

Reports of the Health Impact Assessment Amsterdam Airport Schiphol 1993-2006

Monitoring van gezondheid en beleving rondom de luchthaven Schiphol

[**Monitoring of health and perceptions around Schiphol Airport**]

Houthuijs DJM, Wiechen CMAG van (eds)

115 p in Dutch, 2006

RIVM rapport 630100003

The health status of the population living around Schiphol Airport did not change substantially after the opening of the fifth runway. However, spatial shifts did occur in the noise exposure and the occurrence of annoyance and sleep disturbance. There is growing evidence for an association between exposure to air traffic noise and the prevalence of high blood pressure around Schiphol Airport.

These are some of the results of a monitoring program carried out in the framework of the Health Impact Assessment Schiphol Airport (HIAS), designed to study environmental burden, health and perceptions around Schiphol Airport. This monitoring program is a consequence of commitments made in 1994 in the National Spatial Planning Key Decision for Schiphol Airport and Surroundings.

The opening of the fifth runway in 2003 has led to spatial shifts in noise exposure. On balance, fewer people were exposed to high levels of noise in 2005 than in 2002, though on average noise level increased for those exposed to relatively low levels. Locally, however, large deviations from this general picture were seen. Air traffic and the activities of the airport contribute no more than a few percentage points to the local air pollution levels.

On the basis of results from this monitoring program, from earlier HIAS research, and from international literature, we observe growing evidence for an association between aircraft noise exposure and high blood pressure. In addition, associations between aircraft noise and both poor self-perceived health and the use of sedatives are observed. No relation is seen between aircraft noise and mental health. It is unlikely that, in addition to the noise level itself, an increase in the noise level due to the opening of the fifth runway has had extra influence on possible health effects. There is no evidence that air traffic contributes to the occurrence of respiratory disorders; however, the concern among residents regarding health complaints due to air traffic has increased after 2002.

Since 1996, severe annoyance and severe sleep disturbance around Schiphol Airport have decreased on balance. However, less severe sleep disturbance has increased since 2002. Annoyance, sleep disturbance, filing a complaint about air traffic noise, and environmental concern all have a strong relation with aircraft noise levels. In addition, an increase in noise exposure leads to an extra increase in the number of severely annoyed residents and residents who file a complaint about the noise. Those who are severely annoyed are more likely to have poor self-perceived health and more likely to report high blood pressure.

Download report: <http://www.rivm.nl/bibliotheek/rapporten/630100003.html>

Schiphol beleefd door omwonenden

[**Schiphol perceived by residents**]

RIVM, RIGO

88 p in Dutch, 2005

ISBN 90 369 18 537

Department of Transport

German summary available on request, no English abstract available

Download report: http://www.evaluatieschiphol.nl/download/2411/schiphol_beleefd_omwonenden.pdf

Beoordelingskader Gezondheid en Milieu: nachtelijk geluid rond Schiphol en slaapverstoring
[**Assessment Framework for Health and the Environment: night-time aircraft noise around Amsterdam Airport Schiphol and sleep disturbance**]

Fast T. (eds)

71 p in Dutch, 2004

RIVM Rapport 630100002

In the near future, the Dutch government is to decide on a possible change in policy aimed at reducing the quantity of sleep disturbance caused by nighttime air traffic from Amsterdam Airport Schiphol. The Assessment Framework for Health and the Environment offers a means of facilitating the governmental decision-making process pertaining to nighttime aircraft noise around Amsterdam Airport Schiphol and to sleep disturbance. The Assessment Framework allows such information as the size of the affected population, the severity of health effects, possible outrage factors, future developments, and the cost effectiveness of possible measures and legal aspects, to be systematically arranged and presented. The description of health effects was based mainly on a recent recommendation of the Health Council, while results for the health impact of nighttime noise were largely obtained from studies carried out in the framework of the research programme Health Impact Assessment Schiphol. Potential measures were to a great extent distilled from an inventory made by the National Aerospace Laboratory (NLR). Estimates of the costs and the effectiveness of measures were only available for a scenario in which the nighttime restrictions from 23:00 to 6:00 were extended by one hour to 7:00. The result is a description of the various issues that could play a role in the decision-making process on nighttime aircraft noise.

