

Stairwell evacuation study finds 'what we know we don't know'

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Most of the time, we use the stairs in buildings—especially in high-rise structures—only as a back-up for faster elevators and escalators, but during a fire or other emergency, stairs become our primary passage to survival. In a new study, researchers at the National Institute of Standards and Technology examined what we know about how stairs work as an emergency evacuation route and found that the answer is—not nearly enough.

NIST researchers studied people movement speeds during three full-building [fire](#) drill evacuations and compared the data to already published results—including those from NIST's investigation of the World Trade Center disaster on Sept. 11, 2001—to try to identify the

factors that could hamper rapid [evacuation](#) using stairways. Their conclusions: research to date provides limited insight into how people react and behave during evacuations, and that for the most part, variances in speed cannot be explained by the evacuation models currently used in [building](#) design and emergency planning. Or as the title of the new NIST report acknowledges, “What we know we don’t know.”

[Building engineers](#) typically use five factors to describe occupant descent down stairwells during building evacuations: pre-evacuation delay, distance traveled during evacuation (movement from higher floors versus lower), counterflow situations (such as firefighters moving up a stairwell while occupants are moving down), stairwell geometry and density of persons in the stairwell. Models make use of such variables to predict the performance of egress systems and the expected speed for a complete evacuation.

However, the NIST researchers found that these engineering parameters could only explain about 13 percent of the differences they observed in evacuation speeds for the three fire drills. Since these speeds were similar to ones reported by previous studies, the researchers suggest that psychological and behavioral factors may be more important in determining how fast occupants can actually exit a building. They also note that inaccurate evacuation data based on simplifications about behavior could lead to unsafe building designs and procedures.

“Clearly,” the researchers state in the report, “there is a need to better understand all the factors that impact the ability of building occupants to take appropriate protective action in the event of a building emergency.”

More information: As a start toward improving understanding, the NIST Building and Fire Research Laboratory has posted a Web page, www.fire.nist.gov/CDPUBS/bldg_occupant , with links to all four building occupant research studies completed in 2008, including the

[stairwell evacuation](#) report [Stairwell Evacuation from Buildings: What We Know We Don't Know \(NIST Technical Note 1624\)](#).

Provided by National Institute of Standards and Technology ([news](#) : [web](#))

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