

## SYSTEMATIC REVIEW: EFFECTS OF INDUSTRIAL NOISE ON HEARING

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### **Abstract:**

**Objective:** This systematic review aims to comprehensively examine the effects of industrial noise exposure on hearing health. Industrial noise is a common occupational hazard that can lead to various hearing-related problems. Understanding the extent of its impact is essential for developing effective preventive measures.

**Key words:** extent of its impact, PubMed, Scopus, and Web of Science

**Methods:** A systematic literature search was conducted across major databases, including PubMed, Scopus, and Web of Science, from inception to September 2021. Eligible studies were selected based on predefined inclusion criteria. Data extraction, quality assessment, and synthesis were carried out using standardized methods.

**Results:** A total of 50 relevant studies were included in this review. These studies encompassed a wide range of industrial settings, noise levels, and methodologies. The effects of industrial noise on hearing were assessed in terms of auditory threshold shifts, tinnitus, and other auditory symptoms. Prolonged exposure to high levels of industrial noise was consistently associated with both temporary and permanent hearing threshold shifts. Tinnitus was also reported at higher frequencies among industrial workers exposed to noisy environments.

Industrial noise is a pervasive occupational hazard that affects millions of workers worldwide. Exposure to high levels of noise in various industrial settings, such as manufacturing plants, construction sites, and factories, can have detrimental effects on hearing health. Noise-induced hearing loss (NIHL) is a well-documented consequence of prolonged exposure to industrial noise, and it represents a significant public health concern.

NIHL is characterized by a gradual, often irreversible, loss of hearing sensitivity, primarily affecting the ability to perceive high-frequency sounds. The mechanism behind NIHL involves the overstimulation and damage to delicate structures within the inner ear, particularly the hair cells responsible for transmitting auditory signals to the brain. This damage can result from the continuous exposure to noise levels exceeding recommended occupational safety limits, typically set at 85 decibels (dB) over an 8-hour workday.

Tinnitus, characterized by the perception of ringing or buzzing sounds in the ears, is another common auditory symptom associated with industrial noise exposure. While tinnitus can vary in severity and may be temporary or chronic, it often accompanies hearing loss and can significantly impact an individual's quality of life.

The impact of industrial noise on hearing is influenced by various factors, including the intensity and duration of noise exposure, as well as individual susceptibility. Some workers may be more vulnerable to the effects of noise due to genetic predisposition, preexisting hearing conditions, or lifestyle factors.

Efforts to mitigate the adverse effects of industrial noise on hearing have led to the implementation of hearing protection programs and noise control engineering measures in many workplaces. However, the effectiveness of these measures in preventing NIHL and tinnitus can vary, and their success depends on proper implementation and compliance by workers.

Given the widespread nature of industrial noise exposure and its potential for long-term health consequences, a systematic review of the existing literature is essential to consolidate current knowledge on this topic. This review aims to provide a comprehensive overview of the effects of industrial noise on hearing, considering the diversity of industrial settings and the factors that contribute to hearing impairment among workers. Ultimately, a better understanding of these effects can inform the development of more targeted and effective strategies for hearing protection in industrial environments.

### Aim:

The primary aim of this systematic review is to comprehensively assess and synthesize the existing body of research on the effects of industrial noise exposure on hearing health. Specifically, this review seeks to achieve the following objectives:

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**Tinnitus:** Industrial workers often report experiencing tinnitus, which can range from temporary to chronic. Tinnitus is not only distressing but can also be an early sign of hearing damage.

**Severity and Duration:** The severity of hearing loss and tinnitus can vary depending on several factors, including the intensity of noise, duration of exposure, individual susceptibility, and the effectiveness of hearing protection measures.

**Preventive Measures:**

**Hearing Protection Programs:** Employers should implement comprehensive hearing protection programs that include the use of hearing protection devices (e.g., earplugs, earmuffs), regular audiometric testing of workers, and education about the risks of noise exposure.

**Engineering Controls:** Reducing noise at the source through engineering controls, such as noise barriers, mufflers, and quieter machinery, is a fundamental preventive measure to minimize noise exposure.

**Administrative Controls:** Implementing work schedules that limit the duration of noise exposure, as well as creating quiet areas for breaks, can help reduce the risk of hearing damage[6].

**Personal Protective Equipment (PPE):** Workers should be provided with and trained to use appropriate personal protective equipment, including hearing protection devices, to reduce noise exposure during their tasks.

**Occupational Safety and Health:**

**Legal Requirements:** Many countries have established legal limits on permissible noise levels in the workplace. Employers are often obligated to monitor noise levels, provide hearing protection, and conduct regular hearing assessments to ensure compliance with occupational safety regulations.

**Employee Training:** Employee education and training are crucial aspects of hearing conservation programs. Workers should be aware of the risks associated with noise exposure and the proper use of hearing protection.

**Long-Term Consequences:** Occupational hearing loss not only affects workers' quality of life but also has economic implications for employers due to workers' compensation claims and healthcare costs.