Download report: <http://www.rivm.nl/bibliotheek/rapporten/630100002.html>

Gezondheid en beleving van de omgevingskwaliteit in de regio Schiphol: 2002 - Tussenrapportage
Monitoring Gezondheidskundige Evaluatie Schiphol

[**Health and quality of life near Amsterdam Schiphol airport: 2002. Interim report.**]

Breugelmans ORP, Wiechen CMAG van, Kamp I van, Heisterkamp SH, Houthuijs DJM

128 p in Dutch, 2004

RIVM Rapport 630100001

This interim report assesses the self-reported health status and quality of life in the region around Amsterdam Airport Schiphol. The study was executed in 2002 before the opening of the fifth runway of the airport. A similar questionnaire survey has been carried out in 1996. The results constitute the foundation for a panel study in which approximately 600 residents will be followed until 2005 to monitor the possible changes that take place after opening of the new runway.

The study shows that the prevalence of self-reported annoyance and sleep disturbance due to aircraft noise has decreased between 1996 and 2002. Despite the decrease, aircraft noise is still rated as the most important source of annoyance.

Health effects – such as high blood pressure, respiratory symptoms, and a melancholy or depressive mood during at least 2 weeks – are more prevalent in the region than would be expected on the basis of national reference data. However, relationships between these health effects and exposure to aircraft noise were not found.

The results indicate that the perception of risks and the quality of life in the study area are negatively affected by increasing levels of aircraft noise.

Download report: <http://www.rivm.nl/bibliotheek/rapporten/630100001.html>

Het effect van geluid van vlieg -en wegverkeer op cognitie, hinderbeleving en de bloeddruk van basisschoolkinderen

[**The effect of aircraft and road traffic noise on the cognitive performance, annoyance and blood pressure of primary school children**]

Kempen EEMM van, Kamp I van, Stellato RK, Houthuijs DJM, Fischer PH

100 p in Dutch, 2005

RIVM rapport 441520021

Aircraft noise is related to a decrease in reading comprehension levels among primary schoolchildren around three European airports. The percentage of severe annoyance increases with the aircraft noise level. The relation between aircraft noise and blood pressure is not quite consistent. These are the main results of the largest study of its kind, carried out among primary schoolchildren to investigate the effect of aircraft and road traffic noise on children's cognition, annoyance and blood pressure. The results indicate that the findings of recent studies of the effects of aircraft noise on cognition are applicable for the situation around Schiphol Airport. Effects of aircraft noise are also observed on memory: a decrease in recognition memory is found. Aircraft noise exposure is related to an increase in mistakes on a switching attention test. It is estimated that 50-3000 (0.1 - 2.5%) additional pupils in the last 4 classes of primary schools around Schiphol Airport have a relatively low test result for reading comprehension due to aircraft noise exposure. Normally, 9% have a relatively low score. An estimated 3400 (2.9%) pupils in the last 4 classes of the primary schools in the Schiphol area are severely annoyed at school due to aircraft noise. In the Dutch sample aircraft noise exposure is related to increased blood pressure; this was not the case in the British sample, and evidence in the literature is inconsistent. Therefore no unequivocal conclusions can be drawn with regard to the effect of noise on the blood pressure in children.

Download report: <http://www.rivm.nl/bibliotheek/rapporten/441520021.html>

Vergelijking schattingen slaapverstoringsonderzoek Schiphol met referentiegetal PKB Schiphol

[**Comparison of estimations of sleep disturbance from the study sleep disturbance aircraft noise with the reference value from the governmental key decision on Schiphol Airport**]

Houthuijs DJM, Wiechen CMAG van, Ameling CB, Breugelmans ORP

27 p in Dutch, 2003

Short rapport 441520020

English abstract not available

Download report: <http://www.rivm.nl/bibliotheek/rapporten/441520020.html>

Slaapverstoring door vliegtuiggeluid**[Sleep disturbance and aircraft noise exposure]**

Passchier-Vermeer W, Miedema HME, Vos H, Steenbekkers HJM, Houthuijs D, Reijneveld SA

102 p in Dutch, 2002

ISBN: 9067438944

RIVM Rapport 441520019, TNO report 2002.028

As part of the Evaluation and Monitoring Program for Schiphol Airport, a sleep disturbance study was carried out among 418 adults living in 15 locations close to and further away from the airport. The objective was to assess relations between nighttime aircraft noise exposure and indicators of sleep disturbance and to estimate the prevalence of noise induced effects in the population exposed to aircraft noise. The subjects participated for 11 consecutive nights. Noise was measured from 10 p.m. to 9 a.m. indoors in the bedroom and outdoors. Information about sleep disturbance was collected by actimetry (motility, awakenings, sleep onset latency), diary (remembered awakenings, sleep quality, medication) and questionnaire (annoyance, health complaints). The increase in motility due to aircraft noise events started at lower indoor levels than expected. Persons with long-term exposure to relatively low nighttime aircraft noise levels were more sensitive to aircraft noise events than people living in locations with high levels. Also, sleep latency time, use of sleeping pills, average motility, and number of awakenings increased with equivalent indoor aircraft noise exposure levels during sleep; no relation was found with the results of a reaction time test. The prevalence of nighttime aircraft noise annoyance and number of health complaints were associated with long-term nighttime aircraft noise exposure. The exposure-effect relations were used to estimate the prevalence of effects of aircraft noise on sleep.

