



BROAD-SEARCH ANNOTATED BIBLIOGRAPHY ON

# Acute Respiratory Infections (ARI) and Indoor Air Pollution

(With Emphasis on Children Under Five in Developing Countries)

DECEMBER 1998

Prepared by  
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# INTRODUCTION TO THE BROAD-SEARCH ANNOTATED BIBLIOGRAPHY

*Daniel M. Kammen, Gemini Wahhaj, and Maame Yaa Yiadom*

In July 1997, the second International Conference on Acute Respiratory Infections was held in Canberra, Australia (<http://nceph.anu.edu.au/user/rnd868/aricon.html#THE>), thirteen years after the first in 1984 (Douglas & Kerby-Eaton, 1985). Although the first conference included papers on environmental risk factors for Acute Respiratory Infection (ARI), in the second there was not one paper or plenary presentation on these factors in developing countries, and only one session out of 34 on the topic in developed countries. This is partly due to a perception in the ARI professional community that little progress has been made in understanding this complicated set of issues. Wishing to dispel this image, although recognizing that there is still much room for additional work, EHP prepared a bibliography of material related to air pollution and childhood ARI in developing countries, the vast bulk of which had been published in the period between the two conferences.

That bibliography<sup>1</sup>, compiled by John P. McCracken and Kirk R. Smith and published in 1997, contains 192 references pertaining to air pollution as a risk factor for acute respiratory infections (ARI).

Its focus is ARI in young children in developing countries, who bear the greatest burden of ill-health from ARI worldwide and many of whom seem to have high exposures to a number of harmful air pollutants. A major purpose of the bibliography was to provide an easily accessed source of information on the relationship between ARI and air pollution to researchers and field staff in developing countries, where access to current publications may be limited. For this reason, abstracts were included whenever available. The references, which dated from 1968 to 1997, were collected from several databases, including Medline, Cambridge Abstracts, and the library database of the Environmental Health Project (EHP/USAID). Also included were reports, conference summaries, and other unpublished works from the authors' collection at the University of California.

This new annotated bibliography contains citations and abstracts for 235 papers that relate to air pollution and environmental exposure as a risk for acute respiratory infection (ARI). As did the predecessor volume, this bibliography focuses on children and environmental health conditions in developing nations.

This bibliography augments the 1997 *Annotated Bibliography on Acute Respiratory Infections (ARI) and Indoor Air Pollution*. This 1998 edition follows the same general format as its predecessor, with the addition of several new subject categories to reflect a wider search on the ARI exposure, dose, disease, and outcome(s) literature. The geographic categories have been expanded as well to reflect some of the areas where a significant number of studies were conducted.

The first (McCracken and Smith, 1997) and second (Kammen, Wahhaj, and Yiadom, 1998) ARI bibliographies are complementary. References are *not* repeated in the two editions; users of these resources should search both bibliographies for references and abstracts for the widest and most update search of papers on acute respiratory illness.

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<sup>1</sup> Accessible for download at: <http://www.access.digex.net/~ehp/aribib.html>.

As in the 1997 bibliography, four principal criteria have been applied to choose references:

**Children under 5 years**  
**Developing countries**  
**Indoor air pollution**  
**Confirmed Acute Lower Respiratory Infection or pneumonia**

All references generally meeting at least *three* of these criteria were included in the 1997 edition, while references meeting *two* of these criteria were included in this current (1998) edition. This less restrictive search is the genesis of the title, ‘broad search’ bibliography.

The references in this bibliography, which date from 1968 to 1998, have been collected from several databases, including Lexus-Nexus, Medline, Cambridge Abstracts, university-supported search engines at Princeton University, the California Institute of Technology and the University of California , and the library database of the Environmental Health Project (EHP/USAID).

Several sources of reference materials, reports, and exchange between individuals and organizations working on diverse aspects of environmental health, ARI, and biomass burning now exist as email distribution and discussion lists and on the WorldWideWeb:

<b>List Name</b>	<b>List Email Address</b>	<b>List Coordinator</b>	<b>Person Email address</b>
<i>EHP ARI Network</i>	<a href="mailto:arilist@erols.com">arilist@erols.com</a>	Dan Campbell	campbelldb@cdm.com
<i>Indoor Air Quality</i>	<a href="mailto:iaq@onelist.com">iaq@onelist.com</a>	Cathy Flanders	Rkfabf@aol.com
<i>Stovers</i>	<a href="mailto:stoves@crest.org">stoves@crest.org</a>	Ronal W. Larson	larcon@sni.net

Following this introduction, the first section of this bibliography is the **Thesaurus**, which lists the subject headings by which the bibliography is organized. Geographic designations are those used in the Global Burden of Disease databases of WHO/IBRD/Harvard (see, for example, Murray, C. J. L. & A. L. Lopez, *Global Burden of Disease*, Harvard University Press, Cambridge, 1996). Next is the **Subject Index**, which lists the full reference citations but no abstracts. Many references will be found in more than one section of the Subject Index, of course, because references have been placed in all the categories to which they apply. The **Author Index** provides full citations and abstracts, where available, in alphabetical order by first author.

## **Contact Information and Feedback:**

Comments and additions, updates or corrections to this bibliography are welcomed.

