

Forskningsprogram <b>SNAP</b> <input checked="" type="checkbox"/> <b>REPROSAFE</b> <input type="checkbox"/> <b>FLIPP</b> Inriktning: Ekonomiska styrmedel <input type="checkbox"/> Inriktning: Informationssystem och indikatorer IPP <input type="checkbox"/>				
Projekttitel (svensk): ROADSIDE – Luftvägssjukdom och livskvalitet i relation till exponering för luftföroreningar från trafiken				
Projekttitel (engelsk): ROADSIDE – Respiratory health and quality of life in relation to exposure to air pollution from road traffic				
<b>Huvudsökande</b>	Efternamn: Wickman	Förnamn: Magnus	Födelseår: 1946 Kvinna <input type="checkbox"/> Man <input checked="" type="checkbox"/>	
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<b>Medsökande</b>	Efternamn, förnamn, tjänst, organisation, institution: Nordling, Emma, miljö- och hälsoskyddsinspektör, Arbets- och miljömedicin			
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<p>Sammanfattning på <b>svenska</b> strukturerad enligt följande: 1) Projektets betydelse för programmet 2) Miljörelevans och förväntad betydelse för miljöpolitiken 3) Mål och hypotes 4) Metodik och genomförande 5) Kommunikationsinsatser i relation till programmet:</p> <p>Trafiken är en betydande källa till luftföroreningar i tätorter. Trots trafikens stora bidrag till en försämrad luftkvalitet i tätorter har relativt få studier undersökt hälsoeffekter på luftvägarna av luftföroreningar från trafiken. Ett fåtal studier har visat samband mellan trafikrelaterade luftföroreningar och luftvägssymptom, framför allt på barn.</p> <p>1) Eftersom många människor bor vid högtrafikerade gator har det stor betydelse för folkhälsan om boende nära högtrafikerade vägar leder till en ökad förekomst av luftvägssymptom. Eftersom effekter på livskvalitet är mycket lite studerat är varje bidrag till mer kunskap inom detta område av betydelse.</p> <p>2) Resultaten från de två studierna förväntas kunna utgöra underlag för framtida riskvärdering och prioritering av det preventiva arbetet inom miljöhälsoområdet. Eftersom studierna täcker hela landet kommer det att finnas möjlighet att studera geografiska skillnader som kan vara av betydelse för såväl nationell som regional planering.</p> <p>3) De föreslagna studierna syftar till att ta reda på om barn och vuxna som bor nära högtrafikerade vägar har en ökad risk för luftvägssymptom. Boende i närheten av högtrafikerade vägar är ett mått på exponering för trafikgenererade luftföroreningar. Effekter på särskilt känsliga grupper, till exempel personer med astma, kommer att undersökas.</p> <p>4) Den första studien bygger på en nationell miljöhälsoenkät, som skickades till 15750 personer i hela Sverige under 1999 och hade en svarsfrekvens på 72,5%. Enkäten innehöll frågor om luftvägssymptom, individernas bostad, rökning och upplevd hälsa. Den andra studien bygger på en pågående enkätundersökning, som riktar sig till barn i åldrarna 8 månader, 4, 8 och 12 år. Frågeformuläret liknar det i den första studien. Med hjälp av geografiska koordinater för individernas bostäder, kan exponering för trafikrelaterade luftföroreningar uppskattas. Avstånd till en högtrafikerad gata och trafikflöde kommer att användas som exponeringsmått.</p> <p>5) Resultaten kommer att publiceras i vetenskaplig litteratur och redovisas på konferenser och seminarier både på nationell och internationell nivå.</p>				
		Summa sökta medel per år i kr:	År 2004	År 2005
			463050	476550

Sökta projektmedel fördelade på kostnadslag	År 2004 (kr)	År 2005 (kr)
Personalkostnad inkl. soc. avgifter* Emma Nordling ( $2*12*0.33*1.55*2000$ ) = 270 000 Magnus Wickman ( $2*12*0.10*1.55*50000$ ) = 186 000 Melinda Cutzner ( $2*12*0.10*1.55*20000$ ) = 75 000 Tom Bellander ( $2*12*0.05*1.55*40000$ ) = 75 000	135 000 93 000 37 500 37 500	135 000 93 000 37 500 37 500
Övriga omkostn exkl moms (förbrukningsmtrl, analyser, resor etc)** Resor (konferenser $2*20 000$ ) Datamaterial Särtryck ( $2*5000$ )	20 000 20 000	20 000 20 000 10 000
Delsumma av ovanstående poster:	343000	353000
Förvaltningspåslag: .....35..... %		
<b>Totalsumma per år:</b> (införs sid. 1):	463050	476550

