

MEASURES TO PREVENT AND CONTROL ADVERSE EFFECTS OF NOISE EXPOSURE ON HEARING ABILITY IN INDUSTRIAL ENTERPRISES.

It is aimed at detailing organizational and practical measures to protect against negative consequences caused by noise exposure of employees working in industrial enterprises and to reduce these effects. The Recommendation provides the most effective methods of controlling noise levels, along with the necessary technical and organizational approaches.

Noise is a harmful and unwanted environmental sound that is common in industrial production and can seriously damage the health of employees, especially hearing. As a result of the noise level exceeding the norm, employees may develop negative conditions such as hearing loss, stress, and insomnia.

1. Noise sources and damages arising from them

Noise sources can be very diverse in industrial enterprises, for example, high-powered machines, pneumatic tools, high-pressure steam systems, etc. These sources create continuous or intermittent noise during operation. Noise exposure affects not only hearing, but also the general psychological state, which reduces work productivity and reduces the safety of employees in the workplace.

2. Classification of noise levels and their characteristics

Noise levels are usually measured in decibels (dB). The lowest noise level that can have a harmful effect on hearing is considered to be 85 dB. The higher the noise level, the shorter its negative impact time. For example, it is considered safe to work 8 hours a day at a noise level of 85 dB, but for every 3 dB increase, the safe working time is halved.

3. Effects of working under the influence of noise on working conditions

Noise-related working conditions can have a negative impact on the physical and mental health of employees. There is a risk of hearing loss, insomnia, high stress levels and even cardiovascular disease. Also, noise can lead to an increase in the number of accidents due to distraction in the workplace.

The level of noise is divided into different classifications depending on its intensity and level of harm. The unit of measurement of noise level is decibel (dB). Below is the classification of noise levels and their main characteristics:

1. Low-level noise (from 30 dB to 70 dB)

Characteristics: This level of noise is common in everyday life, such as low-pitched conversations or soft music. These noises usually do not harm human health.

Effects: Not harmful to health if not continuously exposed, but long-term exposure to low and high levels can cause fatigue.

2. Moderate noise (from 70 dB to 85 dB)

Characteristics: Most are produced in industrial plants, vehicles or household appliances (eg refrigerators, air conditioners) during operation.

Effects: Exposure to this level of noise over a long period of time can affect a person's general mood and ability to concentrate.

3. High-level noise (above 85 dB)

Characteristics: This level of noise is observed in the example of industrial production, construction sites or traffic noise.

Impact: This noise level is considered very dangerous. If a person is regularly exposed to noise levels of 85 dB or higher, it can cause hearing loss. Hearing loss can develop gradually and become permanent. Also, a high level of noise causes psychological problems such as stress and insomnia.

4. Very high level of noise (above 100 dB)

Characteristics: Very loud noises occur during pneumatic instruments, rock concerts or some industrial processes.

Effects: Very high noise levels can cause hearing damage even for a short period of time. Therefore, working at this level of noise requires special protective measures.

Effects of working under the influence of noise on working conditions

Working under the influence of noise can cause several negative consequences for the working conditions and general health of employees in industrial enterprises. These effects can be seen in the following main areas:

1. Hearing Loss

As a result of prolonged work under the influence of high noise levels, gradually developing hearing damage occurs in employees. This condition is usually irreversible and significantly reduces the working capacity of employees. In order to prevent hearing damage, employees must use personal protective equipment and the noise level must be constantly monitored.

2. Psychological Stress

Noisy environment increases psychological stress and negatively affects the general mental state of employees. Continuous loud noise is distracting, reduces employee engagement and affects safety. Long-term stress can lead to insomnia, depression and other mental illnesses.

3. Physical Health Problems

Noise, especially at high levels, also affects physical health. For example, employees working at a high noise level increase their heart rate and blood pressure, which makes it difficult to prevent cardiovascular diseases. Also, physical problems such as muscle tension and back pain are observed in employees exposed to constant noise.

4. Decreased Work Productivity

Working in a noisy environment reduces productivity as it distracts employees and increases the number of errors. As a result, delays occur in work processes, which affects production efficiency.

5. Impact on Security

Noise is a serious distraction, causing personnel to miss or misunderstand important safety signals. This increases the risk of workplace accidents and worsens safe working conditions.

