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AN ANALYSIS OF THE GENERAL HEALTH QUESTIONNAIRE SURVEY AROUND AIRPORTS IN TERMS OF ANNOYANCE REACTION

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ABSTRACT
This study reports the analysis of the results of the general health questionnaire (GHQ) survey in terms of the annoyance reaction of the respondents. If stronger annoyance reaction to noise reflects the respondent's sensitivity to noise, part of the individual difference in general health response might be explained by the individual difference of annoyance reaction. Cross analysis of a GHQ survey and a community reaction survey conducted around two airfields in Okinawa, Japan, suggests that the stronger annoyance reaction reflects the sensitivity of individual and the individual who reports higher annoyance score is likely to be affected by aircraft noise more than the individual who reports lower annoyance score.

1 - INTRODUCTION

A general health questionnaire (GHQ) survey and a community reaction questionnaire survey were conducted around two airfields in Okinawa, Japan. If stronger annoyance reaction to noise reflects the respondent's sensitivity to noise, part of the individual difference in general health response might be explained by the individual difference of annoyance reaction. This is a report of the analysis of the results of the general health questionnaire survey in terms of the annoyance reaction caused by aircraft noise.

2 - METHODS AND MATERIALS

2.1 - Questionnaire surveys

The surveys were conducted in nine municipalities (five cities, two towns and two villages) located in the vicinity of U.S. bases, Kadena Airport and Futenma Air Station in Okinawa, Japan. The questionnaire used in GHQ investigation was the Todai Health Index (THI) which consisted of 130 questions regarding subjective symptoms, mental health, habits and so forth. The community reaction questionnaire had questions regarding various aspects of disturbance with daily life, neighbourhood satisfaction and the quality of life, among which the question on annoyance reaction was included.
The terms of the surveys were from November 1995 to September 1996 for GHQ and from November 1996 to March 1997 for the other. The purpose of study, investigation on the effects of aircraft noise

on people, was elaborately concealed from the respondents in the GHQ survey. The subjects answered in the GHQ survey by choosing one of the 3 alternatives; 1. often, 2. sometimes, 3. hardly ever or never. In the community reaction survey they answered in the rating scales of 5 categories, which for the question about annoyance were as follows; 1. very annoyed, 2. pretty annoyed, 3. a little annoyed, 4. not much annoyed, 5. not annoyed at all. Questionnaires were delivered and collected by means of leave-and-pick-up method. The number of valid answers of GHQ including 848 of the control was 7,095 in which the 615 answers of the previous survey conducted in the same area in 1992 [1] was also included. The number of valid answers of community reaction survey was 5,693 including 685 of the control. The number of the valid answers of the respondents who answered the both questionnaires ranged from 4,414 to 4,981 depending upon the item of questionnaire of THI which were used for analysis in the present investigation.

2.2 - Noise exposure

The aircraft noise exposure of the respondents were estimated on the basis of the measurements obtained by the monitoring system installed by Okinawa Prefectural Government around the airfields as reported in the previous paper [2] and in this paper it is expressed by day-night average sound level, L_{dn}.

3 - RESULTS AND DISCUSSIONS

The results of the surveys were reported in inter-noise and ICBEN meetings in 1998 [3,4,5,6,7,8] in which WECPNL was used as the rating scale of noise exposure.

Twelve scale scores of THI were converted to dichotomous variables based on scale scores of 90 percentile values in the control group. Multiple logistic regression analysis taking each of twelve scores converted as the dependent variable and L_{dn}, age, sex and their interaction as the independent variables was conducted.

In Figures 1, 3, 5 and 7 are shown the odds ratios of the scale scores concerning "many subjective symptoms," "respiratory organs," "mental instability" and "depressiveness," respectively, as a function of noise exposure. The score values presented in the figures indicate the threshold taken to calculate the odds ratios and p is significance probability obtained when the trend of increase is tested. The vertical bars in the figure indicate 95 % confidence limits. In the figures one can see fairly clear dose-response relationships and remarkable increase of odds ratios concerning "mental instability" and "depressiveness" in the area of L_{dn} over 70.

To investigate the difference between the groups reporting different annoyance reaction, the respondents were classified into 9 groups according to the level of noise exposure and the annoyance categories. The level of noise exposure was categorised to under 55 dB of L_{dn}, over 55 dB below 65 dB, and over 65 dB. The categories of annoyance reaction were 1) "always annoyed" or "from time to time annoyed," 2) "once in a while annoyed" and 3) "scarcely ever annoyed" or "never annoyed." The reason why the respondents are divided into 9 categories instead of 25 (5 times 5) is to avoid too small numbers of respondents dropping into the cells of the matrix.