\*) Specificera namn, tjänst \*\*) Specificera

**Samtliga övriga miljörelaterade projekt för vilka de sökande har beviljats anslag eller söker anslag för 2004-2006. OBS Även EU-finansiering.**

Projekttitel	Finansiär	Tidsperiod	Sökt kr	Beviljat kr

**Miljörelaterade projekt för vilka sökande har beviljats anslag för 2000-2003 OBS Även EU-finansiering**

Projekttitel	Finansiär	Tidsperiod	Beviljat Kr
BAMSE	Vårdalstiftelsen, AAF, HLF, Mjölkdroppen Konsul Bergh HPU/SLL	2000-2003	3 485 000
Barnens miljöhälsundersökning	HPU/SLL SoS	2002-2003 2002-2003	2 100 000 1 800 000

Datum och sökandes underskrift, vilken samtidigt ger Naturvårdsverket tillåtelse att publicera sökandes namn på sin webbplats:	Datum och underskrift av prefekt eller motsvarande med namnförtydligande:
Magnus Wickman	Göran Pershagen

Ansökan skall bestå av detta formulär jämte högst sex sidor lång projektbeskrivning på **engelska** (strukturerad som den svenska sammanfattningen samt en redovisning av kunskapsläget). Referenser till egna publikationer ges med sifferhänvisning till CV. Andra referenser ges i löpande text. Sökandes och eventuell medsökandes CV får omfatta högst två sidor. Inga bilagor kommer att beaktas vid bedömningen. Ansökan (max 10 A4-sidor, 12 punkters teckenstorlek) skall inlämnas i **original + 15 kopior samt elektroniskt till [ansok@naturvardsverket.se](mailto:ansok@naturvardsverket.se)**. Häfta ihop ansökan och använd hålat papper. Ansökan skall ha inkommit senast den 15 oktober 2003 till Naturvårdsverket, Forskningssekretariatet, 106 48 STOCKHOLM.

## **Project Title**

ROADSIDE – Respiratory health and quality of life in relation to exposure to air pollution from road traffic

## **PROJECT PLAN**

### **Present state of knowledge, significance for the SNAP-programme, environmental relevance and expected significance for environmental policy**

Traffic is a major source of air pollutants in urban areas. Despite the important contribution of traffic sources to reduced urban air quality, relatively few studies have evaluated the specific effects of local traffic-related air pollution on health (2). There are only two studies using geographically detailed assessment of traffic related air pollution and long-term health effects in adults, showing an association with lung cancer (by dispersion modelling; 1) and with cardio-pulmonary mortality (proximity to busy roads; Hoek 2002). Studies of respiratory health effects are mainly cross-sectional studies of children.

Van Vliet et al (1997) found a tendency for chronic cough, wheeze and rhinitis to be more prevalent in children living within 100 meters from freeways. There was also a tendency for chronic cough, wheeze, asthma attacks and rhinitis to be more prevalent in areas with higher density of truck traffic, and the associations were much stronger in girls than boys. Truck traffic density has also been associated with impaired lung function in children by Brunekreef et al (1997) and the associations were stronger in the children living closest to the motorways. Oosterlee et al (1996) found significant relationships between wheeze and use of respiratory medication, when comparing children living along busy streets with children living along quiet streets. Pulmonary function by forced expiration among fourth grade children in Munich was studied by Wjst et al (1993). A significant decrease of peak expiratory flow of 0.71% (95% confidence interval 0.33% to 1.08%) per increase of 25 000 cars daily passing through the school district was described.