Material va methods:

1. Research Object and Participants

The participants of the study were employees of different ages and genders working in industrial enterprises and they were selected. Before participating in the study, the purpose and procedures of the study were explained to all participants and their consent was obtained. Demographic information of the participants was collected, including age, gender, professional experience, and working conditions.

2. Data Collection Methods

Questionnaires: Participants completed a questionnaire about their health status and noise exposure. Questionnaires collected information about their hearing levels, noise-related symptoms, and other health problems.

Medical Examination: All participants underwent a complete medical examination, during which their general health status and especially the ENT organs were examined. Hearing tests, tomography and other diagnostic methods were used in the medical examination.

Hearing Tests: The hearing levels of the participants were determined using audiometric tests. Through these tests, it was possible to accurately assess the degree of hearing loss and the effect of noise on the hearing organs.

3. Data Analysis

Statistical Programs: The collected data were analyzed using statistical programs such as SPSS and R. Methods such as chi-square test, t-test and regression analysis were used in these analyses.

Data Analysis: The effects of noise levels on the hearing and health status of employees have been extensively studied. It also analyzed how demographic variables (such as age and work experience) influence these effects.

4. Experimental conditions

Working Conditions: During the study, the participants' working conditions, sources of noise and their intensity were carefully observed and recorded.

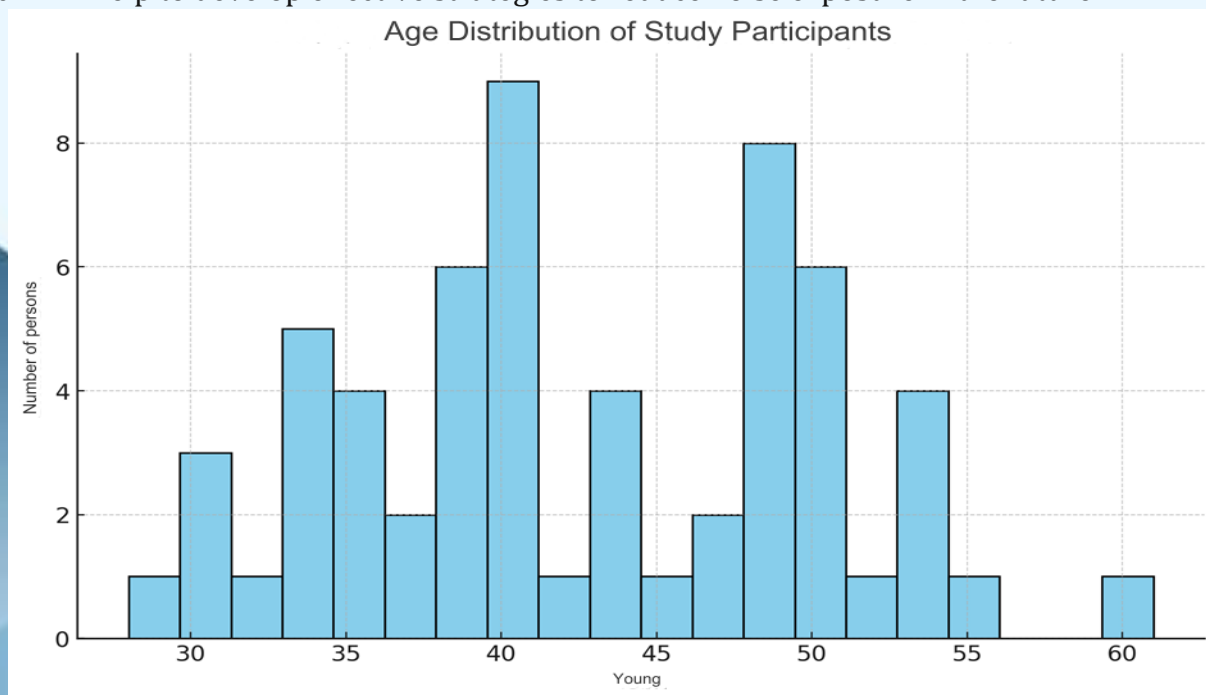
Safety and Ethics: All research procedures were conducted in compliance with safety regulations and ethical standards. The personal data of the participants is processed on the basis of confidentiality.

5. Study Limitations and Potential Mistakes

Sample Size and Selection: Sample size and participant selection methods can affect the generalizability of research findings. For example, if the sample is selected from only one enterprise, it may be difficult to generalize the results to other enterprises or industries.

