

# THE EFFECTS OF COMMUNITY NOISE ON THE HEALTH OF HONG KONG RESIDENTS: A PILOT STUDY

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**Introduction** Community noise has been shown to produce stress, disturbs sleep, and induce an annoyance reaction.<sup>1,2</sup> It has also been incriminated as a risk factor for cardiovascular diseases, including ischaemic heart disease and hypertension, and raised serum lipid concentrations.<sup>3, 4, 5</sup> Hong Kong is a city with over 6 million population living in a small land area of just over 1000 km<sup>2</sup>. A substantial proportion of residents are exposed to severe levels of community noise from traffic<sup>6</sup> and other sources. However, the influence of community noise on the health and well-being of the residents have not been studied. To assess the source of community noise and its effect on the residents' health, we conducted a questionnaire survey on residents in two housing estates that were exposed to various sources of community noise to ascertain the predominant source of community noise, the self-reported effect of noise exposure to their mental well-being and sleep, and their reactions to noise.

**Methods** We conducted a cross-sectional study on 377 residents in two residential estates (201 in Estate A and 176 in Estate B) purposively selected in this pilot study. Estate A, (a private housing estate exposed to high levels of traffic noise) was sandwiched between a major highway and a railway line, while Estate B (a public housing estate, and a somewhat less noisy environment) was situated off the main road. One building block in each estate (out of 5 in Estate A and 6 in Estate B) was randomly chosen. Residents aged 14 and above, who had lived in the estate for one year or longer, were recruited from all dwelling units of the block in each estate. A questionnaire, developed from various sources and adapted for the Chinese community in Hong Kong, was administered to the subjects that sought information on the predominant sources of community noise, their perceived annoyance, disturbance of sleep, their sensitivity to environmental noise, the prevalence (in the past 3 months) of 10 common symptoms (headache, dizziness, nervousness, irritability, tiredness, neck pain, backache, gastric discomfort, anorexia and depression) and the prevalence of doctor-diagnosed chronic illnesses (hypertension, coronary heart disease, diabetes mellitus, hyperlipidemia, peptic ulcer and hearing loss) that may be associated with noise exposure. Annoyance by noise was assessed by a ten-activity interruption scale (each measured with a 5-point Likert scale) and by four individual questions. Sensitivity to noise was measured by a 20-item scale adapted from Weinstein.<sup>7</sup> Sleep disturbance was measured by 11 questions – 7 that asked about various sleep problems and 4 that sought quantitative data on sleep (duration, etc.). In addition, measurements of noise levels in terms of Leq (10 min) were made at different levels of the blocks in both estates in the daytime (1100 to 1800) and at night (2200 to 0030) to give a rough indication of the noise climate there. We used factor analysis of the scales used for measuring annoyance, sensitivity to noise, and sleep.

**Results** 648 residents from the two estates (from 88.9% of the targeted households) participated in the study. A total of 377 (58.2%) residents completed the questionnaire satisfactorily. The overall proportions of males and females were 44% and 56% respectively and were similar in both estates. Estate B had a higher proportion of older residents (12.5%

were aged 60 and over, compared with 8.5% in Estate A). The top sources of outdoor noise in Estate A were road traffic and railway traffic (almost equal in ranking from the residents' response), followed by renovation works as a distant third. In Estate B, road traffic was the only dominant source of outdoor noise. Television was the only dominant source of indoor noise in both estates. Two factors emerged from the annoyance scale. Factor One (that involved sleep and rest) accounted for 70% of the total variance, while Factor 2 (that involved reading and listening problems) accounted for 12% of total variance. The proportions of residents reporting they were very annoyed or annoyed were high - at 74% in Estate A and 64% in Estate B respectively. The overall prevalence of sensitivity to noise was 55% (56% in Estate A and 53% in Estate B). More than one in four residents in both estates (26.6% in Estate A and 27.5% in Estate B) reported that they slept badly. The proportions of residents with all 6 six doctor-diagnosed chronic illnesses were higher in Estate B (with a larger population of elderly), with diabetes and hyperlipidemia reaching statistical significance. The prevalence of all 10 common stress-related symptoms was higher among Estate B residents, six of which were statistically significant. The noise levels in Estate A differed little between day and night, at about 70 dBA ( $L_{Aeq}$ ) in both directions (highway and railway line). The noise levels at Estate B was about 68 dBA ( $L_{Aeq}$ ) in the day, and about 65 dBA ( $L_{Aeq}$ ) at night.

**Discussion** This is the first epidemiological study on environmental noise and its association with health and disease in Hong Kong. The sample size was small, and the choice of estates was not representative and only limited to two. The moderate response rate (at 58%) could have resulted in selection bias. Traffic noise was the predominant noise source and a perceived problem in both estates. The noise levels were high in both estates and relatively constant in Estate A (a characteristic feature of highway road traffic in the city). Although the prevalence of chronic illnesses and stress-related symptoms were higher in Estate B than in Estate A, both health indicators were affected by other factors (e.g., age, social class, etc), and our prevalence data were not adjusted for these confounders. The proportions of noise-sensitive individuals were similar, and the more overt reactions to noise - annoyance and sleep disturbance, were substantial in both estates, indicating the perceived adverse effects of environmental noise on the mental and physiological well-being of the residents. A more in-depth study on communities exposed to a larger difference in environmental noise levels would enable a better understanding of the quantitative effect of environmental noise on the mental and physical health of the community.

## References

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