Journal of Preventive and Population Health
https://jpphealth.com/

REVIEW ARTICLE

Occupational noise exposure and hearing loss in healthcare and industrial workers: a narrative review

Sultan Salman Aldhafeeri

Full list of author information is available at the end of the article

ABSTRACT

Background: Noise-induced hearing loss (NIHL) is a prevalent occupational disease and a serious health issue. NIHL adversely affects the quality of life (QOL) and eventually leads to increasing social isolation and depression. The burden of NIHL varies widely across occupations and regions. There is a lack of studies focusing on NIHL in healthcare settings and the prevention of NIHL in healthcare and industrial settings. Therefore, this narrative review was established to identify the prevalence of occupational NIHL among healthcare and industrial workers and identify the possible preventive strategies. The literature related to the current subject was obtained through an online search process. The eligible articles were reviewed and discussed under three major titles to cover our current subject. We found that occupational NIHL is a significant issue among healthcare workers and industrial workers. The prevalence of occupational NIHL is widely varied based on the field of workers and the type of occupation, even in the same field of work, depending on several factors, including the duration of exposure and level of noise in the working environment, the type of instrument used in work, use of protection, and characteristics of workers. There are various protective measures that can also be used to reduce exposure to noise and reduce NIHL.

Keywords: Occupational NIHL, HCWs, industrial workers, prevention.

Introduction

Noise is defined as any unwanted sound that affects the health of individuals [1]. Noise-induced hearing loss (NIHL) is a prevalent occupational disease that is estimated to be prevalent among 1.3 billion individuals, which represents almost 16% of adult cases of disabling hearing loss (HL) globally attributed to workplace noise exposure [2]. NIHL is a type of sensorineural HL, which progresses over time, and it is most frequently observed at higher frequencies, usually 3–6 kHz [3]. Occupational NIHL is one of the most commonly reported occupational illnesses, especially in developing nations, with a prevalence range of 11.2%–58% [4]. Additionally, males are more prone to be influenced by occupational noise compared to females [5]. HL due to noise can be permanent or transient; the latter occurs following short-term exposure to loud noise and typically returns to normal after a period of rest, whereas long-term exposure to loud noise gradually leads to irreversible damage in most cases [6]. Therefore, the extent of damage depends on the duration and intensity of exposure [5]. Globally, HL resulting from exposure to occupational noise is a serious health issue [7]. NIHL reduces the quality of life (QOL) by hindering communication and limiting social interaction, leading to increasing social isolation. Also, it causes social stress, low self-esteem, depression, poor interpersonal relationships, and impaired self-identity [8]. However, implementation of engineering controls, the use of personal protective equipment (PPE) such as earplugs and earmuffs, and adherence to administrative controls, including limiting time spent in a noisy environment, can reduce exposure to excessive noise [9]. OSHA has determined limits for noise exposure beginning at 90 A-weighted decibels (dBA) for an eight-hour workday with a 5-dBA exchange rate [3]. It was revealed that occupational NIHL burden

Correspondence to: Sultan Salman Aldhafeeri
*Care Medical Hospital, Riyadh, Saudi Arabia.
Email: Ss-205@windowslive.com
Received: 28 July 2026 | **Revised :** 08 August 2026 | **Accepted:** 10 August 2026

varies widely across occupations and regions [4]. Those working in mining, construction, manufacturing, agriculture, transportation, the music industry, and the armed forces are more susceptible to occupational NIHL [8]. However, most related research focuses on occupational NIHL in industrial workers, and few have focused on healthcare workers [10]. Furthermore, there is inadequate focus on the prevention of occupational NIHL. Therefore, this narrative review aims to identify the prevalence of occupational NIHL among healthcare and industrial workers and identify the possible preventive strategies.

