



A story of **Impact**

NIOSH Researchers Developed a Novel Training Tool that Simulates the Effects of Noise Exposure on Hearing Loss

Job-induced hearing loss is a big problem in today's work settings, affecting workers in industry sectors such as manufacturing, construction, mining, transportation, agriculture, and the military. Approximately 22 million workers are exposed on the job to noise levels that could harm their hearing.

The National Institute for Occupational Safety and Health (NIOSH) has developed the NIOSH Hearing Loss Simulator, a software training and communication tool that demonstrates the effects of noise exposure on a worker's hearing without exposing the person to harmful noise levels or toxic materials. The software considers several factors including age, gender, level of exposure, and years of exposure, and then simulates human speech that is degraded to reflect the estimated hearing loss.

▲ Users download free tool from the NIOSH Web site and perform simulation on their own computer.

Relevant Information

At present exposure limits, 1 in 4 people exposed to excessive noise or other toxicants while on the job will develop permanent hearing loss.

Approximately 11.4% (13.9 million) of working American adults report some degree of hearing loss.

Hearing loss may impede some individuals' ability to be gainfully employed.

Hearing loss is not inevitable and can be prevented.



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Human speech is considered the most complex and important sound most workers need to perceive so this software training and communication tool allows the user to combine speech with common background noises to demonstrate hearing loss. Users choose either a male or female voice to demonstrate different sound frequencies and can choose from a variety of background noises, including recorded worksite sounds; they can record and upload their own custom foreground and background noises; and they also have the ability to control the speech-to-background noise ratio to illustrate how increasing background noise interferes with understanding speech that is present in the foreground.

In addition, users can manipulate sound and frequency levels allowing results of an actual hearing test to be entered into the software. Those results can then be used to demonstrate the tested individual's actual hearing loss to individuals without hearing loss. The real-life scenarios of this software has the potential to raise awareness, increase motivation for hearing loss prevention, and reduce the number of people who suffer from hearing loss. NIOSH recommends that employers and individuals interested in hearing loss education and prevention take the following steps to learn more about the effects of noise exposure.

NIOSH Recommendations

Download the free NIOSH Hearing Loss Simulator.

www.cdc.gov/niosh/mining/products/product47.htm.

Read the NIOSH Hearing Loss Simulator Instruction and Training Guide. The guide details the simulator's functions, lists the major objectives that can be addressed with the simulator, and provides training scenarios that can be applied to real-life real-worker situations.

Use the simulator to work through a series of scenarios. Demonstrating degrees of hearing loss under various circumstances helps users better understand how different exposure levels may affect hearing loss.

Gather and use trainee input to tailor lessons to the end user. Scenarios that participants can directly relate to are more meaningful, relevant, and motivational.

Visit www.cdc.gov/niosh for more information on occupational noise-induced hearing loss. Authors of *NIOSH Hearing Loss Simulator: Instruction and Training Guide*—Robert F. Randolph, Dana C. Reinke, and Richard L. Unger; Office of Mine Safety and Health Research; NIOSH—received a 2009 Alice Hamilton Award in the Educational Materials category.

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