AIRCRAFT NOISE AND HEALTH IN THE VICINITY OF THE NEW TOKYO INTERNATIONAL AIRPORT

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Introduction Health effects of aircraft noise in the vicinity of airports have been suggested in some epidemiological studies[1] with showing a potential association between chronic stress due to highly annoying situations and stress-related mental or physical illnesses. In the present study, such possibility was investigated for the surrounding area of the New Tokyo International Airport using a health questionnaire called as the Todai-Health-Index (THI), which was developed by Aoki et al. (1974)[2] and has been used widely for qualitative and quantitative evaluation of health status.

Subjects and Methods The study area consisted of a "noisy area" surrounding the airport and its "control area (an area close to the airport but not affected by aircraft noise). The noisy area was defined officially as the area with WECPNL level of above 75 according to the original WECPNL contour determined in 1978. However, in the present study, WECPNL levels were recalculated based on recent sound measurements for the residences in the study area as reported elsewhere and used throughout the following analyses. The noisy area was divided into two zones with a cutoff level of 75 or 3 zones with those of 75 and 80 according to the new WECPNL levels.

The subjects were 1,326 women aged below 80 years who were recruited randomly with participation rates over 60 % in both of the noisy and control areas and interviewed during winter (December-January, 1999-2000) or summer (June-July, 2000). Eligible subjects for analyses were 223 for the control area, and 272, 317 and 57 for the areas of WECPNL of below 75, 75-80 and 80+, respectively.

Interview was performed using both of a general questionnaire with respect to demographic profiles, environmental or noise problems, annoyance, noise sensitivity or medical history of diseases and the THI questionnaire (130 questions). Each of annoyance and noise sensitivity was rated by a scale of 5 degrees from none to very high and the upper two of "very high" and "high" were combined in the present study and denoted as "high". According to the subjective complaints examined by the THI were summarized as scores for 12 scales or *1. multiple psychological complaining, 2. respiratory symptoms, 3. eye/skin symptoms, 4. oral/ anal symptoms, 5. digestive system symptoms, 6. impulsive personality, 7. fictitious personality, 8. emotional instability, 9. depressive mood, 10. aggressive personality, 11. neurotic symptoms, 12. irregularity of daily activities*. Two discriminant scores for neuroticism and psychosomatic diseases were also calculated.

Statistical analyses were performed with GLM or FREQ procedures in the SAS software (Version 8.0e) Age, occupation, smoking, drinking, living length and season of the interview were adjusted in the GLM model.

Results and Discussion Basic characteristics of the subjects are summarized in Table 1. Only living length was significantly longer in the noisy area than in the control area. Prevalence rates of high annoyance and high noise sensitivity were 0.5 % and 7.5 % in the control area, respectively, while they were 50.2 % and 26.4 % in the noisy area. Most of the subjects with high noise sensitivity were observed among those complaining high annoyance. .

The mean THI scores showed no significant difference between the control area and the noisy area in general with an exception of *10. aggressive personality* showing a slightly higher value in the noisy area than in the control area. However, when they were compared among the 4 areas, the mean scores of *7. fictitious personality* and *11.neurotic symptoms* were significantly higher in the WECPNL80+ area compared to the control area. But, if high noise sensitivity was adjusted with adding it as a covariate in the GLM model, those differences became insignificant. Moreover, it was found that, in the WECPNL80+ area, 2 subjects whose discriminant scores for neuroticism were the highest among all subjects in that area, had medical histories of depression and brain symptoms. The above significant differences disappeared with excluding those two subjects.

Medical hypertension was more prevalent among the aged subjects than the younger as usually observed. Its prevalence rates were 21 % (47/223) in the control area and 27 %(73/272), 23 % (73/317) and 30 %(17/57) in the areas with WECPNL of below 75, 75-80 and 80+, respectively. No significance of its difference among the 4 areas was indicated, however. Moreover, neither high annoyance nor high noise sensitivity was associated with the risk of medical hypertension when examined by logistic regression analyses (data not shown). Thus, it is suggested that the slightly higher prevalence rate in the noisy area could not be attributed to either aircraft noise *per se* or noise-induced high annoyance or noise sensitivity.

Conclusively, it was apparent that aircraft noise has been causing high annoyance with indicating that adaptation to the psychological responses must be hard to occur, if any. On the contrary, there was no appreciable difference in the THI scores or prevalence of medical hypertension among 4 areas in general, suggesting apparent noise effects on illnesses are unlikely in the vicinity of the New Tokyo International Airport. However, the implication of an increase of subjects feeling their noise sensitivity as high with the elevation of aircraft noise level should be examined further in terms of its relation to their higher scores especially for neurotic symptoms.

Table 1 Some characteristics of the subjects

		Control area	**Noisy area**	**P**
Season (year)	Winter	105 (47.1 %)	336 (50.6 %)	
	Summer	118 (52.9 %)	328 (49.4 %)	
Mean age (SE)		52.4 (1.1)	53.6 (0.6)	
Occupation	Farmer	30 (13.5 %)	126 (19.0 %)	$ (p<0.1)
	Non-farmer	193 (86.5 %)	538 (81.0 %)	
Smoking (cig./day)	20 or less	209 (93.7 %)	641 (96.5 %)	$ (p<0.1)
	20+	14 (6.3 %)	23 (3.5 %)	
drinking	little/none	209 (93.7 %)	641 (96.5 %)	
	frequent	14 (6.3 %)	23 (3.5 %)	
Living length (years)	10 or less	39 (17.5 %)	99 (14.9 %)	P< 0.0001
	10-19	54 (24.2 %)	94 (14.2 %)	
	20+	130 (58.3 %)	471 (70.9 %)	

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