of factors, including age, size, building material and strength, location and the underlying soil. But the simplest explanation is that Kathmandu largely sits outside the danger zone of last week's quake.

Because the epicenter was about 80 kilometers (50 miles) from the capital, the quake's power had partially dissipated by the time it got to Kathmandu, said Miyamoto, who is also a seismic safety commissioner for the state of California.

Even so, some of Kathmandu's remaining buildings look "very bad, seismically speaking," with weak foundations and structures, Miyamoto said. They've also been "softened up" by the quake, making them more likely to collapse or be seriously damaged if another, closer quake hits.

The region will likely see aftershocks for another year, including some big ones, Miyamoto said, but it's impossible to predict where or when they will occur. The two biggest aftershocks so far have been more than 60 kilometers (38 miles) from Kathmandu.

A direct or even a near hit on Kathmandu by the April 25 quake would have meant a massive death toll.

The Nepal quake released 16 times the energy of the 2010 Haiti earthquake, where death estimates ranged from 100,000 to 300,000, yet the death toll in Nepal now stands at more than 6,600. This is a huge loss of life, but far less than recent estimates that 100,000 people might die in Nepal's next major earthquake.