In addition to materials found in journals and published databases, a considerable amount of material on environmental health, biomass fuels and combustion, household stoves and cooking is “published” as reports, working papers, health alert circulars, and other types of “gray literature.” These materials may be difficult to obtain by the international community.

We request that readers interested to contribute to this data base send copies of such gray literature reports to Professor D. M. Kammen who will compile this information and forward it to the coordinator of the EHP ARI project as well as the on-line discussion and server lists.

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Wald, E. R. (1994) **Microbiology of Acute and Chronic Sinusitis.** *Immunology and allergy clinics of North America*, 14 (1), 31.

## **21. Women: Exposure, Risk and Health Effects**

Behera, D., Jindal, S. K., and Malhotra, H. S. (1994) **Ventilatory function in nonsmoking rural Indian women using different cooking fuels.** *Respiration*, 61 (2) 89-92.

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Engle, P. L., Hurtado, E., and Ruel, M. (1997) **Smoke exposure of women and young children in highland Guatemala: Prediction and recall accuracy.** *Human Organization*, 56(4), 408-417.

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~~Leynard, B., Liard, R., Bousquet, J., Mesbah, H., and Neukirch, F. (1996) **Gas cooking and respiratory health in women.** *Lancet*, 347, 1052-1053.~~

Padmavati, S. and Aora, R. (1976) **Sex differences in chronic cor pulmonale in Delhi.** *Br J Dis Chest*, 70, 251-259.

Shamebo, D., Sandstrom, A., Muhe, L., Freij, L., Krantz, I., and Lonnberg, G. (1993) **The Butajira project in Ethiopia - a nested case-referent study of under-5 mortality and its public health determinants,** *Bulletin of the World Health Organization*, 71(3-4), 389-396.

Wald, E. R. (1994) **Microbiology of Acute and Chronic Sinusitis.** *Immunology and allergy clinics of North America*, 14 (1), 31.

## **22. World Health Organization (WHO)**

(1984) **A programme for controlling acute respiratory infections in children: Memorandum from a WHO meeting.** *Bulletin of the World Health Organization*, 62(1), 47-58.

Matkovic, V., Kontosic, I., Grubisic-Greblo, H., Matkovic, N., and Micovic, V. (1995) **The effects of air pollution on ventilatory lung functions.** *Arh Hig Rada Toksikol*, 46(2), 225-236.



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Adal, K., Anglim, A., Palumbo, L., Titus, M., Coyner, B., and Farr, B. (1994) **The use of high-efficiency particulate air-filter respirators to protect hospital workers from tuberculosis: A cost effectiveness analysis.** *The New England J of Medicine*, 169-173.

*Background:* After outbreaks of multidrug-resistant tuberculosis, the Centers for Disease Control and Prevention proposed the use of respirators with high-efficiency particulate air filters (HEPA respirators) as a part of isolation precautions against tuberculosis, along with a respiratory-protection program for health care workers that includes medical evaluation, training, and tests of the respirators. Each HEPA respirator costs between \$7.51 and \$9.08, about 10 times the cost of respirators currently used. *Methods:* We conducted a cost-effectiveness analysis using data from the University of Virginia Hospital on exposure to patients with tuberculosis and rates at which the purified-protein-derivative (PPD) skin test became positive in health workers. The costs of a respiratory-protection program were based on those of an existing program for workers dealing with hazardous substances. *Results:* During 1992, 11 patients with documented tuberculosis were admitted to our hospital. Eight of 3,852 workers (0.2 percent) had PPD tests that became positive. Five of these conversions were believed to be due to the booster phenomenon; one followed unprotected exposure to a patient not yet in isolation; the other 2 occurred in workers who had never entered a tuberculosis isolation room. These data suggest that it will take more than one year for the use of HEPA respirators to prevent a single conversion of the PPD test. Assuming that one conversion is prevented per year, however, it would take 41 years at our hospital to prevent one case of occupationally acquired tuberculosis, a cost of \$1.3 million to \$18.5 million. *Conclusion:* Given the effectiveness of currently recommended measures to prevent nosocomial transmission of tuberculosis, the addition of HEPA respirators would offer negligible protective efficacy at greater cost.

Adgate, J. L., et al. (1992) **Nitrogen dioxide exposure and urinary excretion of hydroxyproline and desmosine.** *Arch Environ Health*, 47(5), 376-84.

The relationship between average and peak personal exposure to nitrogen dioxide and urinary excretion of hydroxyproline and desmosine was investigated in a population of preschool children and their mothers. Weekly average personal nitrogen dioxide exposures for subjects who resided in homes with one or more potential nitrogen dioxide source (e.g., a kerosene space heater, gas stove, or tobacco smoke) ranged between 16.3 and 50.6 ppb (30.6 and 95.1 micrograms/m<sup>3</sup>) for children and between 16.9 and 44.1 ppb (12.8 and 82.9 micrograms/m<sup>3</sup>) for mothers. In these individuals, the hydroxyproline-to-creatinine and desmosine-to-creatinine ratios were unrelated to personal nitrogen dioxide exposure even though continuous monitoring documented home nitrogen dioxide concentration peaks of 100-475 ppb lasting up to 100 minute duration. Significantly higher hydroxyproline-to-creatinine and desmosine-to-creatinine ratios were observed in children, compared with mothers ( $p < .001$  and  $.003$ , respectively).