Materials and Methods

The recruitment of articles incorporated in this narrative review was performed via searching through the scientific websites, including "PubMed, Science Direct, and Google Scholar." The searching strategy involved using relevant terms as keywords and implementing them in various combinations to obtain all possible articles. The implemented keywords included "Occupational NIHL, Hearing loss, Prevalence, HCWs, Industrial workers, Healthcare settings, Industry, and Protection." The searching procedure was limited to articles published after 2000 till the present. The screening process was carried out by one author; the articles considered for inclusion were original articles, reviews, systematic reviews, and meta-analyses written in the English language, and available for full-text reporting occupational NIHL and/or prevention of occupational NIHL among HCWs and/or industrial workers. Therefore, the exclusion criteria were letters to the editor and/or articles written in a non-English language and/or available only for abstracts. The steps of selecting the eligible articles started with the exclusion of articles published before the predetermined publication date, followed by the exclusion of articles not focusing on the current subject, with checking of the article type to exclude letters to the editor. The next step involved the exclusion of articles written in other languages and those available only as abstracts. Therefore, the number of included articles was 33 articles published between 2005 and 2026. This narrative review was written under three major specific titles to cover the current subject; each author in this work discussed one or more titles. After finishing the article, each author reviewed the whole article.

Occupational NIHL among healthcare workers

Healthcare workers (HCWs) are at an elevated risk of developing NIHL [10]. However, there is limited research focusing on HCWs and occupational NIHL in healthcare settings.

Although the average noise levels in healthcare settings remain below the occupational exposure limits, noise exposure over a long time can adversely affect hearing and general health [10]. However, not all healthcare sectors maintain such limits [11]; the operating theater is considered an environment where noise is present even when it is not actively in use. One of the contributing factors to the noise in the operating room is the presence of high-capacity air conditioning systems, which are essential for the maintenance of optimal conditions for surgical procedures [11].

Furthermore, the level of noise in such rooms potentially increases once the rooms become occupied with medical staff and patients, which originates from the used equipment during surgeries and the staff, where the surgical tools can produce a noise level of 115 dBA and staff can produce a level of 78 dBA, which collectively are alarmingly high and above the exposure limits of OSHA [3]. This indicates that the levels of noise are varied in different healthcare sectors and that each sector may require separate assessment and study. Furthermore, it was demonstrated that surgical instruments across various specialties have been identified as main contributors to the high noise in operating theaters [12].

One study from Saudi Arabia focused on otolaryngologists and HCWs in operating rooms; the study compared 20 otolaryngologists of varying experience levels with a group of 20 apparently healthy non-otolaryngologist medical professionals. It was found that otolaryngologists exhibited higher odds of low-frequency HL [3]. Besides operating rooms, NIHL has been documented in other critical settings, including intensive care units (ICUs) and pediatric intensive care units (PICUs), despite average noise levels remaining below 85 dBA [13,14], indicating the role of cumulative factors such as continuous exposure or prolonged exposure.

One study from Thailand, conducted at a university hospital and enrolling 169 participants, revealed that the prevalence of HL was 17.2% and was greater among those exposed to occupational noise. Furthermore, HCWs working in the pharmacy department and those exposed to antineoplastic drugs exhibited the greatest mean noise levels. Also, the average number of elevated unweighted peak noise events was discovered in the pharmacy and emergency departments. Additionally, other personal factors were found to be associated with HL, including age, gender, and obesity. It was deduced that the high prevalence of HL was discovered among HCWs despite low noise exposure levels [15]. Such findings underscore the considerable impact of combined exposure to occupational noise and the contributing factors such as the department, characteristic factors, and ototoxic agents such as some antineoplastic drugs.

In dental settings, the overall noise level remains below 85 dBA as recommended by the World Health Organization (WHO); however, specific tools such as model trimmers and air blow pipes can generate noise levels exceeding this limit [10]. Consequently, continuous exposure to such noise may adversely

affect hearing in the long term. These adverse effects also can arise from repeated exposure and cumulative noise, which increase the overall noise level, leading to potential risk of hearing threshold shifts [16].

One study focused on dental personnel from a university hospital in Thailand, which included 184 staff members, found that 30.4% had HL, and those older than 30 years who were consuming tobacco and/or alcohol had significantly higher risks (odds ratio (OR) 2.93, 5.81, and 3.21, respectively). Furthermore, technical and maintenance staff were exposed to greater peak and high-frequency noise than clinical or administrative staff, with 8-hour time-weighted averages ranging from 64.3 to 68.9 dBA, all of which were below occupational noise exposure limits [10]. Such findings indicate that there are certain factors that increase susceptibility to noise, including characteristic factors such as age and occupational factors such as working profession, which lead to greater effect and, in turn, a greater tendency to NIHL.

