

What is a safe noise level for the public?

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ABSTRACT

What is a safe noise level for the public? In the absence of a federal safe noise exposure level for the public, an occupational standard meant to prevent hearing loss in workers has become the de facto safe level for all public noise exposures.

This is demonstrated by the use of 85 decibels as a safe sound level by hearing health professionals and their organizations, in media reports, and in publications, most often without time limits; by its use as a volume limit for children's headphones marketed to prevent hearing loss, again without exposure times; and by general acceptance of higher indoor and outdoor noise levels in the United States.

News reports document intermittent exposure to loud outdoor noise from yard equipment, construction, vehicles, and aircraft and to loud indoor noise, with sound levels of 90 to 100 decibels or greater in restaurants, movie theaters, gyms, concerts, sports events, and other places.

Decades of research show that noise damages hearing and that avoiding exposure or using protection prevents hearing loss. The safe noise exposure level to prevent hearing loss is 70 decibels time weighted average for 24 hours. Government health agencies should establish safe noise levels for the public.

WHAT IS A SAFE NOISE LEVEL FOR THE PUBLIC?

What is a safe noise level for the public? The National Institute on Deafness and Other Communication Disorders states, "Long or repeated exposure to sound at or above 85 decibels can cause hearing loss." [1] In the absence of a federal standard, an occupational standard meant to prevent hearing loss appears to have become the de facto safe level for all public noise exposures. This is demonstrated by the use of 85 decibels as a safe sound level

by hearing health professionals and their organizations, in media reports, and in publications, most often without time limits; by its use as a volume limit for children's headphones marketed to prevent hearing loss, again without exposure times; and by general acceptance of higher indoor and outdoor noise levels in the United States. (Different organizations use A-weighted decibel measurements or unweighted decibel measurements. The decibel measurements used by each organization are cited as used. A discussion of the decibel scale and weighting adjustments is beyond the scope of this editorial.)

Eighty-five decibels is *not* a safe noise exposure level for the public. In 1972, the National Institute for Occupational Safety and Health developed an 85 A-weighted decibel recommended exposure level to reduce the risk of hearing loss from occupational noise exposure. The Occupational Safety and Health Administration adopted this as a legal standard for workplace hearing protection. At 85 A-weighted decibels time-weighted average exposure, an employer must implement a hearing conservation program, including serial audiograms and provision of hearing protection. Even with strict time limits, this standard does not protect all workers from hearing loss. The 85 A-weighted decibel standard also assumes workers have quiet when not at work, which is no longer true for many Americans.

An occupational noise exposure standard is not a safe standard for the public. [2] Noise is different from other occupational exposures (e.g., toxic solvents or ionizing radiation) because exposure also occurs outside the workplace. In 1974, the Environmental Protection Agency's (EPA's) Office of Noise Abatement and Control (ONAC) adjusted the National Institute for Occupational Safety and Health recommendation for additional exposure time: 24 instead of 8 hours daily and 365 instead of 240 days annually. The EPA calculated the safe noise level for the public to prevent hearing loss to be a 70-decibel time-weighted average for a 24-hour period ($L_{eq(24)} = 70$). [3] (The decibel scale is logarithmic, so 85-decibel sound has 31.6 times more energy than 70-decibel sound, not 21% more as might be commonly thought.) The EPA did not adjust for lifetime noise exposure, now almost 80 years versus 40 work-years, so the real average safe noise level to prevent hearing loss is probably lower. Noise also has nonauditory health impacts- increases in stress hormones, hypertension, obesity, cardiac disease, and mortality- at average daily exposures of only 55 decibels, with activity interference beginning at 45 decibels.

Why has little been done to control noise in the United States? The reasons are complex. Although noise was known to be a health hazard, it was treated as an environmental pollutant. The Noise Control Act of 1972 established a national policy to promote an environment for all Americans free from noise that jeopardized their health and welfare, with federal noise control activities assigned to the EPA. These activities were never adequately funded or supported. In 1979, ONAC ran afoul of the waste management industry by proposing regulations requiring longer trash truck compactor cycles to reduce noise. Lobbying efforts, with the support of a president and an EPA administrator who did not believe in regulation, led to ONAC's defunding in 1981. [4] Federal noise control activities ceased. Cities and states to which these activities were relegated lacked the resources to deal with noise. Little has been done since to reduce public noise exposure.

There are few scientific reports about nonoccupational noise exposure and hearing loss. Urbanization exposes people to higher average noise levels. News reports document intermittent exposure to loud outdoor noise from yard equipment, construction vehicles, and aircraft and to loud indoor noise, with sound levels of 90 to 100 decibels or greater in restaurants, movie theaters, gyms, sports events, and other places. Use of personal music players at high volume with earbuds or headphones is common, especially among the young.

The number of Americans with hearing loss increased from 13.2 million (6.3% of the US population) in 1971 to 20.3 million (8%) in 1991 [5] to 48 million (15.3%) in 2011. [6] Numbers are approximate because of methods used to study epidemiology of auditory disorders. Part of the increase is because of the growth of older age groups with a very high prevalence of hearing loss. [6] An increase in hearing loss also occurred in those younger than 20. [7] The nonauditory health impacts of noise are less studied and, except in the case of death, small for each individual but important because of the millions of people affected. Higher noise levels may contribute to increased prevalence of hypertension, diabetes, and obesity.

The solutions are simple. Decades of studies show that noise damages hearing and health and that avoiding exposure or using protection prevents hearing loss and other health problems. The public needs to be educated about the dangers of noise. Policy statements from the American Public Health Association, the American Academy of Nursing, and others should discuss dangers of noise exposure for the public. Congress should pass legislation reestablishing ONAC, and the federal government should set public noise exposure standards to protect health and to prevent hearing loss.

Consumer and industrial products should be labeled with noise ratings. The successful marketing of quieter dishwashers displaying decibel ratings demonstrates that these appliances can be built and sold. The goal of ALARA (As Low As Reasonably Achievable) used for radiation exposure should be adopted to reduce each person's daily noise dose. Noise sources that cannot be made quieter should be insulated or isolated, with standards set and enforced for indoor and outdoor noise levels. Effective noise control technologies have long existed, including noise reduction via design and material specifications, as well as sound insulating, isolating, reflecting, or absorbing techniques; however, indoors all that may be needed is to turn down the volume of amplified sound.

In the 1950s, half of all American men smoked. When research showed that smoking caused cancer, heart disease, and other health problems, doctors and the public health community spoke out, leading to the first Surgeon General's report on smoking and health decreased smoking rates, and eventually a largely smoke-free environment, with dramatic reductions in morbidity and mortality. People still have the right to smoke, just not where others are exposed to secondhand smoke.

A similar approach is needed for noise. Doctors and the public health community should speak up about the health dangers of noise. Laws should be passed and regulations implemented and enforced to reduce noise from fixed and mobile sources and to make places of public accommodation, cities, streets, highways, vehicles, and aircraft quieter. Quiet will prevent hearing loss and other health problems and will help millions with hearing loss, who cannot understand speech in noisy environments with or without hearing aids, as well as those with tinnitus and hyperacusis.

People should still be allowed to make noise, just as they are still allowed to smoke, but not where others are exposed involuntarily to their noise. Where noise may be part of the experience, for example, clubs, concerts, and sports events, warning signs should be posted and hearing protection should be offered. If the United States could become largely smoke-free, it can also become quieter. As with smoke-free air, a quieter environment will benefit all.

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