In Figures 2, 4, 6, 8 are shown the odds ratios as a function of 3 categories of noise exposure for the 3 categories of annoyance reaction. It is clearly shown that those who marked higher scores of annoyance represent higher odds ratios. The dose-response relationships are comparatively clear in the Figures 2 and 4, while in the Figures 6 and 8 are they found only in the highest annoyance category. Wide range of 95 % confidence limits found in the noise exposure categories of L_{dn} over 65 dB can be attributed to the small number, 136, of the respondents among 4,981 in all. It is interesting to know those who live in the areas of extremely high level of noise exposure, L_{dn} over 65, and answer as "not annoyed" show very low odds ratios in the scale of "mental instability" and "depressiveness." It can also be seen from the comparison in the pairs of Figures 5 and 6, and 7 and 8, that the lower odds ratios found in the groups of lower noise exposure might be attributed to the responses of respondents reporting less annoyed.

When an individual gives high score of annoyance, it does not necessarily mean that he or she is sensitive to noise. It could be just an "over-reporting." It can be the case particularly in the group of lower noise exposure. As is presented above, however, those who give higher annoyance score show higher odds ratios in the mental and somatic scales of GHQ. In the GHQ survey of this study since it would be nearly impossible for the respondents to answer so as to make a specific scale score higher, "over-reporting" is basically considered to be avoided. Thus it would be safe to say the stronger annoyance reaction would be the reflection of individual sensitivity to noise and the individuals reporting more annoyed be more vulnerable to noise exposure in mental and somatic aspects of health.

4 - CONCLUSIONS

Cross analysis of the results of GHQ survey and community reaction survey conducted around military

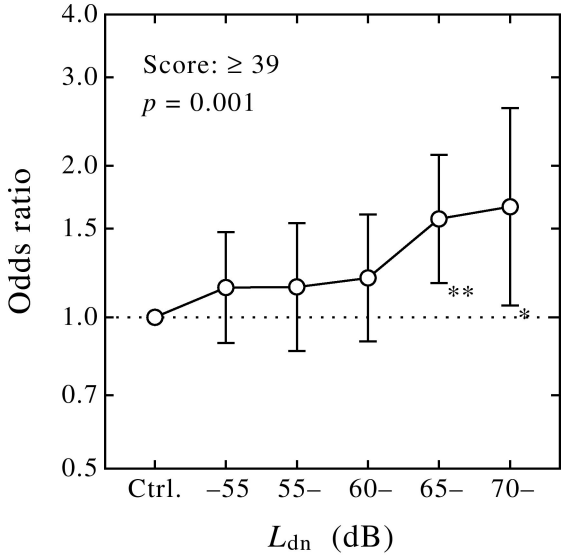

Figure 1: Odds ratio regarding "many subjective symptoms" *vs.* L_{dn}.

airfields in Okinawa suggests stronger annoyance reaction reflects the sensitivity of individual and the individual who reports higher annoyance score is likely to be affected by aircraft noise more than the individual who reports lower annoyance score.

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REFERENCES

1. **K. Hiramatsu et al.**, A Survey on Health Effects due to Aircraft Noise on Residents Living around Kadena Air Base in the Ryukyus, *Journal of Sound and Vibration*, Vol. 205 (4), pp. 451-460, 1997

2. **T. Matsui et al.**, Monitoring and Analysis of Aircraft Noise Exposure around Military and Civil Airfields in the Ryukyus, In *inter-noise 98*, 1998

3. **T. Miyakita et al.**, General Health Questionnaire Survey around Kadena U.S. Air Field in the Ryukyus - An Analysis of the 12 Scale Scores -, In *Proceedings of the 7th International Congress on Noise as a Public Health Problem*, pp. 608-612, 1998

4. **K. Hiramatsu et al.**, General Health Questionnaire Survey around Kadena U.S. Air Field in the Ryukyus - An Analysis of the Discriminant Score and the Factor Score-, In *Proceedings of the 7th International Congress on Noise as a Public Health Problem*, pp. 280-283, 1998