We could not find findings regarding occupational NIHL in emergency settings, although emergency settings are known to be a hospital setting characterized by crowding. Also, we could not find results regarding occupational NIHL among pediatric professionals, hospital technicians, and other professions, which represents a great gap in research regarding this illness among HCWs.

Occupational NIHL among industrial workers

The levels of occupational noise vary with different industrial facilities; in construction sites, metal fabrication shops, and heavy machinery operations, the generated noise levels range between 90 and 110 dBA [17], whereas in textile mills the noise levels range between 88 and 99 dBA, with the weaving room often exceeding 95 dBA [18]. Consequently, the prevalence of NIHL can vary based on the type of industry and occupation. Considering the type of industry, one study revealed that the wood-based industry, hydro services, cement, and polymer were found to have a higher prevalence of occupational NIHL. Also, a higher prevalence of occupational NIHL was found among occupations such as blaster, chipper, carpenters, dryer (knife grinder), and crusher operators [19].

The levels of noise exceeding 85 dBA can produce permanent hearing damage within minutes of unprotected exposure at the highest intensity [17]. The variations in noise levels between different industrial sectors indicate great variations in the risk of occupational NIHL due to the great variations in noise levels in different industrial settings, and the variations in noise levels even in the same industry; this is related to the variations in the instrument used in each industry and its generated level of noise which makes workers at certain industry more prone to NIHL compared to other workers in different industry settings.

Regarding palm-oil mills, HL occurred more frequently among those who were exposed to noise ≥85 dBA compared to those who were exposed to noise of <85 dBA [20]. Even in the case of a borderline-hazardous noise environment, workers accumulating years of daily exposure may develop considerable hearing impairment due to the cumulative impact of noise, which causes damage over time [17]. This indicates the incorporation of other factors that may increase the risk of NIHL. One analysis enrolled 13 studies from seven different countries and revealed that occupational noise ≥85 dBA potentially elevated the risk of HL (aOR = 1.97; P = 0.003) compared to occupational noise <85 dB [21]. Furthermore, prolonged repeated noise exposure at ≥85 dBA can lead to HL; additionally, the louder the sound, the shorter the time it takes for noise to trigger HL to occur [21].

Globally, the prevalence of NIHL varies widely, with a prevalence range in industrial workers of 37%–59.7% depending on the sector [22]. A prevalence of NIHL was reported to be 27.9% among industrial workers in Bhutan. Additionally, significant associations were found between the severity of occupational NIHL and the exposure duration [19].

A previous study from Ireland enrolled 288 industrial workers from construction, manufacturing, and heavy industry sectors and revealed that 64.9% of the participants had HL. Based on severity of HL, the largest proportion (41.7%) had moderate, followed by those who had mild HL (34.2%) and finally severe HL (24.1%). Further analysis revealed that the severity of HL could be predicted by impulse noise exposure, exposure duration, inadequate hearing protection use, and concurrent recreational noise exposure [17].

One study focused on the construction industry and included 500 workers and found that NIHL was prevalent among 13.2%. Additionally, the degree of HL was significantly linked with work experience and the number of hours worked per day [23]. The low rate of NIHL among the workers can be explained by the significant correlation between HL degree and work experience, where more than one-half of the subjects (59.6%) reported work experience of 1–5 years, indicating that more than one-half of the subjects have low experience and spend a few years in work; therefore, a small proportion developed NIHL.

A study from Bangladesh included 185 textile workers exposed to occupational noise levels exceeding 85 dB and found that NIHL prevalence was 58.38%, with a significant association with age (P < 0.001); workers aged 38–47 years had the highest prevalence of HL (80.95%) [18]. Another study focused on workers in a textile mill in Myanmar revealed that 66.4% of the workers were exposed to ≥85 dBA of noise, and the prevalence of HL was 25.7% [24].

Regarding the steel industry, one study from Egypt included 606 workers, with 210 categorized as

unexposed workers, whereas 396 workers were defined as noise-exposed workers. It was found that NIHL was prevalent among 47% of the exposed group compared to 11.9% of non-exposed workers. Furthermore, the probability of NIHL in noise-exposed workers was 6.55 times greater than that in unexposed workers (OR 6.55; $P < 0.001$). Exposure to a noise level of > 85 dBA was associated with greater hearing thresholds at all frequencies, particularly in younger workers below the age of 40 years [25].