Akrout, M., Njah, M., Chadly, A., Hassairi, H., Bakrouff, A., Boulanguet, C., Mrizak, N., Robin, H., Yacoub, M., and Ghachem, A. (1995) **Chronic bronchitis in two Tunisian cotton-mills.** *Arch Ma. Prof Med Trav*, 56(1), 49-55.

In order to compare the respective effects on bronchial tree of recuperation cotton and first use cotton dusts, a respiratory transversal survey was conducted in 121 cotton-mill employees and 106 matched controls working at the hotel enterprise in the same region of Monastir. Each employee was subjected to a questionnaire and a cardio-pulmonary clinical assessment associated with respiratory function tests.

A bacteriological analysis of the cotton dust and a study of the environment were also performed. The prevalence of chronic bronchitis was significantly higher in the employees exposed to the recuperation cotton dust (18.3%) than in those exposed to first use cotton dust (6.5%) or in controls. This difference was attributed to the specific exposure to respirable dusts for the first group of employees using a recycled cotton. No correlation was found between the level of dust pollution in each work-site and the risk of chronic bronchitis. Smoking was an additional risk factor that played a synergic role with cotton dusts.

Allegra, L., Blasi, F., Valenti, V. (1994) **Acute exacerbations of asthma in adults: Role of Chlamydia Pneumoniae infection.** *The European Respiratory J*, 7(12), 2165.

Respiratory infections precipitate wheezing in many asthmatic patients and may be involved in the aetiopathogenesis of asthma. Several studies have demonstrated that viral infections may provoke asthma. Bacterial infections seem to play a minor role. However, Chlamydia Pneumoniae has been recently reported as a possible cause of asthma. The aim of the present study was to evaluate the role of C pneumoniae infection in acute exacerbations of asthma in adults. 74 adult out-patients with a diagnosis of acute exacerbation of asthma were studied. Acute and convalescent serological determination of antibodies to cytomegalovirus, respiratory syncytial virus, adenovirus, influenza A and B, were performed by means of immunofluorescence tests using a specific antigen and a kit with 3 chlamydial antigens. 15 patients (20%) presented seroconversion to at least one of the studied pathogens. 7 were found to be infected by virus, 6 by C pneumoniae alone, and one by M pneumoniae. In one out of 15 patients with productive cough, sputum culture yielded H influenza. In conclusion, viruses were involved in about 9% of asthma attacks, while acute infection with intracellular bacteria were detected in 11% of cases. Notably, most of the latter were due to C pneumoniae infection. Further studies are needed in order to elucidate whether C pneumoniae plays a role only as a precipitant of asthma symptoms or is actually one of the causes of asthma.

Arashidani, K., Yoshikawa, M., Kawamoto, T., Matsuno, K., Kayama, F., and Kodama, Y. (1996) **Indoor pollution from heating.** *Ind Health*, 34 (3), 205-15.

The concentrations of indoor pollutants generated from types of heaters were measured in a model room of 20m<sup>2</sup> in area and 45m<sup>3</sup> in capacity. We used six different heaters: three kerosene heaters of different types, town and propane gas heaters, and an electric heater. Three ventilation conditions were introduced into each experiment: non-ventilation, fan-on ventilation with closed door and fan-off ventilation with half-opened door. The results obtained by heating under non-ventilation condition were as follows: The concentrations of NO<sub>2</sub> and CO<sub>2</sub> were comparatively high and the values obtained from all the heaters except the electric heater exceeded the 1-hr Environmental Quality Standards, Japan (EQS NO<sub>2</sub>: 0.04-0.06 ppm) and the Building Sanitation Management Standards, Japan (BSMS CO<sub>2</sub> 1,000 ppm), respectively. The CO concentration emitted from reflection kerosene and town gas heaters slightly exceeded the BSMS (10 ppm). The concentrations of suspended particulate matter and polynuclear aromatic hydrocarbons showed an increasing tendency during the use of kerosene-fueled heaters. Under two ventilating conditions, NO<sub>x</sub> concentration decreased to less than a third in comparison with non-ventilating condition.

Auregan, G. (1997) **Epidemiological indicators of tuberculosis.** *Cahiers. SANTE* 7(2), 97-102.

The indicators used in the struggle against tuberculosis, particularly in developing countries, can be separated into two groups. First, the variables, are indicators of the overall damage caused by the disease in the community. Secondly, the parameters, are the calculated indicators of the risk for tuberculosis forced by the individual. Their presentation here follows the pragmatic concerns of the coordinators of the programs: evaluating the scale of the tuberculosis problem; ensuring its surveillance

and the supervision of a prevention program; and diffusing the information required to stir the program workers and the population into action to fight tuberculosis. Among the variables, the incidence of mortality lost significance. The emphasis is now on the incidence of the new cases of contagious pulmonary tuberculosis as well as the calculation of the Annual Risk of Infection (ARI). The ARI, despite serious criticisms, remains one of the best indicators for the study of tuberculosis. The data obtained from an active program must be standardized to allow comparisons of the declared cases as well as their follow-up after the initiation of the treatment. The parameters enable a mathematical representation of the different stages in the natural development of the disease: the risk to be infected, the risk of becoming ill, and the development of the illness. These parameters can be advantageously used to mobilize the people into action. The pandemic of HIV drastically changed the natural history of tuberculosis. HIV infection is the most important factor of the transition from tuberculosis infection to active tuberculosis. The HIV pandemic also modified the epidemiological estimations of tuberculosis. In particular, it reinforced the criticisms made against the ARI. The surveillance of the prevalence of HIV among tuberculosis patients is thus important data.