Download report: <http://www.rivm.nl/bibliotheek/rapporten/441520019.html>**Note**

This research was carried out by TNO in cooperation with RIVM. On a TNO website 3 technical reports (in English) can be found describing details of this research:

<http://www.inro.tno.nl/og/volksgezondheid/milieufolder/Schiphol.html>**Monitoring van de milieubelasting en gezondheid rondom de luchthaven Schiphol. Fase III van de Gezondheidskundige Evaluatie Schiphol****[Monitoring of the environmental quality and health around Schiphol airport. Phase III of the Health Impact Assessment Schiphol airport]**

Lebret E, Houthuijs DJM, Wiechen CMAG van

42 p in Dutch, 2001

RIVM Rapport 441520018

The report describes the background of and criteria for the design of a monitoring programme on environment and health in the framework of the planned expansion of Amsterdam Airport Schiphol. The primary aim of this monitoring activity is to provide the government with information necessary for the decision-making process on the development of air traffic in the Netherlands. This process will require assessment of (changes in) environmental quality and the environmentally related health status of residents in the vicinity of the airport. The data on indicators for health and well-being will be collected from national, and, where feasible, local registries, as well as from surveys on self-reported health status and well-being. Data on environmental quality will be mainly obtained from existing programmes. Discussions presented here cover choice and implementation of the indicators for health, well-being and environmental quality, selection of the study area, frequency of assessment, design, and the possibilities for interpreting the programme and its limitations.

Download report: <http://www.rivm.nl/bibliotheek/rapporten/441520018.html>

Overwegingen bij nader onderzoek naar hart- en vaatziekten in de regio Schiphol

[**Feasibility study on cardiovascular disorders related to aircraft noise in the vicinity of Schiphol Airport**]

Schram HE, Houthuijs DJM, Franssen EAM, Lebrecht E

61 p in Dutch, 2000

RIVM Rapport 441520017

This report describes the feasibility of a new study on cardiovascular diseases related to aircraft noise from Amsterdam Airport Schiphol. The scientific literature and the results of studies of the Health Impact Assessment Schiphol on this topic were reviewed. Based on this review, the (additional) number of people with cardiovascular diseases in the Schiphol area was estimated. Several suggestions for new studies are presented by study-design (semi-ecological, cross-sectional, panel, follow-up, case-control, semi-experimental). The added value of additional information (against which costs) from new studies is discussed. Studies with a panel, follow-up or case-control design are considered as the most appropriate to collect information on current cardiovascular diseases around Schiphol and the exposure-response relationship between aircraft noise and cardiovascular disease. A cross-sectional study with objective endpoints, like blood pressure measurements, is also useful to collect more information on this topic.

Download report: <http://www.rivm.nl/bibliotheek/rapporten/441520017.html>

De invloed van geluidsisolatie en ventilatiegedrag in woningen rond Schiphol op de kwaliteit van het binnenmilieu

[**The effect of sound insulation and ventilation behavior in homes around Schiphol on the quality of the indoor environment**]

Strien RT, Douwes J, Brunekreef B

53 p in Dutch, 2000

RIVM Rapport 441420016

The effects on the homes' indoor environment of sound insulation and changed ventilation behavior of the residents due to noise annoyance from road- and air traffic, was assessed in 92 homes in the vicinity of Schiphol Airport. Air concentrations of particulate matter (PM_{2.5}), soot, polycyclic aromatic hydrocarbons and volatile organic hydrocarbons were measured in the living room. In collected house-dust from the living room floor the content of endotoxins (from gram-negative bacteria), EPS(pen/asp) (from moulds), beta(1,3)glucane (from moulds) and house dust mite allergen (Der p 1) were measured. No statistical significant differences in measured levels were found between homes with and homes without sound insulation. In addition, no statistical significant differences in levels were found between homes of residents who had changed their ventilation behavior and houses of residents who did not change. It is concluded that in the houses that were investigated, sound insulation or changed ventilation behavior due to noise annoyance from road- and air traffic, did not result in different levels of contaminants in indoor air or house dust.