A previous analysis included eight articles with a total of 2605 workers from the metal industry, reporting a prevalence of HL of 13.8%–59%. Additionally, the increased risk of HL was linked with smoking, working in regions of high noise levels, working experience, and advanced age [26]. The QOL of individuals complaining of NIHL is adversely affected in terms of participation in social activities and communication with others. Furthermore, those individuals may complain of other diseases, including sleep disorders, headache, and others [27].

Prevention of Occupational NIHL

There is no effective therapy for NIHL caused by persistent noise [28]; however, NIHL is a preventable occupational illness [10]. OSHA has set limits for noise exposure to safeguard workers, beginning at 90 dBA for an eight-hour workday with a 5-dBA exchange rate [3]. However, certain workplace environments, including operating theaters and industrial settings, consistently exhibit noise levels that exceed the recommended limits, posing potential risks to the hearing of workers [3]. Therefore, preventive measures are required to prevent or reduce the impact of occupational noise. The current options to manage occupational NIHL include the implementation of preventive measures to control risk factors and protection from noise [29]. Various preventive interventions can be implemented; however, it remains a challenge to select the most effective ones owing to the varying existing intervention strategies and the varied nature of different work environments [30].

Routine audiometric examination and health education are considered occupational NIHL preventive measures [28]. The regular hearing examination can help detect signs of HL, which enable timely intervention and improved management [31]. Also, administrative and engineering controls for reducing worker noise exposure can be the most effective modalities to reduce noise output and personal noise exposure; however, such modalities are often difficult to implement [28].

Reducing the exposure time spent in a noisy environment is necessary by taking breaks in quieter regions [31]; however, some working settings necessitate spending a long time in a noisy working environment, making it hard to reduce the time of exposure, such as in an operating theater.

The implementation of engineering controls includes using barriers, noise-dampening equipment, or soundproofing material that can help reduce noise levels in the environment [31]. In case reducing noise is not feasible, providing personal hearing protection devices (HPDs) becomes necessary [31]. Hearing protection is a supplementary form of safeguarding that can be performed using earplugs or earmuffs. Such personal HPDs are useful in the protection of occupational NIHL [28].

Earplugs can be placed in the ear canal to reduce exposure to noise; they are available in several styles and materials, including custom-molded options, disposable foam, and reusable silicone. Ear muffs can cover the entire ear and provide more sufficient noise reduction, and they are often used in industrial settings [31]. In a loud environment, noise-canceling headphones can be used to reduce ambient noise. Also, they can help protect hearing while permitting communication and enjoyment of music [31].

Such HPDs should be available in several styles to fit all workers; hence, the employees can select a device that provides comfort, handling, and simplicity to the person. However, education of workers on the usage of HPDs in a noisy work environment is required. Also, training the individuals to select, fit, repair, use, and replace the hearing protectors should be implemented [28]. Furthermore, educational programs are necessary to include education regarding the proper use of HPDs and undergoing regular assessment [31].

Preventive measures in healthcare settings

The healthcare setting and contributing factors may affect the preventive measures adopted. In one study focused on dental settings, it was recommended that the preventive strategies should involve engineering controls to reduce peak noise alongside health promotion targeting modifiable risks such as tobacco and alcohol use [10]. As it is well known that surgical tools across specialties contribute to a high level of noise [12], the implementation of measures to reduce noise in surgical rooms is necessary for the protection of the hearing of workers and professionals [3].

However, there is no previous research focused on the preventive measures among HCWs and the outcomes of using such measures. This is not a surprise, as occupational NIHL gains very low focus and interest in research and literature, despite the consequences that can be caused by occupational NIHL among HCWs, which include losing the ability to communicate with patients, consequently becoming unable to perform their duties in healthcare settings.

Preventive measures in industrial settings

Regarding the industrial field, the implementation of various interventions, including components of hearing conservation programs, training for the proper fitting of hearing protectors, and implementation of

stricter legislation, resulted in low or moderate quality or even lack of evidence on the effectiveness of such interventions to reduce exposure to noise or NIHL. Therefore, new research was recommended [32].

