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IDENTIFYING THE FACTORS RESPONSIBLE FOR ROAD TRAFFIC NOISE ANNOYANCE - CASE STUDY: DELHI, INDIA

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Abstract

Traffic noise annoyance is considered to be the forerunner for other health problems. Identifying the factors having significant role in increasing the level of annoyance is important to reduce the health effects of traffic noise. Current study investigated the health impacts of traffic noise pollution and at the same time Multinomial Logistic (MNL) Regression model and Artificial Neural Network model were developed to identify the factors (demographic factors, noise exposure factors, environmental factors, road related factors and traffic related factors) responsible for traffic noise annoyance. LAeq was monitored on 31 sites along with common noise descriptors. LAeq values were 68.41 to 81.40 dBA during peak hours and 68.45 to 83.23 dBA during off peak hours, which are above the permissible limits of CPCB and WHO. A questionnaire survey was performed on 400 adult residents (294 males and 106 female), aged 20-70 y. Noise annoyance was measured on a self-rated scale (1-5). Multinomial Logistic Regression model identified significant correlation with regard to seven independent variables (with $p < 0.05$), including factors like gender (X1), age (X2), income (X3), exposure in years (X6), daily exposure (X7), LAeq (X8) and traffic volume (X9). Pseudo R-Square values suggest that the MNL regression model developed performed well in explaining the variation of the dependent variable, with Nagelkerke's R-Square value 0.95 indicating a strong fit. The ANN model confirmed, income as the most significant variable followed by age and exposure in years. The overall prediction accuracy of 94.3% for MNL regression and 85.7 % for ANN model was achieved. These results can be utilized by the health officials to plan effective measures to reduce the impact of traffic noise on exposed population especially in sensitive/silent zones like educational institutes, schools, hospitals and offices.

Key words: artificial neural networks, health impacts, multinomial logistic regression model, noise annoyance

Received: January, 2024; Revised final: May, 2024; Accepted: June, 2024; Published in final edited form: December, 2024

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