The effect of aircraft noise exposure on quality of life and psychiatric problem: a report of the Bangkok Airport Study

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INTRODUCTION

Opening in 1914, Don Muang (DM) Airport or Bangkok international airport was the first International Airport in Thailand. It was located in the northern suburbs of Bangkok in the area of 6.21 square kilometers. It was estimated that 80 airlines and more than 250 million passengers with 160,000 flights and 700,000 tons of cargo are used at the airport every year. Don Muang Airport was closed on September 28, 2006 and began to service again on March 25, 2007 for only domestic and charter flights, approximately 90,000, in 2007.

In order to become an aviation hub of Southeast Asia, the Royal Thai Government constructed a new international airport named Suvarnabhumi (SVB) airport. The new airport was located 25-kilometer away and in the eastern suburbs of Bangkok adjacent to Samutprakarn province. This inland airport was approximately 32.38 square kilometers, the new modern biggest international airport. It started full operation on 29 September 2007. This airport consists of 2 runways which could service 76 flights per hour, 45 million passengers per annum and 3 million tons of cargo per annum. The number of flights passing by Suvarnabhumi International Airport was recorded as 270,283 flights in 2007 (AOT 2007).

After opening the SVB airport, there is an ongoing social and political debate regarding the aircraft noise exposure which caused the change the quality of life (QOL) and increased psychiatric problem. WHO reported the health effect due to noise pollution. Aircraft noise could also be interference with speech communication, disturbance of rest and sleep, psychophysiological, mental and performance effects, effects on residential behavior and annoyance, and interference with intended activities (Berglund et al. 2000). All of these effects could have tremendous impacts on quality of life and develop psychiatric problem among residents living around the airport. However, the study about non-auditory effects is still limited.

The lack of knowledge about causal and temporal relationship between aircraft noise exposure and various health effects have prevented control measures for several airports. The opening of an inland airport like this was, therefore, an opportunity to demonstrate that quality of life and psychiatric problem could be affected by aircraft noise exposure.

METHODS

Study area

The study areas in this study were communities around two international airports, SVB airport and DM airport. At the beginning of the study, before the opening of the new international SVB airport, we include the study communities of two areas by using the secondary data of noise contour map (MNRE 2001; Boeing 2005). Communities having NEF > 35 were selected as the study communities. The research team walked around in the areas to select the communities which had no confounding noise and same social structure. Finally, we selected 7 communities in this study; all of them were located within the range of 5 kilometers from either of each airport. One year after the open of the SVB, we followed up the same communities which was selected in the first survey.

Tool

The questionnaire comprised of questions on potential determinants of variables such as personal characteristics, living condition, routine behavior and World Health Organization's quality of life (WHOQOL). The Thai WHOQOL –BREF version consists of 26 items which can be grouped into 4 dimensions namely, physical, psychological, social and environmental domains. Each item has 5 rating scores, from 1-5 score. Thus, the total scores ranges from 26-130. The reliability of this questionnaire was indicated by Cronbach's alpha coefficient, 0.9 (Mahatnirunkul et al. 1998).

For psychiatric effect, Thai version of self-administered General Health Questionnaires (Thai-GHQ 28) was used as a tool to detect having psychiatric problems in the communities. It is composed of 28-items. It can detect four domains of psychiatric problems namely somatic symptoms, anxiety and insomnia, social dysfunction and depression. Each item has four choices of answers; 1-not at all, 2-no more than usual, 3-rather more than usual and 4-much more than usual. For Thai GHQ, the scoring system for GHQ by Goldberg score (0-0-1-1) and the subject showing the score less than3/4 were categorized as "exceptional case" (Nilchaikovit et al. 1996).

Data collection

Community response change in quality of life associated with the operation of the new International Airport was documented in two rounds of community survey. One round was conducted from August to September 2006 prior to the starting of the new airport operation while a second round was undertaken one year later. Self-administered questionnaires were distributed among adults older than 18 years of age by non-probability sampling i.e. to all households on the survey day. One person from each household, who filled in the questionnaire, became subject in this study. Data validity was checked when the questionnaires were collected.