One study reported the impact of using HPDs as a secondary finding, stating that consistent use of such devices resulted in significantly better audiometric outcomes compared to non-users [17]. Also, it was found that not using HPDs was linked with increased risk of HL among metal industry workers [26].

A recent study published in 2026 enrolled 115 workers at an aluminum manufacturing company who were exposed to noise levels exceeding 85 dBA and revealed that 94.8% of workers were aware of the risks of hazardous noise; however, only 51.3% reported always using HPDs. The consistent use of HPD was affected by sex, education level, duration and type of noise exposure, type of HPD, and perceived susceptibility to HL [33]. Such findings confirm the need for training of workers to encourage them to use protective devices and protective measures.

A previous analysis included 17 studies and indicated that most of the studies were conducted in industries. It was found that six studies found a reduction in short-term exposure to noise through engineering/administrative controls; one study found a positive effect due to changes in legislation, whereas five studies have found a positive impact of HPDs in reducing exposure to noise and of educational training in the use of HPD. Additionally, two studies found a reduction in noise levels and an increase in the use of HPD due to the implementation of hearing conservation programs [30]. However, the included studies in the analysis were limited to assessing immediate or short-term effects, with no reporting of long-term effectiveness of such preventive strategies.

Conclusion

Occupational NIHL is a significant problem in healthcare and industry settings. NIHL can adversely affect the QOL of workers in both healthcare and industry. There was various rates of NIHL prevalence; therefore, we could not establish precise prevalence. The prevalence of occupational NIHL is widely varied based on the field of workers and the type of occupation, even in the same field of work, depending on the duration of exposure and the level of noise in the working environment, the different instruments used at work, and the degree of noise the instruments produce. Therefore, NIHL can develop quickly in cases of long exposure with high noise intensity. Furthermore, some demographics and the use of protective tools can influence NIHL progression. Regarding preventive measures, some measures can be generally applied, such as the use of HPDs. However, each field and even each setting in the same field require different preventive measures based on the nature of the working environment and factors contributing to the progression of noise, such as instruments in healthcare settings, which differ based on the different specialties.

Limitations, Strengths, and Recommendations

This narrative review has some limitations; first, we could not provide a comprehensive identification of the exact prevalence of occupational NIHL in healthcare settings due to a lack of studies focusing on the healthcare field, with research focusing on certain sectors, whereas no data could be found regarding other sectors such as the emergency department. Also, we could not provide more details about the preventive measures due to a lack of studies focusing on the investigation of the application and efficacy of preventive measures on occupational NIHL. Other limitations include limited database coverage, inclusion of English articles only, no formal quality assessment, heterogeneous NIHL definitions, reliance on cross-sectional studies, and inability to estimate pooled prevalence. Also, this narrative review has strengths, including the fact that this is the first narrative review focusing on occupational NIHL among both HCWs and industrial workers and that it identifies gaps in research regarding occupational NIHL in healthcare settings. Therefore, further studies are highly recommended to investigate the prevalence of NIHL in HCWs in different healthcare settings and the associated factors. Also, studies investigating the usage and effectiveness of protective measures should be performed. Additionally, training programs for both HCWs and industrial workers are necessary to educate them about the necessity and how to use protective measures.

List of Abbreviations

dBA: A-weighted decibels

HCWs: Healthcare workers

HL: Hearing loss

HPDs: Hearing protection devices

ICUs: Intensive care units

NIHL: Noise-induced hearing loss

OR: Odd ratio

OSHA: Occupational safety and health administration

PICU: Pediatric intensive care units

PPE: Personal protective equipment

QOL: Quality of life

WHO: World Health Organization

Conflict of interest

None.

Funding

None.

Consent to participate

Not applicable.

Ethical approval

Not applicable.

Author details

Sultan Salman Aldhafeeri

Care Medical Hospital, Riyadh, Saudi Arabia.

