Aircraft Noise and Birth Weight

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Summary. Data from six infant welfare centres in the vicinity of Amsterdam airport were analysed. Birth weights of 902 infants were related to aircraft noise levels to which the mother was exposed in pregnancy. The analysis was restricted to deliveries in hospital, single births and mothers aged 20–34 years.

In high noise areas the mean birth weight was 69 g lower than in low noise areas. Of the infants in high noise areas 24% had a birth weight less than 3000 g, compared with 18% in low noise areas.

In the analysis the effect of sex of the infant, birth order and to some extent socio-economic status were taken into account. An effect of smoking seemed unlikely. The results, together with existing knowledge, give some suggestion that aircraft noise can decrease birth weight.

Key words: Aircraft noise – Birth weight

Aircraft noise, as prevalent in the vicinity of major airports, can cause annoyance problems for many people (Schultz 1978). Epidemiological studies suggest medical effects as well (increased consultation rate, psychological problems, psychosomatic symptoms, high blood pressure, cardiovascular disease) (Knipschild 1977).

Of recent interest is the question whether aircraft noise has adverse effects on pregnancy and the foetus. In animal experiments it has been shown that excessive noise can cause stillbirth, birth defects and decreased birth weight, probably as a result of changes in the uterine and placental blood flow (Geber 1970; Klosterkötter et al. 1974). Human volunteer studies with pregnant women, in which the length of exposure to noise has been more than a few minutes, do not exist.

Epidemiological studies are needed to see whether aircraft noise is a risk factor in the environmental ("real") situation. One such study (Ando and Hattori 1974) indicates a relationship between aircraft noise and toxemia in pregnancy. Another study (Ando and Hattori 1977) points at the decrease of human placental lactogen (as an indicator of the placental function) under the influence of aircraft noise. Studies on the relationship between aircraft noise and stillbirth
(Ando and Hattori 1974; Horner 1972; Rehm 1976) have given conflicting results, probably due to registration problems and confounding. Epidemiological studies about the relationship between aircraft noise and birth defects (Jones and Tauscher 1978; Edmonds et al. 1979) also have given rise to uncertainty, although an effect of very much aircraft noise on the occurrence of neural tube defects remains possible.

So far two epidemiological studies have been performed on the relationship between aircraft noise and birth weight. From one study in Japan (Ando and Hattori 1973) it is concluded that there is "a great possibility that the growth of the human embryo was inhibited by aircraft noise". The other one was performed in Germany (Rehm 1976) and there "no relationship between aircraft noise and decreased birth weight could be demonstrated". Yet, in the study in Germany a tendency ("nonsignificant") was found to decreased birth weight in the area with much aircraft noise. We felt that a third study about this relationship could make sense. The results are presented here.

Method

Data of infants born in 1973–1976 were collected from the files of the infant welfare centres in six villages in the vicinity of Amsterdam airport.

Aircraft Noise. Using the addresses in combination with aircraft noise maps, we made a division into two groups of infants: from mothers who had lived during pregnancy in high noise areas (HNA) or in low noise areas (LNA). As a criterion for high/low noise we chose \( L_{dn} = 60–65 \text{dBA} \). \( L_{dn} \) is the daynight weighted equivalent sound level in decibels. The aircraft noise maps were provided by the National Aerospace Laboratory in Amsterdam.

Birth Weight. At the first contact with the infant welfare centre (mostly within two weeks after delivery) each mother had been asked about the birth weight of her infant and whether the delivery had taken place at home or in hospital.

Confounding Factors. The following factors that are supposed to be associated with birth weight, were registered: twinship, age of the mother, birth order, sex of the infant and family income. The family income was registered by way of health insurance: in the Netherlands persons with—in that period—a family income below DF1. 30,000 per year have a national health insurance. No data were available on other factors such as smoking.

To exclude an effect of twinship and age of the mother we restricted the study to single births and mothers aged 20–34 years at the time of delivery. We also restricted the study to infants whose registry form was complete.

In the analysis, we restricted the study population to infants born in hospital, because it is generally known that birth weight data in case of deliveries at home are not very accurate. We paid special attention to differences in the mean birth weight and in the occurrence of birth weights less than 3000 g. The differences in the mean birth weight were tested with the Student test. The differences in the proportion of lower birth weight were analysed according to the Mantel-Haenszel procedure. As level of significance was chosen \( \alpha = 0.05 \); tests were done one-sided.

Results

Table 1 shows the selection of the study population. In the six villages 3094 infants were born in 1973–1976 of which 90% were single births and had mothers