Statistical analysis

Statistical analysis were performed using SPSS for windows (version 11.5, SPSS Incorporated). For quality of life, comparison of baseline quality of life score between the groups was tested by t-test. The difference QOL scores between before and after opening SVB airport in each area was tested by pair t-test. The difference quality of life scores were calculated by subtracting the "before" score from the "after" score. These scores between two areas were tested by t-test. For psychiatric problem, the

prevalence or incidence rate of exceptional GHQ was presented by percentage and 95% confidence interval. The difference rate between two areas was tested by Chi-square test. A p-value of less than 0.05 was considered significant.

RESULTS

The total number of cohort in this project was 972 subjects at the beginning. After one-year follow up, some subjects are not reachable or not capable of responding or refused to participate again or move to other area. Finally, 417 subjects participated in the second-time survey, thus, yielding 42.9 percent of response rate. However, there was no difference in quality of life score among the respondents and non-respondents comparing between DM and SVB areas.

Most of subjects were female, middle aged, with low to medium education and medium socio-economic status. Residents living around SVB Airport had older age, lower level of education, more positive money status, but had longer duration of living in the area, higher proportion of underlying diseases than those living around DM Airport.

Quality of life

The descriptive QOL score, before and after opening of new international airport of each community, were shown in Table 1. Before the opening of the new airport, the mean QOL scores of both areas were not statistically different (p=0.52). However, at one-year follow up, the mean QOL scores of residents living around the new airport were decreased. The different scores between before and after the opening of residents around SVB Airport decreased significantly (p<0.001) while the difference scores of residents around DM Airport were not significant. However, the magnitude of difference and dispersion of variance was larger among SVB residents than DM residents.

Table 1: Descriptive QOL score classified by area and time period

Study sites	n	Mean ± Standard deviation (S.D.) of score		
		Before	After	Difference
SVB				
- SVB 1	36	92.6±12.8	82.9±16.2	-9.1±14.3
- SVB 2	25	93.3±10.2	92.0±15.3	-1.3±15.2
- SVB 3	96	88.1±13.9	87.0±13.5	-1.1±12.3
- SVB 4	84	91.8±13.9	83.3±11.5	-8.5±15.2
Total	**241**	**90.6±13.5**	**85.7±13.6**	**-4.9±14.4**
DM				
- DM 1	103	90.5±12.1	90.8±10.9	0.3±9.7
- DM 2	44	94.1±11.8	94.2±11.0	0.1±10.1
- DM 3	29	90.6±10.4	94.8±10.9	4.2±9.0
Total	**176**	**91.4±11.8**	**92.3±11.0**	**0.9±9.7**

Psychiatric problem

Prior to the opening of SVB airport, the prevalence of exceptional GHQ was 21.99 % (95% CI = 16.73-27.26) in SVB-group and 18.18 %(95%CI = 12.43-23.94 %) in DM-group. No significant statistical difference was found in prevalence rate of abnormal GHQ in the two groups (p=0.34). In the one-year follow up study significant statistical difference is found in prevalence rate and incidence rate between the two groups with p-value<0.001. The prevalence of abnormal GHQ are 39.42 % (95% CI=33.21-

45.63 %) in the SVB-group and 17.61 % (95% CI=11.93-23.30 %) in the DM-group (Figure 1).

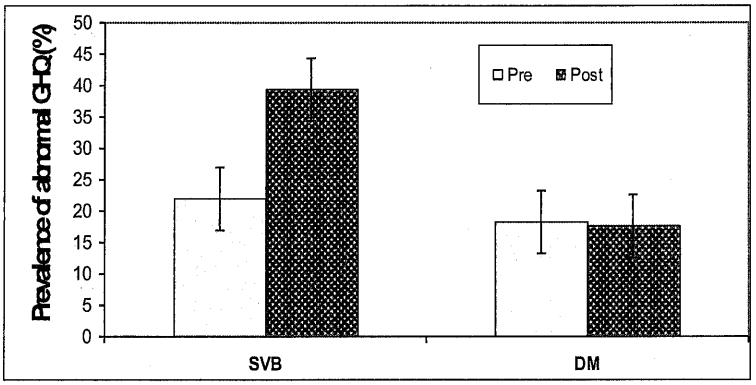

Figure 1: The prevalence rate of exeptional GHQ before and after the opening of the new international airport

CONCLUSIONS

This study supports the temporal relationship between aircraft noise exposure and non auditory effect in risk of decreasing quality of life and having psychiatric problems among residents living around airport. Risk should be communicated for people living in prospective airport areas prior to the planning and implement of the airport expansion and construction.

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