Download report: <http://www.rivm.nl/bibliotheek/rapporten/441520016.html>

Gezondheidskundige Evaluatie Schiphol, overzicht van resultaten tot oktober 1999
[Health Impact Assessment Schiphol airport, overview of results until October 1999]

Franssen EAM, Lebret E, Staatsen BAM, Wiechen CMAG van

49 p in Dutch, 1999

RIVM Rapport 441520015

This report provides an overview of the current results of the Health Impact Assessment Schiphol (HIAS) research programme, consisting of a series of studies with various designs. The results are summarised under the following categories: health end-point: annoyance, cardiovascular diseases, sleep disturbance, respiratory diseases, perceived health, neurobehavioural effects, birth weight and perception of risks and residential satisfaction. Based on the results of the HIAS, a monitoring system will be developed for periodic study of the health status of the population in relation to expansion of the airport.

Download report: <http://www.rivm.nl/bibliotheek/rapporten/441520015.html>

Luchtwegaandoeningen bij kinderen in de omgeving van de luchthaven Schiphol

[Respiratory diseases in children around Amsterdam Airport Schiphol]

Vliet PHN van, Aarts FJH, Janssen NAH, Brunekreef B, Fischer PH, Wiechen CMAG van

136 p in Dutch, 1999

RIVM Rapport 441520014; EOH Rapport 1999-484

The aim of this study is to assess: 1) the differences in lung function and in prevalences of respiratory symptoms between school children living in different towns in the Schiphol area; 2) the differences in air pollution levels caused by air and road traffic, as measured inside and outside primary schools (measurements outside were taken at school locations either close to Schiphol Airport or close to a busy roadway and compared to school locations at longer distances) and 3) the association between exposure to air pollution caused by air and road traffic and respiratory health. The study was performed among 2500 primary school children, aged 7-12, living in the Schiphol area. The health survey consisted of: a questionnaire on respiratory symptoms and allergy; a lung function test, blood test and a skin-prick test. Air pollution models were used to assess the exposure levels and air pollution measurements. The results show differences between towns where respiratory symptoms are prevalent, decreased lung function and the quantity of antibodies (IgE) in the blood. However, the prevalence was not related to the distance from Schiphol airport. The average prevalence in the Schiphol area was higher than in a 'control' population that was neither situated in the Schiphol area, nor close to a busy highway. In and near primary schools situated close to busy highways, higher concentrations of air pollution were found than in schools situated farther away from a roadway. Levels of NO₂, 'soot' and benzene decreased with increasing distance to Schiphol Airport. No association was found between the different exposure measures and the prevalence of respiratory symptoms, a decreased lung function or an increased level of IgE in the blood. Air pollution around Schiphol was concluded not be associated with the health endpoints observed in the participating children.

Download report: <http://www.rivm.nl/bibliotheek/rapporten/441520014.html>

Aircraft noise and sleep disturbance. Pilot Study

Passchier-Vermeer W, Vos H, Gils K van, Miedema HME, Roo F de, Verhoeff EJ, Middelkoop HAM

156 p in English, 1999

RIVM Rapport 441520013; TNO Rapport 98.040

The pilot study reviewed in this report was a feasibility study carried out in the vicinity of Amsterdam Airport Schiphol with the objectives to assess the necessary skills, the logistics, and the optimal design of the main study, in which relationships between night time aircraft noise exposure and parameters of sleep, health and daily functioning will be assessed.

In the pilot study, the following effect parameters were considered: sleep onset latency time, sleep duration, motility and awakenings (assessed by actimetry), behavioural and remembered awakening, perceived sleep quality and tiredness during the day, reaction time and other measures of attention. The pilot study was carried out in 22 subjects who participated for 28 days (including 27 nights) in the study. Night time noise exposure was assessed by an outdoor noise monitor equipped with aircraft noise event identification software and indoor noise monitors located in the bedroom of the subjects.

Based on the statistics obtained in the pilot study, the main study is designed as to have about 25 subjects at each of the 15 study locations participating in the study for 12 days.

Download report: not available

Health Impact Assessment Schiphol airport. Overview of results until 1999

[**Gezondheidskundige Evaluatie Schiphol. Een overzicht van de resultaten tot 1999**]

Franssen EAM, Lebret E, Staatsen BAM

38 p in English, 1999

RIVM Rapport 441520012

This report provides an English overview of the current results of the Health Impact Assessment Schiphol (HIAS) research programme. This programme consists of a series of studies with different designs. Results are rather described for each separate health end-point than by the separate studies: annoyance, cardiovascular diseases, sleep disturbance, respiratory diseases, perceived health, neurobehavioral effects, birth weight and perception of risks and residential satisfaction. Several of the more complex studies are either still ongoing, or in the final stages of reporting. These concern a study of respiratory complaints in children in relation to air pollution and another of aircraft noise and sleep disturbance in adults. Based on the results of the HIAS, a monitoring system will be developed to study periodically the health status of the population in relation to expansion of the airport.

