

## Quick Facts: Environmental Noise Exposure and Hearing Loss

- Noise causes hearing loss.<sup>1-3</sup>
- There is an unrecognized epidemic of hearing loss in the United States. The percentage of Americans with hearing loss has nearly tripled from 7% of the population in 1971 (age 3 and over) to 9% in 1991 (age 3 and over) to 20% in 2008 (age 12 and over).<sup>4,5</sup> Today, more than 48 million Americans are estimated to suffer from significant hearing loss.<sup>4</sup>
- Older adults are especially affected by hearing loss: 45% of those aged 60-69 years; 68% of those aged 70-79 years, and almost 90% over age 80.<sup>4</sup>
- The epidemic of hearing loss is spreading to younger age groups. In 2006, approximately 20% Americans aged 12-19 years had measureable hearing loss, compared with 15% in 1994.<sup>6</sup>
- In 2000, hearing loss and other communications disorders were estimated to cost the United States \$122-\$186 billion annually (2%-3% of the U.S. Gross Domestic Product; up to \$600 billion in 2015 dollars).<sup>7</sup>
- Noise-induced hearing loss is the most common cause of hearing loss in adults.<sup>8</sup>
- Recent research shows that there is no such thing as temporary hearing loss or tinnitus.<sup>9</sup> Any fullness or ringing in the ears after noise exposure indicates that permanent auditory damage has occurred.
- Environmental noise levels in American society exceed safe standards. Landscape maintenance machines (mowers, leaf blowers) operate at levels up to 110 decibels around homes, schools, parks, hospitals, and shopping areas.<sup>10</sup> Sound levels of 80-90 decibels and higher have been measured in restaurants<sup>11-14</sup>, up to 105 decibels in fitness classes<sup>11,15,16</sup>, 80-90 decibels in retail stores<sup>11,17</sup>, 80-100 decibels in movies (up to 130 decibels in some action movies)<sup>18,19</sup>, and average 80-90 decibels at sports events.<sup>20</sup>
- The public is exposed to noise 24 hours a day. The recommended environmental noise exposure level to prevent hearing loss in the general public (exposed to noise 24 hours each day) is an average of 70 decibels over 24 hours.<sup>3</sup> The standard for occupational noise exposure to prevent hearing loss in workers is 85 A-weighted decibels (dB(A))\* with time exposure limits of 8 hours a day, 240 days a year, for 40 years. \*\*<sup>21</sup> This occupational noise standard has been widely but erroneously applied as safe for the public<sup>22-24</sup> without a specified time exposure limit. The difference between the environmental and occupational levels has been confirmed by the National Institutes of Occupational Safety and Health and the Centers for Disease Control and Prevention.<sup>25,26</sup>
- Noise-induced hearing loss is 100% preventable.<sup>25</sup> Individuals must avoid noise exposure. Governments should develop standards and enforce rules to make indoor and outdoor places quieter.

\*A decibel (dB) is a unit of sound measured using a logarithmic scale for which each 10 point increase in dB level represents a 10-fold increase in noise level. An unweighted decibel makes no adjustment for sound frequency; an A-weighted decibel (dB[A]) which adjusts the frequencies for those found in human speech minimizes the measurement of low frequency sound.

\*\*The National Institute for Occupational Safety and Health and the Occupational Safety and Health Administration have recommendations, regulations, and rules to protect worker hearing. NIOSH recommends an 85 db(A) exposure level<sup>22</sup>. Worker protections include provision of personal protective equipment, hearing conservation programs, insurance, and workers compensation. In contrast to workers, the public has no protection from these same levels of harmful noise generated in their communities.