Aviado, D. M. (1978) **Physiological and biochemical responses to specific group of inhalants: Concluding remarks.** *Fed Proc*, 37(11), 2508-2509.

The abused inhalants can be grouped into four categories: the fluorocarbon propellants that produce cardiac arrhythmia, the chlorinated solvents that depress myocardial contractility, the ketones that provoke pulmonary hypertension, and the aromatic compounds that induce bronchospasm.

Awasthi, S., Glick, H. A., Fletcher, R. H., and Ahmed., N. (1996) **Ambient air pollution and respiratory symptoms complex in preschool children.** *Indian J Med Res*, 104, 257-62.

To study the association between ambient air pollutants (AAP) and respiratory symptoms complex (RSC) in preschool children, a cohort of 664 children between the ages of 1 month to 4.5 yr were randomly selected from 28 slums (anganwadi centres) of Lucknow, north India. They were followed up fortnightly for six months. The outcomes assessed were presence of RSC at the time of interview and days on which symptoms had occurred in the past week. Exposure to ambient air sulphur dioxide (SO<sub>2</sub>), oxides of nitrogen (NO<sub>x</sub>) and suspended particulate matter (SPM) on the day of the interview or in the week prior, was assessed by ambient air monitoring at 9 centres within the city. The cumulative incidence of RSC was 1.06 and the incidence density per 100 days of follow up was 1.63. All three pollutants were positively correlated with each other and negatively correlated with temperature. Ambient air SPM and SO<sub>2</sub> and cooking and heating fuels like dung cakes, wood, coal and kerosene and remaining indoors while the food was cooked were associated with increased incidence of RSC, increased duration of symptoms, or both. We conclude that to improve the respiratory health of preschool children, ambient air SPM and SO<sub>2</sub> levels should be kept as low as possible and mothers should be advised to keep children in another room while cooking.

Azizi, B. H., and Henry, R. L. (1994) **Ethnic differences in normal spirometric lung function of Malaysian children.** *Respir Med*, 88 (5), 349-356.

Spirometric recordings of 1098 Malaysian children who were free of respiratory symptoms were examined by least square regression analysis of log-transformed lung function data. Ethnic differences were observed in FVC, FEV<sub>1</sub>, and FEF<sub>25-75</sub> independent of father's education, exposure to passive smoking, wood stove, kerosene stove and mosquito repellents, family history of chest illness and history of allergy, after adjusting for standing height, age and sex. Exposure to kerosene stove was significantly associated with reduced FVC and FEV<sub>1</sub> indicating that environmental factors may impair lung function in symptomless children. Prediction equations were derived for each ethnic group and sex. Comparison with data from the literature showed that Malaysian children had lower lung function

values than Caucasian children. Generally, Chinese children had higher FEV1, FVC and FEF25-75 than Malay and Indian children. Indian children consistently had the lowest lung function values. Since these ethnic differences were independent of environmental and other host factors, anthropometric variations could be an explanation.

Azizi, B. H. O., Zulkifli, H. I., Kasim, M. S. (1995) **Indoor Air Pollution and Asthma in Hospitalized Children in a Tropical Environment.** *The J of Asthma*, 32(6), 413.

Bahl, S., Wali, J. P., Handa, R., Rattan, A., Aggarwal, and Kindo, A. J. (1997) **Legionella as a low respiratory pathogen in North India.** *Indian J of Chest Diseases and Allied Science*, 39, 81-86.

One hundred patients of lower respiratory tract infection (LRTI) were prospectively studied over 2 years to find out if Legionella is a causative agent in these patients. In addition, 50 environmental samples and 50 age and sex matched controls were studied. Culture and direct fluorescent antibody testing (DFA) of respiratory tract secretions, and serodiagnosis by indirect immunofluorescence (IF) and ELISA, were employed to detect Legionella. Respiratory tract secretions from all patients were negative for Legionella on culture and DFA. Low antibody titers to Legionella were observed in 21 patients and these could be attributed to cross reaction with other gram-negative bacteria. All environmental samples and controls tested negative for Legionella. Legionella does not seem to be an important lower respiratory tract pathogen in this part of the country and empirical addition of erythromycin to treatment regimens for pneumonia is not warranted in our setting.

Baek, S.-O., Kim, Y.-S., and Perry, R. (1997) **Indoor air quality in homes, offices and restaurants in Korean urban areas - indoor/outdoor relationships.** *Atmospheric Environment*, 31(4), 529-544.

