

ABSTRACT

Environmental pollution by noise is a major public health problem in both developing and developed countries. Environmental noise (also termed - community noise, residential noise or domestic noise) is defined as noise emitted from all sources other than noise within the industrial work places. The main sources of environmental noise are traffic noise (includes road, rail and air traffic), industrial noise (outside of the industry), construction noise, public services noise and noise from neighborhoods. Noise is an inevitable companion of development process and is becoming an increasingly dangerous and disturbing environmental pollutant. Excess noise produces number of health effects and noise induced hearing loss (NIHL) is probably the most serious health effect of it.

The present study was carried out to determine the pattern of day time noise pollution and prevalence and correlates of NIHL among traffic policemen in the city of Colombo, Sri Lanka. The study comprised of three components. The first component was a cross sectional descriptive study to determine the day time noise levels in identified locations in the city of Colombo, to describe the noise levels of selected sources of noise in the city of Colombo and to predict the level of noise based on traffic data using computer software. The second component was also a cross sectional descriptive study to determine the prevalence and socio-demographic correlates of NIHL among traffic policemen employed in the city of Colombo. The third component was a validation study to develop and validate a self administered questionnaire as a screening instrument to detect NIHL.

The study was carried out in the city of Colombo from November 2011 to June 2012 and the traffic policemen who were working in the city of Colombo were included in the study. The noise measurements were carried out in purposively selected 60 places. Measurement of noise was taken for a total of six hours duration on a week day to determine the noise level of a place. Equivalent continuous A weighted sound pressure level (LA_{eq}) was measured while getting L_{10} , L_{50} , L_{90} , and LA_{max} at the same time. LA_{eq} for peak and off-peak traffic hours (three hours each) was measured separately to obtain final LA_{eq} (8hrs) value. Measuring of noise levels was done by using a Rion NL 52 Class I sound level meter.

LA_{eq} (8hrs) ranged from 76.6 dB to 84.0 dB with the median of 80.9 dB within the city area while recommended LA_{eq} level for the city area was 63.0 dB. Noise levels of the city of Colombo were 13.3 dB to 21.0 dB higher than the recommended value and this 13.3 dB

implies the increase of sound pressure level (SPL) by 21.4 times while 21.0 dB implies the increase of SPL by 125.9 times above the recommended noise level.

LA_{eq} for the peak hours of the traffic ranged from 76.6 dB to 83.6 dB while 80.9 dB was the median. LA_{eq} for the off-peak hours of the traffic ranged from 76.2 dB to 84.4 dB with the median value of 80.4 dB. There was not much difference in noise levels in peak and off-peak hours of traffic.

The commonest cause for noise in the city of Colombo was traffic noise while noise from lottery sellers and noise from musical shops also contributed to noise pollution to some extent. Noise levels of all type of vehicles which run within the city were measured and it was in the range of 80.2 dB (cars) to 105.2 dB (diesel three wheelers). The three noisiest vehicles in the city were diesel three wheelers, large buses with normal engines and petrol two stroke three wheelers while least noisy three vehicles were cars, jeeps and pickups.

Noise levels of some places were predicted using the IMMI noise mapping software. Traffic data from the Transport Laboratory of University of Moratuwa was used to provide necessary inputs to IMMI software. The predicted noise levels were compared with observed noise levels of same place and it was found that the software was able to predict the noise level with an overestimation of around 3.0 dB.

Hearing assessment of the traffic policemen was carried out by doing pure tone audiometry on a sample of 287 policemen. It was found that the prevalence of NIHL among traffic policemen working in the city of Colombo was 41.1% (95% CI = 35.5% – 46.9%). A third of those having NIHL had major high frequency hearing loss.

The socio-demographic correlates for the NIHL were assessed by using an interviewer administered questionnaire and there were 23 socio demographic characteristics which showed statistically significant associations with NIHL according to bi-variate analysis. However only “age” of the participant showed statistically significant association with major NIHL (OR = 1.088, 95% CI; 1.055 – 1.123) and only “duration of work as a policeman in career” showed statistically significant association with any type (minor or major) of NIHL (OR = 1.007, 95% CI; 1.005 – 1.009) according to multi-variable analysis.

A self administered questionnaire (SAQ) consisting of 22 items was developed by the PI to be used as a screening tool to detect NIHL. However, the results indicated that the SAQ cannot be used for the intended purpose.

These results highlight the need to take effective actions to lower the noise level in the city. As a first step the relevant authorities such as Central Environmental Authority should take action to implement existing rules and regulations regarding noise pollution. Consultation of the scientific community for the upward revision of recommendation regarding noise level for a Municipal Council area is suggested as lowering of noise levels to 63 dB in a city may be an unrealistic target. Curtailing of importation of diesel three wheelers and large buses with normal engines is suggested as those are producing more noise and better alternatives are available.

Introduction of new regulations to reduce the LA_{max} of the horns of the vehicles is suggested. It is recommended to explore the feasibility of using surveillance cameras already installed in the city of Colombo to obtain traffic data and to use that data as input for the IMMI software to estimate noise levels.

It is also recommended to conduct pre recruitment hearing assessments for the policemen and periodic hearing assessments to the traffic policemen. To explore the feasibility of reducing the number of hours per day spent on the road by traffic policemen by increasing the pool of traffic policemen is suggested to the Department of Police. It is suggested that traffic policemen, who are suffering from NIHL, should be immediately transferred to a different branch of the Police.

Key words: Noise pollution, Environmental noise, Noise induced hearing loss, Vehicular noise, Traffic policemen, Noise prediction