## REFERENCES

1. Kryter KD. *The Handbook of Hearing and the Effects of Noise: Physiology, Psychology, and Public Health*. San Diego: Academic Press, 1994
2. Henderson D, Hamernik RP, Dosanjh DS, et al (Eds). *Effects of Noise on Hearing*. New York: Raven Press, 1976.
3. U.S. Environmental Protection Agency, Office of Noise Abatement and Control. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, Washington, DC, 1974. Accessed May 18, 2016 at <http://www.nonoise.org/library/levels74/levels74.htm>
4. Lin FR, Niparko JK, Ferrucci L. Hearing loss prevalence in the United States. *Arch Internal Medicine* 2011;171(20):1851-1852.
5. Ries PW. Prevalence and characteristics of persons with hearing trouble: United States, 1990-1991. National Center for Health Statistics. Data from the National Health Survey. *Vital Health Stat* 1994; 10(188).
6. Shargorodsky J, Curhan SG, Curhan GC, Eavey R. Change in prevalence of hearing loss in US adolescents, *JAMA* 2010;304(7):772-778.
7. Ruben RJ. Redefining survival of the fittest: communication disorders in the 21<sup>st</sup> century. *Laryngoscope* 2000;110(2)Part 1:241-245.
8. National Institute for Deafness and Other Communication Disorders, Quick Statistics About Hearing, Accessed May 19, 2016 at <https://www.nidcd.nih.gov/health/statistics/quick-statistics-hearing>.
9. Liberman C. Hidden hearing loss. *Scientific American*, August 2015, 49-53.
10. *How Do We Protect Our Ears? Worksheets. A PLANET Safety Training Program for Land Care Employees*. Professional Landcare Network, 2012. Accessed at [https://www.osha.gov/dte/grant\\_materials/fy10/sh-21001-10/Trainee\\_Worksheets-Ears.pdf](https://www.osha.gov/dte/grant_materials/fy10/sh-21001-10/Trainee_Worksheets-Ears.pdf)
11. Buckley C. Working or playing indoors: New Yorkers face an unabated roar. *New York Times*, July 19, 2012. Accessed May 19, 2016 at [http://www.nytimes.com/2012/07/20/nyregion/in-new-york-city-indoor-noise-goes-unabated.html?\\_r=0](http://www.nytimes.com/2012/07/20/nyregion/in-new-york-city-indoor-noise-goes-unabated.html?_r=0)
12. Hernandez P. For restaurant owners, striking the right noise level is key. *Boston Globe*, April 22, 2014. Accessed May 19, 2016 at <https://www.bostonglobe.com/lifestyle/food-dining/2014/04/22/what-can-hear-you/uJGdqAwATBLxAKDxV0wK/story.html>
13. Melamed S. It's not just you: Philly restaurants are getting louder. *Philadelphia Enquirer*, July 27, 2015. Accessed May 19, 2016 at [http://articles.philly.com/2015-07-27/news/64884576\\_1\\_rittenhouse-square-acoustics-philly-restaurants](http://articles.philly.com/2015-07-27/news/64884576_1_rittenhouse-square-acoustics-philly-restaurants)
14. Hallock B. How noisy are restaurants? We do a sound check, *Los Angeles Times*, August 18, 2012. Accessed May 19, 2016 at <http://articles.latimes.com/2012/aug/18/food/la-fo-restaurant-noise-20120818>
15. Hallet V. If you think the music at your gym is too loud, that's because it probably is. *Washington Post*, February 17, 2015. Accessed May 19, 2016 at [https://www.washingtonpost.com/lifestyle/wellness/if-you-think-the-music-at-your-gym-is-too-loud-it-probably-is/2015/02/17/98084620-abc1-11e4-9c91-e9d2f9fde644\\_story.html](https://www.washingtonpost.com/lifestyle/wellness/if-you-think-the-music-at-your-gym-is-too-loud-it-probably-is/2015/02/17/98084620-abc1-11e4-9c91-e9d2f9fde644_story.html)
16. Cheer L. Is your gym class making you deaf? New research has revealed that the music in gym classes reaches almost the same level as a jet engine. *Daily Mail Australia*, 30 September 2014. Accessed May 19, 2016 at <http://www.dailymail.co.uk/news/article-2774452/Is-gym-class-making-deaf-New-research-revealed-music-gym-classes-reaches-level-jet-engine.html>
17. De Groote M. Shopping out loud: Retail stores getting noisier to stimulate purchases, study says. *Deseret News*, November 6, 2012. Accessed May 19, 2016 at <http://www.deseretnews.com/article/865566181/Shopping-out-loud-Retail-stores-getting-noisier-to-stimulate-more-purchases-study-says.html?pg=all>
18. Hernandez S, Walker W, Byknish D. Dangerously loud: monitoring movie theater volume, KXAN TV station, February 14, 2014. Accessed May 19, 2016 at <http://kxan.com/2014/02/14/testing-movie-theater-volume-too-loud>
19. Ferguson MA, Davis AC, Lovell EA. Cinemas: do they pose a risk to hearing? *Noise Health* 2000;2:55-58.
20. Poon L. Extremely Loud And Incredibly Close: Fans Risk Hearing Loss. National Public Radio, February 1, 2014. Accessed May 24, 2016 at <http://www.npr.org/sections/health-shots/2014/02/01/268370350/extremely-loud-and-incredibly-close-fans-risk-hearing-loss>
21. National Institute for Occupational Safety and Health. *Criteria for a Recommended Standard: Occupational Noise Exposure*, Cincinnati, OH, 1998. Accessed May 19, 2016 at <http://www.cdc.gov/niosh/docs/98-126/pdfs/98-126.pdf>
22. National Institute for Deafness and Other Communication Disorders, *Noise Induced Hearing Loss*. Accessed May 19, 2016 at <https://www.nidcd.nih.gov/health/noise-induced-hearing-loss>
23. American Academy of Audiology. How's Your Hearing: Ask an Audiologist, *Hearing Loss Prevention*. Accessed May 19, 2016 at <http://www.howsyourhearing.org/prevention.html>
24. American Speech-Hearing-Language Association. *Protect your hearing*. Accessed May 19, 2016 at <http://www.asha.org/uploadedFiles/Protect-Your-Hearing-Presentation.pdf>
25. Kardous C, Themann CL, Morata TC, et al. Understanding noise exposure limits: occupational vs. general environmental noise, NIOSH Science Blog, February 8, 2016 Accessed May 19, 2016 at <http://blogs.cdc.gov/niosh-science-blog/2016/02/08/noise>
26. Centers for Disease Control and Prevention, National Center for Environmental Health. Environmental Noise Sources. Centers for Disease Control and Prevention. Website [http://www.cdc.gov/nceh/hearing\\_loss/noise\\_sources.html](http://www.cdc.gov/nceh/hearing_loss/noise_sources.html) , updated May 16, 2016.