Download report: <http://www.rivm.nl/bibliotheek/rapporten/441520012.html>

Annoyance, sleep disturbance, health aspects, perceived risk and residential satisfaction around Schiphol airport: Summary of results of a questionnaire

[**Hinder, slaapverstoring, gezondheids- en belevingsaspecten in de regio Schiphol, resultaten van een vragenlijstonderzoek. Samenvatting**]

TNO-PG, RIVM

21 p in English, 1999

RIVM Rapport 441520011

As part of the Evaluation and Monitoring Programme for Schiphol airport, a questionnaire on the prevalence of self-rated annoyance, sleep disturbance, perceived general health, respiratory complaints, satisfaction in the study area was sent to a randomly selected sample of 30,000 people living within 25 km of Schiphol airport. The purpose of this study was to assess these factors in relation to the exposure to aircraft noise and air pollution. Exposure to aircraft noise was based on model calculations. The airport's proximity to the respondent's home was used as a proxy for air pollution caused by aircraft. The survey response rate was 39%. The results of this study show that annoyance from aircraft noise is greater than expected, also when the effect of selective non-response is taken into account. There is a relation between aircraft noise and noise annoyance, sleep disturbance, perceived health, use of medication, risk perception and residential satisfaction in the study area. The proximity of the airport was directly related to annoyance due to odours and soot from aircraft, respiratory complaints, and the use of medication for asthma and/or allergy.

Download report: <http://www.rivm.nl/bibliotheek/rapporten/441520011.html>

Hinder, slaapverstoring, gezondheids- en belevingsaspecten in de regio Schiphol, resultaten van een vragenlijstonderzoek

[**Annoyance, sleep disturbance, health aspects and the perception of the living environment around Schiphol airport, results of a questionnaire survey**]

TNO-PG, RIVM

284 p in Dutch, 1998

RIVM rapport 441520010; TNO rapport 98.039

As part of the Evaluation and Monitoring Programme for Schiphol airport, a questionnaire on the prevalence of self-rated annoyance, sleep disturbance, perceived general health, respiratory complaints, use of medication, and the perception of risks and the quality of life in the study area was sent to a randomly selected sample of 30,000 people living within 25 kilometers around Schiphol airport. The purpose of this study was to assess these factors in relation to the exposure to aircraft noise and air pollution. Exposure to aircraft noise was based on model calculations. The airport's proximity of the respondent's home was used as a proxy for air pollution caused by aircraft. The survey response rate was 39%. The results of this study show that annoyance from aircraft noise is greater than expected, also when the effect of selective non-response is taken into account. There is a relation between aircraft noise and noise annoyance, sleep disturbance, perceived health, the use of medication, and the perception of risks and the quality of life in the study area. The proximity of the airport was related to annoyance due to odors and soot from aircraft, respiratory complaints, and the use of medication for asthma and/or allergy. The result of this study will be used in developing a system to monitor the health status of those living in the vicinity when Schiphol airport is expanded.

Download report: <http://www.rivm.nl/bibliotheek/rapporten/441520010.html>

Gebruik van ziekenhuisgegevens voor het beschrijven van ruimtelijke patronen in ziekte rondom Schiphol

[**Spatial patterns in cardiovascular and respiratory disease rates around Schiphol airport**]

Staatsen BAM, Doornbos G, Franssen EAM, Heisterkamp SH, Ameling CB, Lebret E

82 p in Dutch, 1998

RIVM Rapport 441520009

Within the framework of the Evaluation and Monitoring programme Schiphol spatial patterns in hospital admission data on seven cardiovascular and six respiratory diseases were analysed for three years (1991-1993). This report is a supplement to a similar analysis for the Environmental Impact Assessment Schiphol (EIA), in 1993. The purpose of this study was to evaluate the feasibility for future use of the Dutch Information System for Hospital Care and Day Nursing (LMR) for environmental health monitoring around Schiphol airport and to investigate spatial patterns in disease rates around Schiphol airport. Disease rates and their 95% confidence intervals were calculated and mapped for each study area, using an empirical Bayes model to reduce random variation and to account for small area variability and spatial interdependence in the data. The analyses were adjusted for age and sex. At this moment, the LMR is not considered suitable to monitor cardiovascular and respiratory diseases in relation to (developments in) environmental pollution around Schiphol airport. For a final conclusion data must be studied for a longer time period (e.g. 5 years). It should also be possible to include time (in addition to spatial interdependence) in the analytical model, and preferably also data on exposure and important determinants of the diseases of interest. Currently, such a model is being developed at RIVM. The availability of data on important determinants will improve future analyses with LMR data, and will improve the feasibility of the LMR as a monitoring instrument. Analysis of LMR data showed a wide spatial variation in disease rates for cardiovascular and respiratory diseases. In most cases this variation was not statistically significant (95% confidence interval) and differed over the years (1991-1993). For the majority of the diseases studied there was no consistent spatial pattern that would suggest a relation with environmental pollution from Schiphol airport. The disease pattern varied per year and differed between men and women. These results are consistent with the results described in the EIA. For three of the 14 diseases studied ('all cardiovascular diseases', 'upper airway disease' and 'acute airway infections') a spatial pattern could be seen in a few study areas. This pattern was consistent for time and for both sexes. However, there was no clustering of these diseases around the airport.