5. **K. Hiramatsu et al.**, Annoyance and its Related Responses of the Residents around Kadena U.S. Air Field in the Ryukyus, In *Proceedings of the 7th International Congress on Noise as a Public Health Problem*, pp. 590-593, 1998

6. **K. Minoura et al.**, Sleep Disturbance Reported around Kadena US Air Field in the Ryukyus, In *Proceedings of the 7th International Congress on Noise as a Public Health Problem*, pp. 463-466, 1998

7. **T. Tokuyama et al.**, Disturbance of TV and Telephone Use by Aircraft Noise Reported around an Air Field in the Ryukyus, In *inter-noise 98*, 1998

8. **K. Hiramatsu et al.**, Evaluation of the Residential Environment by the Inhabitants around an Air Field in the Ryukyus, In *inter-noise 98*, 1998

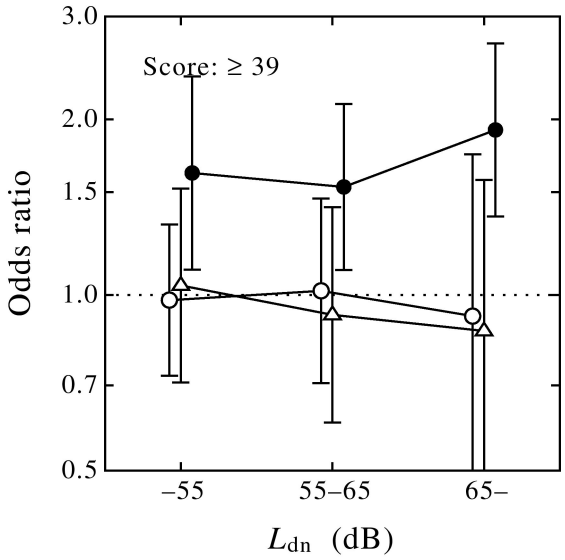

Figure 2: Odds ratios of the respondents stratified by annoyance score regarding "many subjective symptoms".

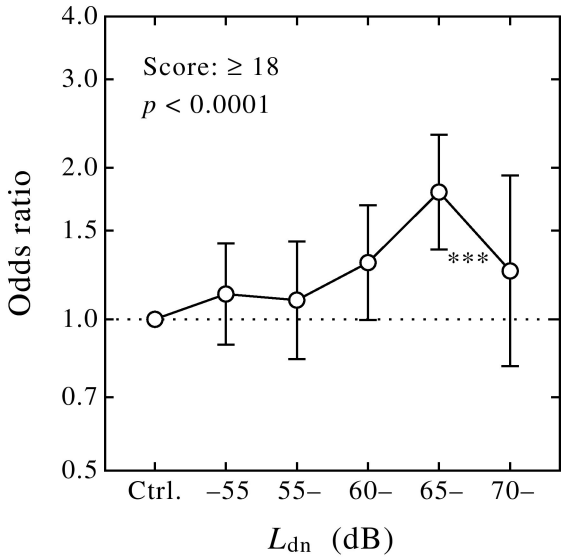

Figure 3: Odds ratio regarding "respiratory organs" *vs.* L_{dn}.

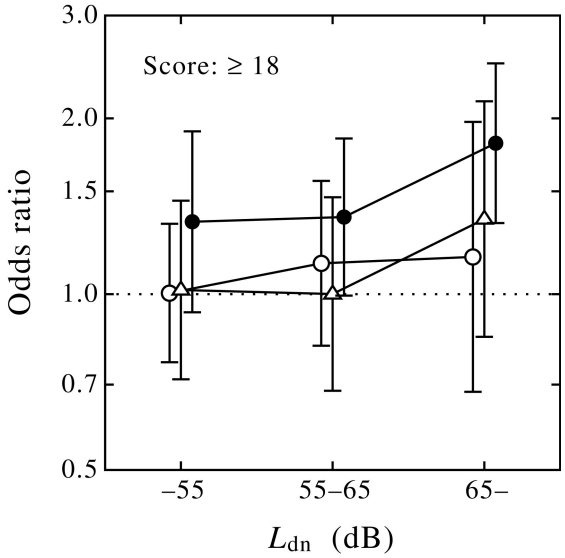

Figure 4: Odds ratios of the respondents stratified by annoyance score regarding "respiratory organs".