Air quality monitoring was carried out to collect data on the levels of various indoor and ambient air constituents in two cities in Korea (Seoul and Taegu). Sampling was conducted simultaneously indoors and outdoors at six residences, six offices and six restaurants in each city during summer 1994 and winter 1994-1995. Measured pollutants were respirable suspended particulate matter (RSP), carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), and a range of volatile organic compounds (VOCs). In addition, in order to evaluate the effect of smoking on indoor air quality, analyses of parameters associated with environmental tobacco smoke (ETS) were undertaken, which are nicotine, ultraviolet (UVPM), fluorescence (FPM) and solanesol particulate matter (SolPM). The results of this study have confirmed the importance of ambient air in determining the quality of air indoors in two major Korean cities. The majority of VOCs measured in both indoor and outdoor environments were derived from outdoor sources, probably motor vehicles. Benzene and other VOC concentrations were much higher during the winter months than the summer months and were not significantly greater in the smoking sites examined. Heating and cooking practices, coupled with generally inadequate ventilation, also were shown to influence indoor air quality. In smoking sites, ETS appears to be a minor contributor to VOC levels as no statistically significant relationships were identified with ETS components and VOCs, whereas very strong correlations were found between indoor and outdoor levels of vehicle-related pollutants. The average contribution of ETS to total RSP concentrations was estimated to range from 10 to 20%.

Bahl, S., Wali, J. P., Handa, R., Rattan, A., Aggarwal, and Kindo, A. J. (1997) **Legionella as a low respiratory pathogen in North India.** *Indian J of Chest Diseases and Allied Science*, 39, 81-86.

Use of antibodies for acute respiratory infection (ARI) of presumed viral etiology is a worldwide problem. The World Health Organization (WHO) has provided guidelines for diagnosis and treatment of ARI for developing countries. Methods. Specially trained observers applied the WHO criteria to

study the diagnosis and treatment of ARI given by 100 randomly selected health care workers (HCWs) in a rural county in China. A total of 760 cases of ARI were evaluated. Results. Before the parents sought medical care, 47% of children in the county hospitals, 25% of those in the townships and 18% of those in the villages had already received antibiotics, available without prescription. Among the HCWs, antibiotic abuse (antibiotics for presumably viral disease) was detected in the treatment of 97% of cases, and severe abuse (such as prescription of two incompatible antibiotics) was detected in 27%. Most (197 of 200) patients with bacterial disease received antibiotics, but inappropriate antibiotic (dose or type) was observed in 63% of these cases. HCWs with university training and those with higher test scores on knowledge and attitude prescribed antibiotics more judiciously than those lacking those attributes. Conclusions: Abuse of antibiotics for ARI is a serious and costly problem in rural China, potentially leading to widespread antibiotic resistance. Educating HCWs in the management of ARI and proper use of antibiotics has high priority in China.

Bang, A. T., Bang, R. A., and Sontakke, P. G. (1994) **Management of childhood pneumonia by traditional birth attendants.** *Bulletin of the World Health Organization*, 72(6), 897-905.

In a field trial in Gadchiroli, India, we trained 30 paramedical workers (PMWs), 25 village health workers (VHWs) and 86 traditional birth attendants (TBAs) from 58 villages to diagnose childhood pneumonia and treat it with sulfamethoxazole + trimethoprim. Continued training, the development of a breath counter, and educative supervision progressively reduced errors in case management made by the TBAs. Over the 3.5-year period 1988-91, 2,568 attacks of childhood pneumonia were managed and the case fatality rate was 0.9%, compared with a rate of 13.5% in the control area. The case fatality rates for the three types of worker were similar. The TBAs were superior to the other workers in terms of their availability, outreach, access to neonates, and cost. Satisfaction with the VHWs, TBAs, and PMWs was expressed by 85%, 69% and 18% of users, respectively. In the intervention area the mortality rate attributable to pneumonia among neonates declined by 44% ( $P < 0.01$ ) while the total neonatal mortality fell by 20%, presumably because of the involvement of TBAs in the control of acute respiratory infections (ARI). If adequately supported by the health system, TBAs can successfully manage childhood pneumonia in villages at the lowest possible cost and with a high degree of community acceptance. TBAs and VHWs are the most suitable community-based health workers for ARI control programmes in developing countries.

Beckett, W. S., Russi, M. B., Haber, A. D., Rivkin, R. M., Sullivan, J. R., Tameroglu, Z., Mohsenin, V., and Leaderer, B. P. (1995) **Effect of nitrous acid on lung function in asthmatics: a chamber study.** *Environmental Health Perspectives*, 103 (4), 372-275.

Nitrous acid, a component of photochemical smog and a common indoor air pollutant, may reach levels of 100 ppb where gas stoves and unvented portable kerosene heaters are used. Nitrous acid is a primary product of combustion and may also be a secondary product by reaction of nitrogen dioxide with water. Because the usual assays for nitrogen dioxide measure several oxides of nitrogen (including nitrous acid) together, previous studies of indoor nitrogen dioxide may have included exposure to and health effects of nitrous acid. To assess the respiratory effects of nitrous acid exposure alone, we carried out a double-blinded crossover chamber exposure study with 11 mildly asthmatic adult subjects. Each underwent 3-hr exposures to 650 ppb nitrous acid and to filtered room 3-hr exposures to 650 ppb nitrous acid and to filtered room air with three 20-min periods of moderate cycle exercise. Symptoms, respiratory parameters during exercise, and spirometry after exercise were measured. A statistically significant decrease in forced vital capacity was seen on days when subjects were exposed to nitrous acid. This effect was most marked at 25 min and 85 min after exposure began. Aggregate respiratory and mucous membrane symptoms were also significantly higher with nitrous acid. We conclude that this concentration and duration of exposure to nitrous acid alters



lung mechanics slightly, does not induce significant airflow obstruction, and produces mild irritant symptoms in asthmatics.