Comparatively fewer studies have dealt with older children or adults. The results from a cross-sectional study on 5000 housewives in 3 zones on different distances from major roads in Tokyo suggested that exposure to automobile exhaust may be associated with respiratory symptoms (Maeda et al 1991-92). Wyler et al (2000) investigated the relation between road traffic and allergies by matching the data of the traffic inventory of Basel with data from the 820 participants of the SAPALDIA study (Swiss Study on Air Pollution and Lung Diseases in Adults) who had completed a respiratory health questionnaire and undergone allergy testing. They found that living at busy roads was associated with a higher risk for sensitization to pollen. No relation was found between motor vehicle traffic and hay fever or seasonal allergic symptoms.

In summary, few studies have looked at the relationship between exposure to traffic and respiratory health in adults. Quality of life outcomes are even more rare in the literature. To investigate how respiratory symptoms are associated with living close to major roads in large nation-wide population-based studies will contribute greatly to our knowledge of the role traffic generated air pollution plays for this health outcome.

The proposed two studies will investigate the association between distance from the home to major roads and respiratory symptoms in children and adults. The first study is based on a nation-wide questionnaire survey that was done in Sweden in 1999. The second study

is based on an ongoing national study of 40 000 children. Exposure to traffic related air pollution will be defined as proximity to major roads. This is a comparatively easy way of assessing exposure to vehicle exhaust with sufficient geographical detail. It is probably not as good measure of personal long-term exposure as dispersion modelling would be, but such models are not currently available for large parts of Sweden. It has been shown, however, that the exposure measures “traffic intensity” and “distance to major streets” is important predictors of differences in long-term nitrogen dioxide concentrations within a city (Briggs et al 1997).

Approximately 430 000 adults have bedroom windows facing a busy street, traffic route or industry (3) which means that the impact on public health would be important if effects on respiratory health could be partially explained by the distance of the residence to major roads.

The effects of traffic on “quality of life” parameters, such as perceived general health, is something that has been overshadowed by the study of clinical outcomes such as pulmonary and cardiovascular health in recent research. Nevertheless has this aspect of human health a large impact on the everyday life of many individuals, and any effort to reduce this problem could have great public health benefits. We intend to study the relationship between traffic exposure and perceived general health in the general population as well as in potentially sensitive subgroups such as the elderly, those suffering from respiratory diseases and children.

The results of the proposed studies will be important for future regulatory decisions and priority settings in preventive public health work related to air pollution, and it may also be useful for evaluation of health benefits of regulation. Of specific importance is that it deals with an outcome that is not possible to retrieve from health registers and in the same time related to quality of life.

## **Objective and hypothesis**

The hypothesis of the proposed study is that living close to major roads is associated with increased respiratory symptoms in adults and children and decreased quality of life as measured by perceived poor health. Different aspects of traffic exposure such as distance to nearest major road and traffic intensity of that road will be explored in relation to health. The effects of traffic exposure on potentially susceptible subgroups, such as people with respiratory disease, children and the elderly will also be analysed.

## **Methods and implementation**

### *Study population 1*

During the spring of 1999 a questionnaire was sent out to a random sample of 15 750 adults in Sweden (3). The target population consisted of all persons between 19 and 81 years of age, who had lived in the country for the last five years. In total, this population numbered 6.4 million individuals. To allow for comparison between counties, the sample included 750 individuals from each of the 21 counties. The overall response rate was 72.5%. Internal non-response to specific questions was marginal and on average below 2%. The questionnaire included several questions about upper and lower respiratory

symptoms. The questions on outcome variables of asthma and other allergic diseases have been used in other studies. Furthermore, questions on residential characteristics and other environmental exposure factors such as tobacco smoke were included. A question on perceived general health in relation to other people of the same age group was also included in the questionnaire. In addition to the questionnaire data we have access to a number of background variables for the subjects, such as income, education, ethnic background and geographic coordinates of their residence. Results from this study showed an over all prevalence of 8% of doctor's diagnosed asthma, varying considerably with age and gender (4). Geographical differences were also apparent. Allergic rhinitis or conjunctivitis was found in 27%; differences related to sex and age resembled those of asthma but were less pronounced. Perceived poor or very poor health was reported by 3.3% of the entire study population.