References:

1. Elboraei YA, Alshammari MS, Al Humaidan MF, Alruwaili AJ, Alghannam AA. An overview of noise-induced hearing loss: systematic review. Int J Pharm Res Allied Sci. 2022;11(3–2022):148–57. https://doi.org/10.51847/RpFihXejAK
2. Vos T, Flaxman AD, Naghavi M, Lozano R, Michaud C, Ezzati M, et al. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet. 2012;380(9859):2163–96. https://doi.org/10.1016/S0140-6736(12)61729-2
3. Obeid DA, Assiri H, AlShalawi J, AlKhaldi A, AlZhrani F. Hearing loss among otolaryngologist and healthcare workers: Case control study. Am J Otolaryngol. 2025;46(4):104635. https://doi.org/10.1016/j.amjoto.2025.104635
4. Chen KH, Su SB, Chen KT. An overview of occupational noise-induced hearing loss among workers: epidemiology, pathogenesis, and preventive measures. Environ Health Prev Med. 2020;25(1):65. https://doi.org/10.1186/s12199-020-00906-0
5. Roublah FA, Alnemari RF, Althumali ZH, Qanadeely EM, Zarnogi DN, Jabbad AH. Occupational Noise-Induced Hearing Loss in Saudi Arabia: A Systematic Review. Cureus. 2026;18(2):e103463-.https://doi.org/10.7759/cureus.103463
6. Anastasios G, Magioula G, Konstantinos K, Ioannis A. Noise and health: review. Indian J Otolaryngol Head Neck Surg. 2022;74(Suppl 3):5482–91. https://doi.org/10.1007/s12070-021-02797-1
7. Nelson DI, Nelson RY, Concha-Barrientos M, Fingerhut M. The global burden of occupational noise-induced hearing loss. Am J Ind Med. 2005;48(6):446–58. https://doi.org/10.1002/ajim.20223
8. Masterson EA. Hearing impairment among noise-exposed workers-United States, 2003-2012. MMWR. Morb Mortal Wkly Rep. 2016;65. https://doi.org/10.15585/mmwr.mm6515a2
9. Basner M, Babisch W, Davis A, Brink M, Clark C, Janssen S, et al. Auditory and non-auditory effects of noise on health. Lancet. 2014;383(9925):1325–32. https://doi.org/10.1016/S0140-6736(13)61613-X
10. Choosong T, Teawanan S, Dindamrongkul R, Khaimook W, Srimeechai S, Bunruang P, et al. Noise-induced hearing loss among dental personnel in a University Hospital: occupational noise exposure and lifestyle factors-a cross-sectional analytical study. Saf Health Work. 2026; 254–61. https://doi.org/10.1016/j.shaw.2026.02.002
11. Mcleod RW, Myint-Wilks L, Davies SE, Elhassan HA. The impact of noise in the operating theatre: a review of the evidence. Ann R Coll Surg Engl. 2021;103(2):83–7. https://doi.org/10.1308/rcsann.2020.7001
12. Sampieri G, Namavarian A, Levin M, Philteos J, Lee JW, Koskinen A, et al. Noise in Otolaryngology-head and neck surgery operating rooms: a systematic review. J Otolaryngol Head Neck Surg. 2021;50(1):8. https://doi.org/10.1186/s40463-020-00487-6
13. Jung S, Kim J, Lee J, Rhee C, Na S, Yoon JH. Assessment of noise exposure and its characteristics in the intensive care unit of a tertiary hospital. Int J Environ Res Public Health. 2020;17(13):4670. https://doi.org/10.3390/ijerph17134670
14. Schmidt N, Gerber SM, Björn Z, Tom G, Alvin C, Klemens G, et al. Effects of intensive care unit ambient sounds on healthcare professionals: results of an online survey and noise exposure in an experimental setting. Intensive Care Med Exp. 2020;8(1):3–4. https://doi.org/10.1186/s40635-020-00321-3
15. Choosong T, Srimeechai S, Dindamrongkul R, Khaimook W. Impact of ototoxic agents and noise exposure on hearing loss among healthcare personnel in a medical university: a cross-sectional analytical study. BMC Public Health. 2025;25(1):4069. https://doi.org/10.1186/s12889-025-25371-8
16. Amine M, Boualam A, Al Jalil Z. Noise pollution in dental education: health risks and mitigation strategies. New Ideas Concern Arts Soc Stud. 2025;2:68–77. https://doi.org/10.9734/bpi/nicass/v2/4989
17. O›Brien S, Murphy A, Kelly C, Walsh S. Hearing loss patterns among industrial workers: A clinical study. Int J Med Sci. 2024;7(2):32–8. https://doi.org/10.33545/26648881.2025.v7.i2a.80
18. Haque MS, Alam MR, Uddin MN, Islam K. Prevalence of Occupational Noise Induced Hearing Loss among Textile Industry Workers of Bangladesh. J Monno Med Coll. 2025;11(1):28–32.https://doi.org/10.3329/jmomc.v11i1.84855
19. Wangchuk P, Dendup P. Prevalence of Occupational noise induced hearing loss (ONIHL) among industrial workers in Bhutan. Bhutan Health J. 2020;6(1):25–31. https://doi.org/10.47811/bhj.96
20. Ristiani N, Fitria H, Oktariani E, Devitria R. Noise exposure, work duration, and hearing loss in a palm-oil mill: a cross-sectional study. J Syifa Sci Clin Res. 2026;8(1):164–73. https://doi.org/10.37311/jsscr.v8i1.36952
21. Salamah II, Sumardiyono S, Murti B. Meta analysis-effect of occupational noise on the risk of hypertension and noise induced hearing loss in industrial workers. J Epidemiol Public

