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NOISE: AN UBIQUITOUS POLLUTANT

Peter W Alberti
MB PhD FRCS
Professor Emeritus of Otolaryngology
University of Toronto
Canada

Email: peter.alberti@rogers.com

Noise is one of the most ubiquitous* environmental pollutants. It permeates all aspects of life - urban and rural, domestic and social, educational and occupational. Long thought to be a problem only to the military and heavy industry, it is now recognised as an almost universal issue. It may interrupt communication and thought, as well as disrupting audition. Prolonged exposure damages hearing and has adverse physiological consequences leading to auditory and non-auditory problems.

Some of these effects have been reported since ancient times. For example, the disruption of speech reception by waterfalls, deafness in gunners on 18th century naval vessels and hearing loss in ancient metal workers. Two important sources of damaging sound today are military noise and entertainment, as in discos or concerts and individually from listening to MP3 players. There is evidence of increased frequency of hypertension, psychiatric disturbance, interference with cognition and sleep disruption with excessive noise exposure. Occupational hearing loss increased exponentially with the industrial revolution; damaging military noise started with the invention of gunpowder and has become ever more intense. Global urbanisation and population growth have compounded to make social noise a major problem. The negative impact of excessive sound on sleep, speech, schooling and everyday life is well documented and is growing. In addition, it may precipitate tinnitus. There are particular problems in schools, both from external sounds and poorly designed classrooms where the acoustics are frequently appalling (extremely poor). Oral communication becomes difficult and thinking may be disrupted.

**Ubiquitous: Ever present; everywhere*

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Noise: An Ubiquitous Pollutant

The 'Developed' World and the 'Developing' World

In the developed world, excessive occupational sound exposure is diminishing. New manufacturing techniques such as welding or glueing are replacing riveting in shipyards and aircraft factories, making the workplace quieter. Greater efficiencies and automation are also reducing the total number of workers exposed and the sound levels which they experience. The developed world workforce expects a safe work site and has accepted occupational safety is a required priority. This is not the situation in much of the developing world where, in spite of some excellent programmes, equipment may not be silenced, hours of exposure are less monitored and hearing protection is rarely used. In addition, occupational sound levels are lower in the post industrial occupations than in manufacturing. Farm mechanisation is a global problem, machinery is loud, varied and work hours are not controlled.

The urban 'soundscape' is ever louder, in Toronto as well as in Karachi, in Sao Paulo as well as in Rome. Many cities have noise bye laws, however, few are implemented. Traffic noise is difficult to control and is a greater problem in developing world cities than in most of the developed world. More traffic, older and poorly silenced vehicles, amplified music in outdoor bazaars, all producing a cacophony of sound, making speech communication difficult. This is largely due to diesel trucks and motorcycles. The hearing of the 'Baby Boomers'** is worse by about 10 years than that of the preceding generation at the same age; i.e., 50 year olds today have hearing like 60X year olds of the last generation.

***Baby Boomers – The baby boom generation is a term which portrays a generation born during the middle part of the 20th Century*

Hearing Conservation Programmes

However, there is also cause for cautious optimism. Hearing conservation programmes have multiplied in industry and are effective. Their demonstrable (provable) benefits to occupational safety and the work environment encourage their adoption. Maximum sound level specifications are also more and more frequently required when machinery is ordered. Issues with classroom acoustics have become fairly widely recognised in the USA, Canada and several European countries, with helpful developments occurring. City noise is being addressed by an innovative programme in India (see Chadha, Djelantik and Agarwal in the next Issue of CEHH) and is being studied with interest in South East Asia. The World Health Organization has had workshops and has published recommendations regarding urban noise. Machinery of all types is becoming quieter. The more fuel efficient, modern jet engines are also less noisy. It is being recognised by manufacturers that noise is an unwanted by-product, not a needed indicator of power. Sadly, so much of this is offset by the increasing exposure to and intensity of recreational sound. The greater efficiency of the now ubiquitous MP3 players makes them more hazardous than the personal radios and CD players that preceded them.

Cellular Basis of Hearing Loss

The cellular basis of hearing loss from intense sound exposure is becoming clearer. Work is advancing rapidly on medication to prevent the damage produced by extreme noise exposure, such as in military noise. It seems to work in animal models; hopefully, it will translate to man.

When I started working in this area almost 50 years ago, I thought that by the year 2000 there would be no more industrial hearing loss in the industrialised nations. Well, I was wrong, but the amount is reducing. There is still much to be done. The focus has shifted from industrial to community noise and this requires continuing effort. ❑

THE RISK OF HEARING LOSS IN YOUNG ADULTS

Thais C Morata
PhD F-AAA CCC-A
Hearing Loss Prevention Team
Division of Applied Research and Technology
National Institute for Occupational Safety and Health
Cincinnati, OH 45226
USA

Email: tmorata@cdc.gov

In the past few years, the number of publications on the risk of acquired hearing loss among children and young adults has increased substantially both in the scientific literature as well as in the popular press.

The headlines tend to be fear-provoking:

- 'TURN IT DOWN! MP3 fans told'
- 'Sounding a warning on earbuds!'
- 'People risk hearing losses at younger ages, experts warn.'

Although sensationalised by the media, scientific evidence of increased risks to hearing faced by youth is not yet available.

Music Exposure amongst Children and Young Adults

The increased media attention may be a consequence of the introduction of MP3 players and a 2006 lawsuit which alleged that such devices pose a risk to users' hearing. This issue has brought widespread scrutiny to the question of potential risks to young people's hearing. Teenagers, more than any other age group, expose themselves to loud sound levels during their leisure time. Recreational exposure sources include toys, arcade games, and music (from concerts, discos, car stereos, and Walkman*-style and other personal media players). Modern audio equipment can produce peak sound pressure levels of 130-140 dB which are harmful to human ears. Recent studies have examined teenagers' noise exposures, their attitudes and behaviours towards noise and music, and the consequences of those exposures to their hearing.[1, 2, 3, 4, 5, 6] However, researchers have reported mixed results. Some studies found no effects of recreational music exposure and hearing loss. A study conducted in Brazil assessed the hearing thresholds of 957 young adults between the ages of 14 and 26 years and their exposure to amplified electronic music.[7] The main source of exposure was through personal media players, which was reported by 65% of the participants. However, no significant differences in audiometric thresholds were found between the exposed and the non-exposed. A study of 10,000 people conducted in Germany

**Walkman: Walkman is Sony's audio cassette player brand, now used to market its portable audio and video players. The original Walkman introduced a change in music listening habits (Wikepedia)*