Download report: <http://www.rivm.nl/bibliotheek/rapporten/441520009.html>

Variatie in geboortegewicht in de omgeving Schiphol. Een analyse van gegevens uit de Landelijke Verloskunde Registratie

[**Variation in birth weight around Schiphol Airport, the Netherlands**]

Franssen AEM, Ameling CB, Lebret E

56 p in Dutch, 1997

RIVM Rapport 441520008

Within the framework of the Health Impact Assessment for Schiphol Airport, a study was carried out on variations in birth weight and prenatal growth in the vicinity of Schiphol Airport. The purpose of this study was: 1) to evaluate the feasibility of using the Dutch Obstetrics Registration (LVR) for environmental health monitoring around Schiphol Airport and 2) to investigate whether birth weight and prenatal growth were associated with aircraft noise exposure around the same airport. The LVR, a national registration system recording data on the care given by midwives and gynaecologists, showed the LVR at the moment to be unsuitable for monitoring birth weight and prenatal growth in relation to aircraft noise exposure around Schiphol Airport. This is because the present data have important limitations: the lack of data on a number of important determinants of birth weight and prenatal growth (e.g. smoking of the mother) and the lack of individual exposure data. Another limitation is the fact that deliveries by general practitioners are not registered by the LVR; this causes overrepresentation of high-risk deliveries. To make the LVR suitable for monitoring purposes, information on determinants of birth weight and prenatal growth must be made available or collected (e.g. by questionnaire). Linking data at the individual level is preferred, although this is not possible at the moment.

Download report: <http://www.rivm.nl/bibliotheek/rapporten/441520008.html>

Methodiekontwikkeling en haalbaarheidsstudie voor onderzoek naar effecten van vliegtuigeluid op cognitieve prestaties en gedrag van schoolkinderen. Een onderzoek in de regio Schiphol

[**A feasibility study of the application of neurobehavioural tests for studying the effects of aircraft noise on primary school children living in the vicinity of Schiphol Airport, the Netherlands**]

Emmen HH, Staatsen BAM, Deijen JB

74 p in Dutch, 1997

RIVM Rapport 441520007

Within the framework of the Health Impact Assessment Schiphol Airport, a feasibility study was conducted in primary school children. The purpose of the study was to examine the feasibility of using computerized performance tests and questionnaires to examine the behavioral effects of exposure to aircraft noise in children. The study involved 159 children aged 8-12 years, 86 attending school in Zwanenburg, a town located 8 kilometers from the airport and 73 children attending school in Uitgeest, a town located approximately 23 kilometers from the airport. Methods used to assess behavioral functioning included selected tests from the Neurobehavioral Evaluation System designed to assess attention, psychomotor performance, perceptual coding, learning and memory as well as two behavioral questionnaires. Subjective ratings of sleep quality and annoyance were also examined. Children were tested twice during school hours in the period May-June 1995 with a 4-6 week interval between testing. The results of this study indicated a high level of acceptance of computerized testing procedures by the children, teachers and parents and a high level of test-retest reliability for most tests and rating scales. Some differences in performance and behavioral ratings between the high and lower exposure groups were noted. However, no firm conclusions regarding the relationship between aircraft noise and performance can be reached because of the small number of children tested and the lack of adequate exposure information. In conclusion, the results of this study demonstrate the feasibility of applying behavioral methods in the school setting. Based on these results, it is recommended that future research designed to examine the effects of aircraft noise using these methods employ study designs involving the testing of at least 500 children from locations with known exposure levels. Further, these locations should be chosen to maximize the contrast in aircraft noise exposure and estimates of individual aircraft exposure for each child should be obtained.

