

**UNIVERSITI TEKNOLOGI MARA**

**OCCUPATIONAL NOISE, CHEMICAL EXPOSURE AND  
HEARING LOSS AMONG WORKERS IN PAINT  
MANUFACTURING FACTORY**

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**Project Paper submitted in partial fulfillment of the requirements for  
the degree of Bachelor in Environmental Health and Safety (Hons.)**

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### Declaration by Student

Project entitled "Occupational Noise, Chemical Exposure and Hearing Loss among Workers in Paint Manufacturing Factory" is a presentation of my original research work. Wherever contributions of others are involved, every effort is made to indicate this clearly, with due reference to the literature, and acknowledgement of collaborative research and discussions. The project was done under the guidance of Mr. Nasaruddin Abd Rahman as Project Supervisor and Tuan Haji Mohd Pozi Bin Mohd Tahir as Co-Supervisor. It has been submitted to the Faculty of Health Sciences in partial fulfillment of the requirement for the Degree of Bachelor in Environmental Health and Safety (Hons).

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## Abstract

### Occupational Noise, Chemical Exposure and Hearing Loss among Workers in Paint Manufacturing Factory

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**Introduction:** Studying the impact of combined exposure to both industrial pollutants such as noise and Volatile Organic Compound (VOC) on hearing was scarcely pointed. The objective was to study the association between noise and VOC exposure to the level of hearing impairment among workers who exposed to both noise and a mixture of organic solvents simultaneously in a paint manufacturing factory, Jotun Paint (M) Sdn Bhd in Shah Alam.

**Methodology:** In this comparative cross-sectional study, simple random sampling method used to select the subjects. The exposed group (Group A) consisted of 31 workers who work in the Production Area. The unexposed group (Group B) consisted of 31 workers who work in the Administration Area. The unexposed group was matched to exposed group in age, sex, years working in this factory, job task, hobbies, previous employment, previous medical history, present medical condition and exposed to both noise and VOC through the questionnaire distribution. Noise level at the work places was carried out using a Calibrated Precision Sound Level Meter Type 407703. Personal noise dose of each subject was measures using Dosimeter Model EG3 and EG4 while Environmental Monitor Model EVM-7 used to measure the VOC level. Level of noise had been measured for 8 hours during working hour. All studied samples were subjected to complete Audiometric Test using pure tone Audiometer (Silent Cabin Model 'S'). The result from the audiogram was used as sign of hearing loss.

**Results:** The level of VOC exposure in both solvent and water based area were exceed the permissible limit stated in Code of Practice on Indoor Air Quality, 2010 with 7.54ppm and 6.0ppm respectively. Levels of noise exposure below the action level which complying with the standard in Factories and Machinery (Noise Exposure) Regulations 1989. Hearing level was comparable in group A & B. Based on the Pearson Correlation Test conducted, there is linear relationship between noise, VOC and hearing loss ( $p < 0.05$ ). From the outcome of the test of Multiple Regression conducted, it has been proved that the level of VOC exposure significantly causes the effect, and it is the main factor of affecting hearing level in this study ( $p < 0.042$ ). The T-Test conducted proved the mean difference between level of hearing of exposed and unexposed group are statistically significant ( $p < 0.001$ ). It shows that the exposed group was developing hearing loss due to the exposure to high VOC level while the unexposed group is not having any ear damage because they did not exposed to high VOC level in anyway.

**Conclusion:** Workers exposed to both noise and VOC suffered from the highest proportion of hearing loss compared to those not exposed to both noise and VOC factor, therefore it can be concluded that solvents may interact synergistically with noise. (Nature and Science 2010, 8(6):95-99). Hierarchy of control is recommended in reducing the VOC exposure among both A & B group.

*Keywords: Hearing Loss, Noise, Volatile Organic.Compound.*