Becklake, M., and Ernst, P. (1997) **Environmental Factors**. *Lancet*, 350, SII 10-13.

Environmental factors have a key role in the genesis of asthma. Epidemiological studies are starting to provide information on the relevant environmental determinants. Evidence for environmental factors as important determinants of asthma comes from several sources. Geographical differences in prevalence rates within countries, are unlikely to be due solely to differences in diagnostic practices and/or criteria. International studies in adults and children support the clinical impression that differences in disease occurrence between countries are real. In addition there is evidence of an increase in prevalence, particularly in children, in industrialised and in industrialising countries. Finally, the increase in prevalence, particularly of childhood asthma, over the past few decades, has raised the question of whether "a more toxic environment or a more susceptible population" is responsible. Seaton has argued that the increased prevalence of asthma associated with a westernised lifestyle or changing from rural to urban living is more likely to be due to a change in individual and population susceptibility than to an increase in exposure to a sensitising agent such as allergen. The determinants (see panel) of asthma can be considered under the two general categories commonly used in epidemiology, namely environmental and host (see table). Several important primary determinants are host factors, which are mainly genetic and are reflected in family history (particularly maternal history) of allergic conditions, and, more controversially, race and/or ethnic grouping. Atopy is considered by some to be the only established risk factor for asthma, and is certainly one of the most important. Among the environmental determinants, occupational exposure is generally accepted as a primary determinant of asthma, for example to sensitising chemicals such as the isocyanates. Community air pollution by allergen has also been responsible for sensitisation (ie, is a primary determinant) as shown by the soy bean Barcelona epidemic. Sustained exposure to indoor allergens postnatally is thought to be a primary determinant for atopy and a secondary determinant for asthma, responsible for ongoing inflammation and asthma severity. Prenatal exposure to allergens may also be important. Other possible environmental determinants of asthma in childhood include exposure to respiratory irritants such as environmental tobacco smoke, both before and after birth and some viral infections. Asthma exacerbations have been linked to urban pollutant concentrations, 43 while exposure to motor vehicle exhaust in children in Africa and Europe has been linked to increased prevalence of symptoms and other markers of asthma such as non-specific airway responsiveness. Paradoxically, certain infections, in addition to being risk factors, appear in some circumstances to be protective. Changing environments and changing lifestyles. Several of the environmental factors listed in the table are associated with changing lifestyles, and are probably surrogates for various environmental determinants of asthma. For instance, socioeconomic disadvantage (poverty) has been associated with increased rates of asthma in children in the USA living in inner cities and in Montreal school children. This association may be a reflection of poor housing conditions, dampness which encourages the growth of moulds and house-dust mites, use of certain fuels for home heating or cooking with unvented gas appliances or wood.

Behera, D., Dash, S., and Yadav, P. (1991) **Carboxyhaemoglobin in women exposed to different cooking fuels**. *Thorax*, 46 (5), 344-346.

Behera, D., Jindal, S. K., and Malhotra, H. S. (1994) **Ventilatory function in nonsmoking rural Indian women using different cooking fuels**. *Respiration*, 61 (2) 89-92.

Lung function parameters, forced vital capacity (FVC), forced expiratory volume in 1st second (FEV<sub>1</sub>), and peak expiratory flow rate (PEFR), were measured in 3,318 nonsmoking Indian women using four different types of cooking fuels (biomass, liquified petroleum gas, kerosene and mixed). Biomass fuel users had FVC values less than 75% predicted (73.42 ± 0.90; mean (± SE) whereas in

other groups it was more than 75% of predicted, though less than 80% of the predicted values. However, FEV<sub>1</sub>, FEV<sub>1</sub>/FVC (%) and PEF<sub>R</sub> were within normal limits in all the four groups. The absolute values of all the three parameters of lung functions were the lowest in the biomass and mixed fuel users. A negative correlation was observed between these parameters and the duration of cooking and exposure index. Thus the present study showed that, lung function, particularly FVC, is affected by indoor air pollution due to domestic cooking more so with biomass fuel. Better housing and use of smokeless devices for cooking might be helpful to avoid this effect on lung. This ventilatory impairment seems to be more of the restrictive (parenchymal) type, since obstruction could be ruled out. A longitudinal study is needed to demonstrate whether or not these changes are variable, reversible or progressing to fibrosis.

Bendahmane, D. B. (1997) Activity Report No. 38: **Air Pollution and Child Health: Priorities for Action**. Report of a Meeting of and EHP Technical Advisory Group on Air Pollution, July 17-18, 1996 Arlington, Virginia.