Probability of Errors: Errors that may occur during data collection and analysis, including incorrect data entry or incorrect selection of statistical methods used in analysis.

Through this detailed approach, the research is expected to provide clear and reliable results, which will help to develop effective strategies to reduce noise exposure in the future.



Most common age groups: The highest columns in the diagram are in the 35-45 age range, the large number of participants in this age group indicates the predominance of this age group in the research sample.

Less common age groups: The number of participants under 25 and over 60 is relatively low, which means that these age groups are underrepresented in the enterprise.

General Trend: According to the histogram, the research participants are mostly middle-aged, representing the demographic composition of the population working in this enterprise.

Results

This study was conducted to assess the impact of noise on the hearing of industrial workers, and the following key findings were obtained through data collection, analysis, and review:

1. Prevalence of Hearing Impairment

According to the results of the study, most of the participants were found to have varying degrees of hearing impairment. In particular, sensorineural hearing loss was the most common diagnosis among employees working in high-noise environments. The prevalence of this condition was analyzed as a function of variables related to age and length of service.

2. Effect of Noise Level

The noise level and its duration have clearly shown the effect on the hearing level of the employees. Hearing loss was more severe in employees working in workplaces with higher than normal noise levels. At the same time, employees with longer exposure to noise had a higher rate of hearing loss.

3. Symptoms and Co-morbidities

Various symptoms and co-morbidities have been observed in connection with noise. In particular, conditions such as dizziness, ringing in the ears, headache and hypertension often occur together with hearing loss. These symptoms exacerbated the negative effects of noise and affected the overall health and productivity of employees.