#### *Study population 2*

During 2003 a similar questionnaire to parents of children in all parts of Sweden is being distributed. It is a stratified sample of 960 children from each county, in the ages 8 months, 4, 8 and 12 years, plus locally enlarged samples in some counties. In all, about 42 000 children will be invited. The questionnaires are sent out at nine different occasions, distributed over a year. The overall response rate for the first three occasions is 64%. The distribution over a longer period of time in comparison with the survey to adults, will allow analysis of both spatial (proximity to roads) and temporal (season) variation of complaints of airway disease.

#### *Exposure assessment*

Exposure to traffic related air pollution will be assessed by measuring the distance from the subjects homes to major roads. By using the geographical co-ordinates for the residences of the individuals and information from the Swedish National Road Administration and from local community administrations about traffic flow on major roads, we can classify exposure of the subjects in both distance to roads and traffic intensity. The exact distance from the residence to nearest road will be assessed by the use of a Geographic Information System. Questionnaire information about years of residence can be used as an indicator of duration of exposure.

#### *Statistical analysis*

The relationship between occurrence of health outcomes (respiratory disease and perceived poor health) and traffic exposure will be analyzed with the use of multivariate logistic regression models. This allows for adjustment for other environmental factors, such as tobacco smoke, home dampness and socio-economic status. Traffic exposure will be assessed in different ways: distance to major roads, traffic intensity on nearest road and combination of distance and intensity. This will enable us to explore which aspects of traffic exposure have most impact on the health outcomes.

### **Dissemination of results**

The results from the study will be presented at national and international scientific conferences and will be published in international scientific journals in the field of environmental medicine. The results will also be presented in Swedish reports aimed at public agencies and the general public.

## **Time plan**

Data on outcome is available from study 1 and will be completed with geographical data in the spring of 2004. The analyses will be performed in the fall of 2004 and reported in early 2005. Data from population 2 will be available in the end of 2004 and completed with geographical data in the spring of 2005. The analyses will be performed in the fall of 2005 and reported at the end of 2005.

## **References**

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Wylser C, Braun-Fahrlander C, Kunzli N, Schindler C, Ackermann-Lieblich U, Perruchoud AP, Leuenberger P, Wuthrich B. Exposure to motor vehicle traffic and allergic sensitization. The Swiss Study on Air Pollution and Lung Diseases in Adults (SAPALDIA) Team. *Epidemiology*. 2000 Jul;11(4):450-6.

## CV:s

### **Magnus Wickman**

MD 1979, PhD 1993, Associate professor 1999 in pediatric allergology. Senior consultant at Sachs Children's Hospital and affiliated to the National Institute of Environmental Medicine, Karolinska Institutet. Associate head of the Department of Occupational and Environmental Medicine. Currently within the management group of Centre for Allergy Research, Karolinska Institutet. Research interests are mainly been related to clinical and experimental allergy, including long-term prospective studies on prediction and prevention of allergy, and the interaction between environmental and genetic factors for the development of allergy. He is supervisor of 3 completed and 8 ongoing doctoral theses. He has been invited as major speaker to numerous international meetings over the past 10 years and is the author of more than 50 original papers.

Research Group: Head of a research group, composed of 10 members.

Board Member of the Pediatric Section, EAACI.

### **Emma Nordling**

Emma Nordling is employed as an environmental health officer at the department of Occupational- and Environmental Health at Stockholm County Council since 2000. She has been working with several studies of the health effects of exposure to traffic related factors, mainly noise and air pollution. She has both worked as a field worker and a co-ordinator of field work and has been involved in the analysis of epidemiological studies. In the ROADSIDE project she will be responsible for data collection, analysis and contribute as an author for the scientific publications of the project. She will be registered as a PhD student in epidemiology at the Karolinska Institutet in 2004.

### **Other members of the project group**

Melinda Cuzner, statistician

Tom Bellander, associate professor

### **Publications**

(1) Bellander T, Berglind N, Gustavsson P, Jonson T, Nyberg F, Pershagen G, Jarup L. Using geographic information systems to assess individual historical exposure to air pollution from traffic and house heating in Stockholm. *Environ Health Perspect* 2001 Jun;109(6):633-9.

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(4) Wickman M, Bellander T, Bergling N, Lundqvist M, Pershagen G. Asthma in relation to age, gender, exposure and perceived health in a nationwide study. In press.