Contents are as follows: (1) Background, (2) Purpose of the Panel, (3) Panel Members, (4) ARI--The Leading Cause of Death in Children Under Five, (5) Effects of Air Pollution on Infants and Children, (6) The Characteristics of Particulate Matter, (7) Sources of Exposure, (8) Patterns of Exposure, (9) Dependence on Biomass Fuels, (10) Evidence Associating Particulates with ARI, (11) Health Effects, (12) Options for Action, (13) Conclusions and Recommendations, (14) Next Steps.

Bergstra, A. (1988) **Domestic air pollution and respiratory infections in young Gambian children: Analysis of data from a cross-sectional study**. *Environ Tropical Health Rep*, 350 1 - 22.

A cross-sectional study on domestic air pollution and acute respiratory infections (ARI) in young children was carried out by the Medical Research Council in Gambia. The analysis of the data was carried out by the Wageningen Agricultural University, The Netherlands. In 7 selected villages in the Basse area, The Gambia, children under the age of 5 years were weekly examined for upper and lower respiratory infections by local fieldworkers. The following risk factors for were incorporated in the study: Exposure to pollutants from biomass combustion, parental smoking and lanterns, nutritional status, socioeconomic status, immunisation rate and ethnic origin. Analysis of the data showed a positive but not statistically significant association between and exposure to biomass combustion products. The use of gasoil as fuel for lanterns was an important risk factor for lower respiratory infections. Compared with other fuels, it had an odds ratio of 3.0.

Beser, E., and Cakmakci, T. (1994) **Factors affecting the morbidity of vitamin D deficiency rickets and primary protection**. *Ast Afr Med. J*, 71(6), 358-362.

Rickets was investigated in 860 children in the 3 to 36 month age group in 21 villages attached to Sinik Health Centre, in northeastern Turkey. The blood calcium, phosphorus and alkaline phosphatase levels of suspect cases were determined following examination and wrist x-rays taken. The prevalence of cross-sectional rickets was determined, in the cohort group formed by removing the rickets cases (to the first group, advice was not given; to the second, 400 IU of vitamin D) and its incidence determined. The prevalence of rickets was calculated as 9.8% with no distinction observed between males and females ( $P > 0.05$ ). It is higher in children in the 3-6 month group (23.97%) ( $P < 0.05$ ); exposed rarely to the sun ( $P < 0.001$ ); without fish in diet ( $P < 0.01$ ); born to mother under 18 years old ( $P < 0.001$ ); with a mother not using contraception ( $P < 0.01$ ). The prevalence of acute respiratory infections (ARI) was calculated as 47.62% and 35.70% ( $P < 0.05$ ) in children with and without rickets, respectively. The prevalence of enteritis was calculated as 29.76% and 18.43% ( $P < 0.05$ ) in children with rickets and without rickets, respectively. Rickets was not seen where 400 IU of vitamin D was administered,

while incidence for the twelve-month period was calculated as 3.8% in the other group. Combatting rickets is important in developing countries where deaths under five years are largely due to and enteritis.

Bhattacharyya, S. N., Bhatnagar, J. K., Kumar, S., and Jain, P. C. (1976) **Chronic bronchitis in rural population.** *Indian J of Chest Diseases and Allied Sciences*, 17(1), 1-7.

Smoking has long been associated with high morbidity and mortality from chronic bronchitis Doll and Hill (1964) found a marked gradient in chronic bronchitis mortality with increasing amount of tobacco smoked. Higgins (1959) found the frequency of persistent cough with phlegm to be as high as 42 per cent in heavy smokers aged between 55 and 64 years. The report of Royal College of Physicians in 1962 cites several studies, indicating that chronic bronchitis and productive cough are both related to this. This study was an attempt to bring out the role of smoking in chronic bronchitis prevalence in persons aged 30 years and above in a rural area of Lucknow District.

Black, P. N., and Brodie, S. M. (1998) **Nitric oxide and response to inhaled bradykinin in severe asthma (editorial).** *Lancet*, 351(9100), 7.

Fabio Ricciardolo and co-workers (Nov 1, p. 1297) describe the response to inhaled bradykinin in ten patients with severe asthma. Ricciardolo and colleagues conclude that in severe asthmatics there was a loss of the bronchoprotective effect of the nitric oxide formed in the airways by the constitutive form of nitric-oxide synthase. Their findings could also be explained by inhaled corticosteroids blocking the formation of nitric oxide by the inducible form of nitric-oxide synthase (iNOS). We believe that the latter explanation is more likely. We compared the response to inhaled bradykinin in eight mild asthmatics and ten patients with severe asthma. Subjects with mild asthma had an FEV1 greater than 80% of predicted (mean 98.0% predicted) and inhaled steroid dose of 0-400 µg daily (mean 250 µg) of beclomethasone dipropionate. The severe asthmatics had an FEV1 less than 80% of predicted (mean 54.1% predicted) and inhaled steroid dose of >1600 µg daily (mean 1960 µg) of budesonide or fluticasone propionate. To investigate whether the reduced response to inhaled bradykinin in severe asthmatics was due to the formation of nitric oxide we conducted a double-blind crossover study of the effects of nebulised L-NMMA (1 mg in 5 mL saline) or saline on the response to inhaled bradykinin in seven of the severe asthmatics. Findings suggest that the reduced response to inhaled bradykinin in severe asthma is due partly to increased release of nitric oxide in the airways. We believe that the enhanced response to inhaled bradykinin seen in the patients described by Ricciardolo and co-workers reflects the ability of inhaled steroids to suppress the formation of nitric oxide by iNOS in the airways of mild to moderate asthmatics. By contrast, in our group of severe asthmatics, the reduced response to bradykinin results, at least in part, from the formation of nitric oxide in the airways, an effect which is not abolished by treatment with high doses of inhaled steroids.