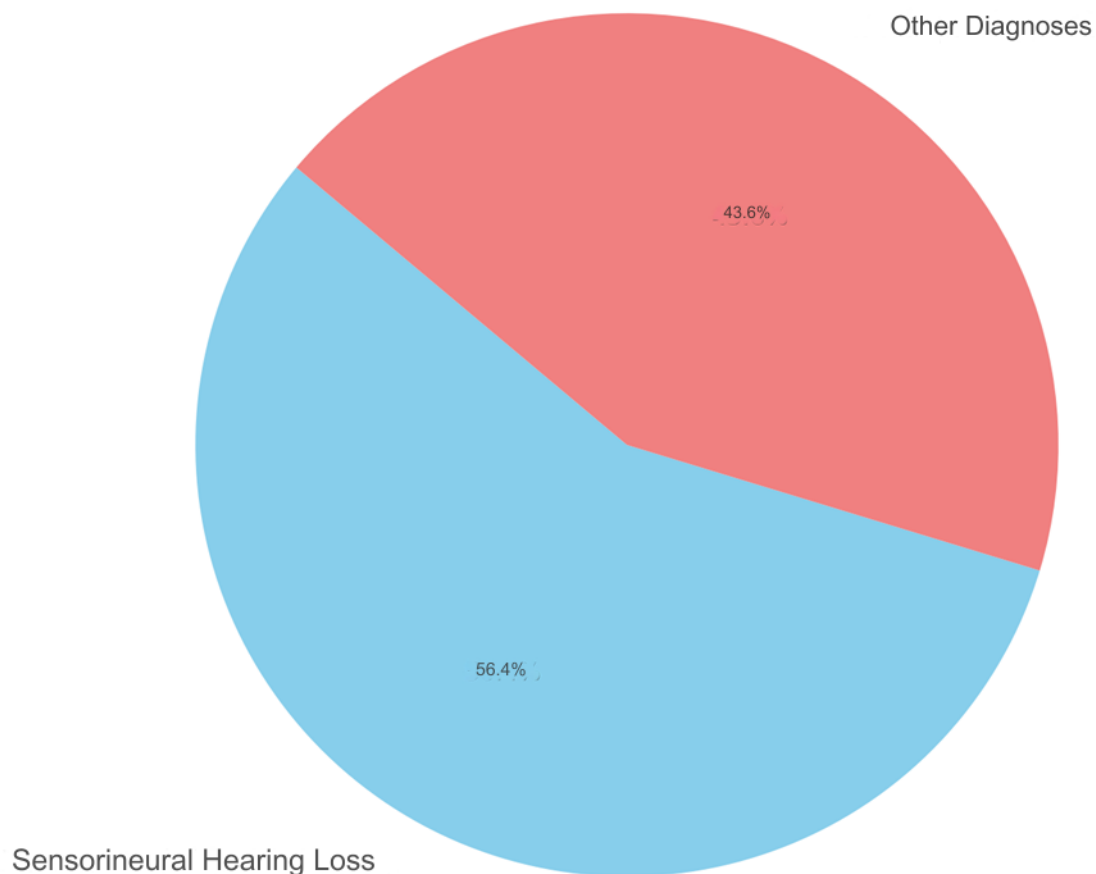
4. Role of demographic variables

The results of the analysis showed that the influence of demographic variables such as age and gender on the status of hearing impairment was significant. The prevalence of hearing loss increases with age, which should be taken into account when developing prevention and treatment strategies.

5. Prevention and treatment recommendations

Based on the results of the study, preventive measures such as noise level control, noise isolation and use of personal protective equipment were recommended. It was also emphasized the need for regular medical examinations and the use of treatment methods to restore hearing.

Overall Proportion of Sensorineural Hearing Loss



Increased Work Productivity: By reducing noise levels, employees can improve their focus and increase their productivity. This increases production efficiency and ensures high profitability for the enterprise.

Reduce Illnesses and Reduce Medical Costs: A reduction in noise levels reduces the likelihood of occupational diseases among employees, which allows the enterprise to significantly reduce medical costs.

Measures to Prevent and Control Adverse Effects of Noise Exposure on Hearing in Industrial Facilities: Cost-Effectiveness

In this chapter, the cost-effectiveness of the proposed method for preventing and managing the adverse effects of noise exposure on hearing in industrial enterprises is calculated.

The results of the study confirm the positive effect of regular monitoring and reduction of the noise level in industrial enterprises on the hearing health and work efficiency of employees. Reducing the noise level not only increases safety in the workplace, but also improves the general working consciousness and health of employees. This, in turn, reduces interruptions in production and increases the company's profit.

The effectiveness of investments is significantly increased by investing in technologies aimed at reducing the noise level. When the working conditions of employees are improved, their morbidity rate decreases, which significantly reduces the medical expenses of the enterprise. Also, the loyalty

of employees to work and the length of stay at their workplaces will increase, which will have a positive effect on the economy of the enterprise.

Conclusion: The implementation of measures to reduce the impact of noise is proving to be beneficial not only economically, but also legally and socially for businesses. By complying with labor laws and improving the working conditions of employees, the enterprise demonstrates its social responsibility and increases its reputation in the public eye. This situation makes the enterprise more attractive for employers and investors, and also serves to improve the enterprise culture and ensure social stability.

Literature

1. Fillips S., Thompson G. (1999) - Iqtisodiy samaradorlikni baholash usullari.
2. 2. Labor Protection Rules - Labor Protection Rules and Standards of the Republic of Uzbekistan.
3. 3. Journal of Industrial Psychology and Ergonomics - Psychological consequences of noise exposure and productivity of industrial workers.
4. 4. Institutes of Medicine and Industrial Health - Scientific-research works on the effect of noise level on the health of employees.
5. 5. National Institutes of Labor and Health - Modern methods and technologies for reducing noise exposure.
6. 6. National Conference on Industrial Safety - Recent Research and Practices in Noise Exposure Management.
7. 7. National Association for the Conservation of Hearing - Noise and Hearing Loss: Strategies for Prevention and Treatment.
8. Henderson, D., & Bielefeld, E. (2021). "Noise-Induced Hearing Loss: Scientific Advances." Springer.
9. European Agency for Safety and Health at Work. "Exposure to Noise in the Workplace: A European Overview."
10. Suter, A.H. (2019). "The ability of occupational noise exposure to predict hearing loss." Occupational and Environmental Medicine.
11. Goelzer, B., Hansen, C.H., & Sehrndt, G.A. (Editors) (2001). "Occupational exposure to noise: Evaluation, prevention and control." Dortmund: Federal Institute for Occupational Safety and Health.
12. Fligor, B.J. (2022). "Noise Exposure and Hearing Health in the 21st Century." Hearing Research.
13. U.S. Department of Labor, Occupational Safety & Health Administration. "Occupational Noise Exposure: Health Effects."
14. Davis, R.I., & Qiu, W. (2018). "Environmental noise pollution: Noise mapping, public health, and policy." Elsevier.