Health. 2023;8(4):422–33. https://doi.org/10.26911/jepublichealth.2023.08.04.01

22. Uddin AS, Naher L, Rahaman ML, Islam MS. Prevalence of Noise Induced Hearing Loss among the Textile Workers. Bangladesh J Otorhinolaryngol. 2023;29(2):89–95. https://doi.org/10.3329/bjo.v29i2.72288
23. Ramalingam A, Davis P, Ganesan P, Velayutham P. Prevalence of Noise-Induced Hearing Loss Among Construction Workers in Puducherry, India. Cureus. 2024;16(10):70–76. https://doi.org/10.7759/cureus.72804
24. Zaw AK, Myat AM, Thandar M, Htun YM, Aung TH, Tun KM, et al. Assessment of noise exposure and hearing loss among workers in textile mill (Thamine), Myanmar: a cross-sectional study. Saf Health Work. 2020;11(2):199–206. https://doi.org/10.1016/j.shaw.2020.04.002
25. Elshaer N, Meleis D, Mohamed A. Prevalence and correlates of occupational noise-induced hearing loss among workers in the steel industry. J Egypt Public Health Assoc. 2023;98(1):11. https://doi.org/10.1186/s42506-023-00135-7
26. Raphela FS. A systematic review of hearing loss and its associated factors among workers in the metal industry. J Otorhinolaryngol Hear Balance Med. 2025;6(2):18. https://doi.org/10.3390/ohbm6020018
27. Sampaio Fernandes JC, Carvalho AP, Gallas M, Vaz P, Matos PA. Noise levels in dental schools. Eur J Dent Educ. 2006;10(1):32–7. https://doi.org/10.1111/j.1600-0579.2006.00393.x
28. Sowndarya Valli A, Sundari Sri MK. An overview of standard preventive measures for noise-induced hearing loss. Int J Dent Med Sci Res. 2022; 4(3):359–362.
29. Pattafi MJ, Mumtaz N, Saqulain G. Occupational noise induced hearing loss: it›s frequency & risk factors. Pak Armed Forces Med J. 2021;71:13–20. https://doi.org/10.51253/pafmj.v1i1.3850
30. Samelli AG, Matas CG, Gomes RF, Morata TC. Systematic Review of Interventions to Prevent Occupational Noise-Induced Hearing Loss-A Follow-up. CoDAS 2021; 33(4): e20190189.
31. Chen KT, Su SB. A review of occupational noise-induced hearing loss: focus on mechanisms and preventive measures. Br Med Bull. 2025;156(1):ldaf020. https://doi.org/10.1093/bmb/ldaf020
32. Tikka C, Verbeek JH, Kateman E, Morata TC, Dreschler WA, Ferrite S. Interventions to prevent occupational noise-induced hearing loss. The Cochrane database of systematic reviews. 2017;2017(7):CD006396. https://doi.org/10.1002/14651858.CD006396.pub4
33. Moroe N, Shandu A. Hearing protection among workers exposed to occupational noise in the south African aluminium industry. Int J Environ Res Public Health. 2026;23(3):306. https://doi.org/10.3390/ijerph23030306