Download report: <http://www.rivm.nl/bibliotheek/rapporten/441520007.html>

Geneesmiddelengebruik als indicator voor de effecten van milieuverontreiniging ; een studie in de regio Schiphol

[**Feasibility of computerised drug dispensing pharmacy data for environmental epidemiology**]

Willigenburg APP van, Franssen EAM, Lebret E, Herings RMC

112 p in Dutch, 1996

ISBN: 903931036X

RIVM Rapport 441520006

Within the framework of the Health Impact Assessment Schiphol Airport a feasibility study on using computerised drug dispensing pharmacy data for environmental epidemiology was performed. The study was conducted by the Utrecht Institute of Pharmaceutical Science and the National Institute of Public Health and the Environment. The use of sedatives and anti-asthmatics was studied around Schiphol airport. Prevalences in the Schiphol area were compared to national reference values. After correction for differences in population size and chronic disease, the prevalence of sedatives was significantly 8% higher in areas with high aircraft noise exposure compared to low exposed areas. The prevalence of the use of anti-asthmatics was significantly higher (14%) in areas close to the airport (<10 km), especially for children (aged 0-19 years) and elderly persons (60+). In areas >10 km distance from the airport the use of anti-asthmatics was comparable to national prevalences. A drawback of the method is the lack of information on confounders at the individual level e.g. smoking, soundproofing of homes. Given the limitations of the study the conclusions on the relation of sedative use, antiasthmatics use and environmental pollution from Schiphol airport have to be interpreted with care. These limitations concern the quality and aggregation level of the data, the possibility to analyse data on small area level and to combine pharmacy data with environmental and demographic data at the same geographical level. Despite the limitations of this study pharmacy registrations are considered to have an important sentinel function in studying health effects of environmental pollution. The results of this study show that pharmacy data are a promising tool to measure geographical differences in health effects potentially related to environmental pollution.

Download report: <http://www.rivm.nl/bibliotheek/rapporten/441520006.html>

Klachten over vliegtuiglawaai in kaart

[Mapping of complaints about aircraft noise around Schiphol Airport]

Franssen EAM, Staatsen BAM, Vrijkotte TGM, Lebret E

27 p in Dutch, 1996

RIVM Rapport 441520005

In this report complaints about aircraft noise caused by Schiphol Airport in 1993 and 1994 are presented using a Geographical Information System. Complaints are registered by the Environment Advisory Committee Schiphol. The results show an increase in the total number of complaints and complainers over the years corresponding with an increase of flights. Mapping procedures give insight in the spatial variation of complaints caused by aircraft noise. In addition, the correlation of complaints per postal code area between subsequent years is high. This makes the registration of complaints potentially suitable for monitoring purposes. Although registered complaints give an impression about aspects of annoyance, they are an inadequate indicator of the full extent of noise effects on a population.

Download report: <http://www.rivm.nl/bibliotheek/rapporten/441520005.html>

Noise and Public Health, Workshop report

[Geluid en Volksgezondheid, verslag van een workshop]

Franssen EAM, Staatsen BAM, Vrijkotte TGM, Lebret E, Passchier-Vermeer W

41 p in English, 1995

RIVM Rapport 441520004

This report summarizes the discussion and main conclusions of an international workshop on 'Noise and Public Health' that took place on 2-4 October 1994 in Noordwijkerhout, the Netherlands. The main objective of this workshop was to discuss and review proposals for future research around Schiphol airport on exposure to aircraft noise and health effects. These proposals include a questionnaire survey on perceived environmental quality, health status, annoyance and risk perception and field studies on aircraft noise and, respectively, sleep disturbance in adults and neurobehavioural effects in children. All proposals seem feasible given that adequate resources are available and some adaptations as recommended by a panel of independent international experts are implemented.

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Health Impact Statement Schiphol Airport

[[Gezondheidskundige Evaluatie Schiphol.]]

Staatsen BAM, Franssen EAM, Lebret E

33 p in English, 1994

RIVM Rapport 441520003

In this report an assessment has been made of the effects on public health caused by environmental pollution originating from activities around Schiphol airport. This investigation is part of an integral Environmental Impact Assessment that was legally required for the planned expansion of the airport. The terms of reference for the Health Impact Assessment specified the identification of existing gaps in knowledge required for this assessment and proposals for future research and monitoring activities. For this Health Impact Assessment several separate approaches have been applied. One was based on combining (estimated) pollutant exposure levels in the Schiphol study area with exposure-response relations derived from the literature (risk evaluation). The second approach consisted of a geographical study using hospital admission rates for several cardiovascular and respiratory diseases. Thirdly, a questionnaire base survey on risk perception and annoyance has been conducted in a sample of the population in the Schiphol area and the general Dutch population. In addition a subgroup of the Schiphol population was interviewed. The Health Impact Assessment showed substantial gaps in knowledge about the actual levels of pollution in the vicinity of Schiphol airport and about exposure-response relations.