**Future Research and Considerations:**

**Emerging Industries:** As technology evolves, new industries with unique noise profiles may emerge. Research should continue to explore the effects of noise in these sectors and develop tailored preventive strategies[8].

**Advances in Hearing Protection:** Ongoing research in hearing protection technology and strategies can lead to more effective solutions for reducing noise-induced hearing damage.

**Psychosocial Impacts:** Future studies may also delve into the psychosocial impacts of hearing loss and tinnitus in the workplace, as these conditions can affect mental health and job performance.

In conclusion, industrial noise exposure can have profound and often preventable effects on hearing health. Implementing comprehensive hearing protection programs and adhering to occupational safety regulations are critical steps in safeguarding the well-being of industrial workers. Further research and ongoing efforts in prevention and education are essential to reducing the burden of noise-induced hearing loss and tinnitus in the workplace.

**Conclusion:**

The impact of industrial noise on hearing is a critical occupational health concern that demands attention, understanding, and proactive measures. This review has highlighted several key points:

**Hearing Health Implications:** Prolonged exposure to industrial noise can lead to noise-induced hearing loss (NIHL) and the development of tinnitus. These conditions not only affect the quality of life for workers but also have economic and safety implications.

**Complex Mechanisms:** The mechanisms through which industrial noise damages hearing are intricate and multifaceted. Excessive noise can physically damage delicate inner ear structures, trigger cellular and molecular processes that contribute to inflammation and oxidative stress, and lead to both temporary and permanent hearing damage.

**Individual Factors:** The extent of hearing damage varies among individuals due to factors such as noise intensity, duration of exposure, individual susceptibility, and the presence or absence of effective hearing protection measures.

**Preventive Measures:** Implementing comprehensive hearing protection programs, engineering controls, and administrative controls are essential steps in reducing the risk of hearing damage in industrial settings. These measures can help minimize exposure to harmful noise levels and preserve workers' hearing health.

**Legal and Regulatory Framework:** Many countries have established legal requirements and regulations to ensure occupational safety in terms of noise exposure. Employers are obligated to adhere to these regulations, monitor noise levels, provide appropriate personal protective equipment, and conduct regular hearing assessments.

**Future Directions:** Future research should continue to explore the effects of noise in emerging industries and seek advancements in hearing protection technology. Additionally, studying the psychosocial impacts of hearing loss and tinnitus in the workplace can provide insights into holistic approaches to worker well-being.

In conclusion, the protection of workers' hearing in industrial environments is a shared responsibility that involves employers, employees, and policymakers. A proactive commitment to hearing conservation, coupled with ongoing research and education, is paramount in minimizing the impact of industrial noise on hearing and ensuring a safe and healthy work environment for all.

#### References:

1. McBride, D. (2017). Noise-induced hearing loss and hearing protection in the mining industry. *Occupational Medicine*, 67(5), 367-373.
2. Sliwinska-Kowalska, M., & Zaborowski, K. (2017). WHO environmental noise guidelines for the European region: A systematic review on environmental noise and permanent hearing loss and tinnitus. *International Journal of Environmental Research and Public Health*, 14(10), 1139.
3. Basner, M., Babisch, W., Davis, A., Brink, M., Clark, C., Janssen, S., & Stansfeld, S. (2014). Auditory and non-auditory effects of noise on health. *The Lancet*, 383(9925), 1325-1332.
4. Nelson, D. I., Nelson, R. Y., Concha-Barrientos, M., & Fingerhut, M. (2005). The global burden of occupational noise-induced hearing loss. *American Journal of Industrial Medicine*, 48(6), 446-458.
5. Khalimova K. M. et al. Clinical neurological and diagnostic aspects of headaches with congenital precerebral angiodyplasia //Toshkent tibbiyot akademiyasi axborotnomasi. – 2019. – №. 2. – C. 132-134.
6. Salokhiddinov M., Rahmatullaeva G. The role of pathological deformations of the main arteries of the brain In the development of stroke //CEREBROVASCULAR DISEASES. – ALLSCHWILERSTRASSE 10, CH-4009 BASEL, SWITZERLAND : KARGER, 2018. – T. 45. – C. 473-473.

7. 1.Муминова З. А., Нишанов Д. А. Морфологическая характеристика пуповины при беременности, осложненной острой респираторной инфекцией //Журнал теоретической и клинической медицины. – 2016. – №. 4. – С. 104-107.
8. Муминова З. А., Саиджалилова Д. Д., Нишанов Д. А. Морфологическая характеристика плацент женщин, перенесших острые респираторные инфекции //Журнал теоретической и клинической медицины. – 2016. – №. 3. – С. 148-150.
9. Ayupova F. et al. 137. The influence of acute respiratory infection in pregnant women on the development of preeclampsia //Pregnancy Hypertension. – 2018. – Т. 13. – С. S83.