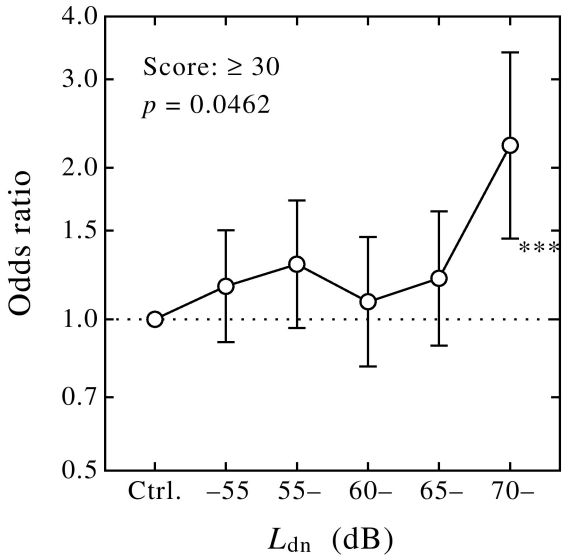

Figure 5: Odds ratio regarding "mental instability" *vs.* L_{dn}.

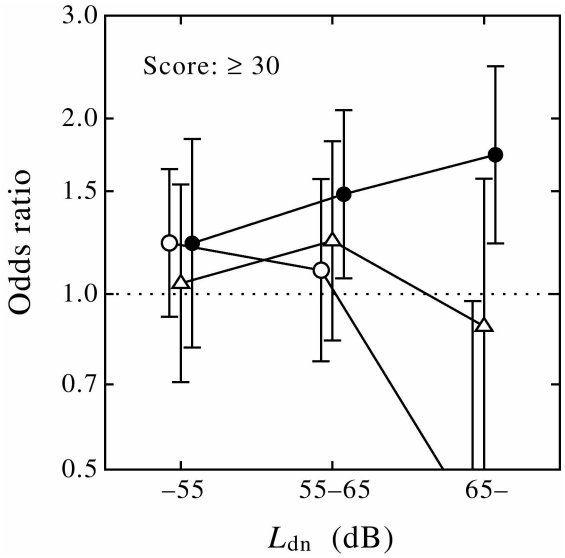

Figure 6: Odds ratios of the respondents stratified by annoyance score regarding "mental instability".

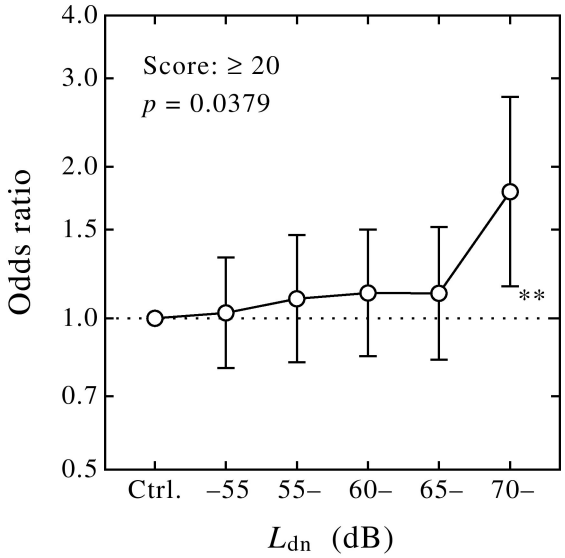

Figure 7: Odds ratio regarding "depressiveness" *vs.* L_{dn}.

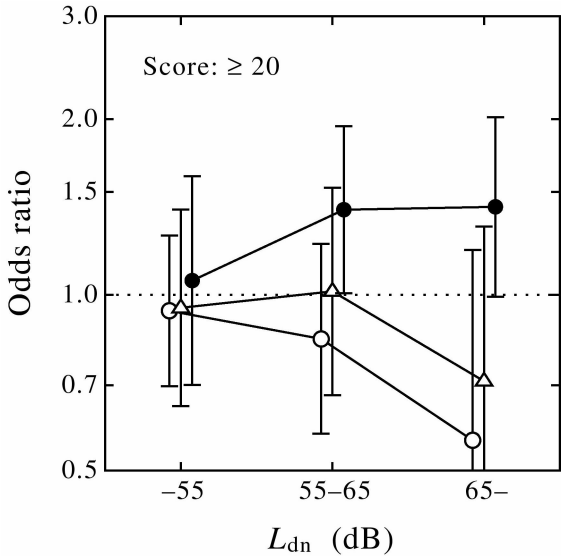

Figure 8: Odds ratios of the respondents stratified by annoyance score regarding "depressiveness".