



A story of **Impact**

NIOSH Smart Phone Application Improves Ladder Safety to Reduce Falls

Ladder-related injuries are a persistent, and yet preventable, public health problem with significant economic impact on society. In 2013, approximately 511,000 people in the United States were injured from ladders and treated in hospital emergency departments, doctors' offices, clinics and other medical settings.¹ The financial cost of these injuries was \$24 billion, including work loss, medical, legal, liability, and pain and suffering expenses.¹ Falls-from-ladders are a leading cause of fall injury and death in all industries. In 2011, there were 113 deaths from work-related ladder-falls and approximately 34,000 additional nonfatal injuries from work-related ladder-falls treated in hospital emergency departments in the U.S.² Among construction workers in the U.S., about 81% of reported fall injuries treated in emergency departments involved a ladder. These injuries can be severe and cause disability, changing the lives of workers and their families. Ladder angle significantly affects ladder stability. Research has suggested that ladder users tend to position extension ladders at suboptimal angles, which increases the risk of ladder slide-out events and associated falls. A ladder set too steeply or too shallow cannot provide safe support.

▲ The NIOSH Ladder Safety App has a measurement tool to indicate when a ladder is set at the optimal angle. Photo by NIOSH.

Relevant Information

Among workers in 2011, approximately 20% of the fall from height fatal injuries involved ladders.³

In 2011, an estimated 15,460 nonfatal ladder-fall injuries reported by employers involved multiple days away from work.²

About 34,000 nonfatal work-related ladder-fall injuries were treated in emergency departments in 2011.²



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Researchers at the National Institute for Occupational Safety and Health (NIOSH) developed, evaluated, and patented a method and technology for positioning extension ladders at an optimal angle. NIOSH then partnered with ATL International and DS Federal Inc. to transform the ladder safety technology into the first NIOSH Smart Phone application “Ladder Safety.” It features an easy to use ladder positioning tool—an indicator that provides visual, sound, and vibrational signals—to assist users in quickly positioning an extension ladder to the proper angle. The application also provides graphic-oriented interactive reference materials, safety guidelines, and checklists for extension ladder selection, inspection, accessorizing, and use, which can serve as a convenient reference and training tool. To ensure that the guidance materials are up-to-date with the latest ladder safety standards, NIOSH partnered with the American Ladder Institute and the American National Standards Institute A14 committee. The NIOSH Ladder Safety Smart Phone app is available as a free download for Apple and Android mobile devices in both English and Spanish.

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As a mobile application, the NIOSH Ladder Safety tool has the potential to reach a large audience, prevent falls-from-ladders, and save lives in the workplace and at home. Fifty-eight percent of American adults, as of January 2014, have a smartphone.⁴ As of July 2014, the app has been downloaded more than 24,000 times and has received very positive reviews and high ratings. Since the app can be readily accessed at the job site, workers can ensure they position ladders at the correct angle to prevent falls. The NIOSH Ladder Safety Smart Phone application will help ladder users feel more confident about their safety and can improve their productivity.

The app has been promoted by many state officials, industry leaders, and safety professionals, and has received considerable international attention. Many safety-related organizations and individuals have examined the app and posted web reviews recommending it as a very useful training and performance tool. In addition, the app was recognized by the Department of Health and Human Services (2014 HHS Innovates Award Honorable Mention), the Centers for Disease Control and Prevention (notable accomplishment in CDC’s 2013 Year in Review digital press kit), and NIOSH (2014 Alice Hamilton Award for Occupational Safety and Health: Engineering and Control Winner and 2014 Bullard-Sherwood Research-to-Practice [R2P] Technology Award Winner). NIOSH is exploring opportunities to develop more mobile applications to promote workplace safety and health and help protect workers from occupational injuries and illnesses.

Visit the NIOSH website (www.cdc.gov/niosh) for more information about the NIOSH Ladder Safety Smart Phone Application and other construction-related topics.

¹⁻⁴ For a complete list of references, see www.cdc.gov/niosh/docs/2015-176/.

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