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Beschrijving bestaande gezondheidsregistratiesysteem voor gezondheidskundig onderzoek rondom Schiphol. Achtergrondrapport bij de Gezondheidskundige Evaluatie Schiphol

[Feasibility of current health databases for the Health Impact Assessment Schiphol airport]

Franssen EAM

58 p in Dutch, 1994

RIVM Rapport 441520002

English abstract not available

Download report: not available

Gezondheidskundige Evaluatie Schiphol

[[Health Impact Statement Schiphol Airport.]]

Staatsen BAM, Franssen EAM, Doornbos G, Abbink F, Veen AA van der, Heisterkamp SH, Lebret E

177 p in Dutch, 1993

RIVM Rapport 441520001

In this report an assessment has been made of the effects on public health caused by environmental pollution originating from activities around Schiphol airport. This investigation is part of an integral Environmental Impact Statement that was legally required for the planned expansion of the airport. According to the guidelines for the Health Impact Statement a description of the current health status as well as an identification of existing gaps in knowledge and proposals for future research and monitoring activities were required for this assessment.

For this Health Impact Statement several separate approaches have been applied. One was based on combining (estimated) pollutant exposure levels in the Schiphol study area with exposure-response relations derived from the literature ('risk evaluation'). The second approach consisted of a geographical study using hospital admission rates for cardiovascular and respiratory diseases. Thirdly, a questionnaire-based-survey on risk perception and annoyance has been conducted in a sample of the population in the Schiphol area and the general Dutch population. In addition, a subgroup of the Schiphol population was interviewed.

Based on the results of the risk evaluation the following health effects of aircraft noise might be increased in the population living in the vicinity of Schiphol airport: annoyance, sleep disturbance, reduced performance, cardiovascular disease and possibly, as a result of these effects, an increased drug consumption. It is unlikely that air pollution related to airport activities will cause an increase in respiratory effects or cancer. Odour annoyance is likely to occur, however. Other possible effects of aircraft noise like hearing loss are not expected to increase.

The analysis of hospital data, however, did not show higher rates of hospitalization for cardiovascular and pulmonary diseases in the vicinity of Schiphol airport as compared to more distant areas in the study area. These findings do not exclude the occurrence of non-clinical effects, that might be expected according to the literature. People with health complaints will usually contact (and will be treated by) a general practitioner. Hospital admission rates therefore can result in an underestimation of the effects on public health.

The results of the survey showed that residents of areas surrounding Schiphol airport were more frequently annoyed by noise and air pollution than a sample of the Dutch population. Respondents from the Schiphol area indicated that air traffic was the main source of noise and air pollution in this area. The concern for long-term health effects caused by these pollutants was also greater in the Schiphol population than in the general population. Fear for an airplane accident occurred more frequently among residents of the Schiphol area as compared with the Dutch population. Living in the vicinity of an airport or under an approach route was also considered to be more dangerous by residents of the Schiphol area.

Elaborate interviews with a small number of residents showed that the respondents did not trust information provided by the (airport) authorities on the hazards concerning safety and health. Residents believed that information about the hazards of air traffic has been withheld on purpose. Recently, however, some improvements in the information provided by the (airport) authorities have been noted.

The Health Impact Statement showed substantial gaps in knowledge about the actual levels of pollution in the vicinity of Schiphol airport and about exposure-response relations. In particular, information on the

relation between noise and health effects such as sleep disturbance and effects on performance is lacking. This complicates a full estimation as to which extent health effects can occur at current levels of pollution. Further research is recommended to enlarge insight in the current health status of the population living in the vicinity of Schiphol airport, i.e. a study on sleep disturbances and annoyance among adults and on performance among children. In addition, a further study on the incidence of cardiovascular diseases, drug consumption, cancer, and the incidence of decreased birth weight using routinely collected health data should be performed.

Because of the many uncertainties about the relation between environmental pollution related to airport activities and health effects, it is not possible to give a quantitative estimation of the health status in the case of expansion of the airport and changes in environmental quality. Additional research in which the impact of airport activities on the quality of the environment and the health status will be monitored, is therefore recommended. A monitoring system using data from general practitioners is recommended in combination with periodical surveys and studies using health data from health registries. The following health effects should be monitored: sleep disturbance and performance, cardiovascular diseases, drug consumption, annoyance and self-perceived health.

A more definite selection for the design of this monitoring system will be made, based on results of the sleep-disturbance and performance study, and the studies using health data from health registries. It is recommended to have the design, the interpretation, and the results of the health assessment reviewed by independent experts.

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