Blasi, F., Legnani, D., and Lombardo, V. M. (1993) **Chlamydia pneumoniae infection in acute exacerbations of COPD.** *The European Respiratory J*, 6 (1), 19-22.

*Chlamydia pneumoniae* is a frequent causative agent of acute respiratory disease. We assessed the incidence and prevalence of *Chlamydia pneumoniae* infections in COPD. Studied 142 out-patients with acute exacerbations of chronic obstructive pulmonary disease (COPD) and 114 healthy control subjects. Oropharyngeal swab specimens were collected at each exacerbation and analysed using a high definition monoclonal indirect fluorescent antibody test for *Chlamydia pneumoniae* identification. Immunoglobulins G and M (IgG and IgM) fractions on antibodies to V were studied. Prevalence of specific IgG was 63% in COPD and 46% in controls (Chi-sq p-test p = 0.007). Moreover, mean titre of IgG was significantly higher in COPD than in controls. Our data suggest that V infection is a rather frequent event in COPD since at least 4% of exacerbations may be associated with it.

Bono, R., Calleri, M., Corrao, G., and Scursatone, V. (1988) **Air pollution and health: A descriptive study among populations of the urban area of Turin.** *Atmos Env*, 22(1), 193-194.

A descriptive study has been carried out in Turin to evaluate the effectiveness of the Italian law that controls the sulphur concentration in fuels. The authors have considered the effects in relation to environmental conditions, such as the decrease of pollutants like SO<sub>2</sub> and TSP with the state of meteorological parameters, and also in relation to public health in the urban area, analysing the admissions to hospital for chronic bronchitis in the period 1976-1981. The results indicate a connection between increase of atmospheric pollutants and health (during the cool season), though concentration is not very high during the studied period. The future purpose of the authors is to analyse, as a health indicator, the resident mortality from 1970 to 1986 and then to study a longer period, before and after the law.

Brauer, M. (1995) **Assessment of indoor aerosols with an integrating nephelometer.** *J of Exposure Analysis and Environmental Epidemiology*, 5(1), 45 – 56.

A portable nephelometer was used to assess particulate levels inside and outside of homes with indoor air impacted by biomass combustion. Simultaneous sampling with PM<sub>10</sub> and PM<sub>2.5</sub> inertial impacters was undertaken to determine the relationship between particle light scattering coefficient and particle mass concentration. Measurements were conducted in 22 homes in rural Mexico and 6 homes in rural British Columbia, Canada. In both areas, biomass combustion resulted in high levels of fine particulates, mainly indoors in Mexico and outdoors in British Columbia. Substantially different relationships were observed between the Mexico and British Columbia particulate, indicating the importance of particle composition and ambient conditions as factors affecting light scattering, even indoors.

Braun-Fahrlander, C., Vuille, J. C., Sennhauser, F. H., Neu, U., Kunzle, T., Grize L., Gassner, M., Minder, C., Schindler, C., Varonier, H.S., and Wuthrich, B. (Year) **Respiratory health and long-term exposure to air pollutants in Swiss schoolchildren.** *Am J Respir Crit Care Med*, 155(3), 1042-1049.

The impact of long-term exposure to air pollution on respiratory and allergic symptoms and illnesses was assessed in a cross-sectional study of schoolchildren (ages 6 to 15 yr, n = 4,470) living in 10 different communities in Switzerland. Air pollution measurements (particulate matter less than 10 (µm) in diameter (PM<sub>10</sub>), nitrogen dioxide (NO<sub>x</sub>), sulfur dioxide (SO<sub>2</sub>), and ozone) and meteorological data were collected in each community. Reported symptom rates of chronic cough, nocturnal dry cough, and bronchitis, adjusted for individual risk factors, were positively associated with PM<sub>10</sub>, NO<sub>2</sub>, ratios for chronic cough, nocturnal dry cough, and bronchitis between the most and the least polluted community for PM<sub>10</sub> were 3.07 (95% CI: 1.62 to 5.81), 2.88 (95% CI: 1.69 to 4.89), and 2.17 (95% CI: 1.21 to 4.89), respectively). The high correlation between the average concentrations of the pollutants makes the assessment of the relative importance of each pollutant difficult. No association between long-term exposure to air pollution and classic asthmatic and allergic symptoms and illnesses was found. There was some indication that frequency of fog is a risk factor of chronic cough and bronchitis, independent of air pollution. In conclusion, this study provides further evidence that rates of respiratory illnesses and symptoms among children augment with increasing levels of air pollution even in countries like Switzerland with moderate average air pollution concentrations.

Britton, J., and Knox, A. (1997) **Respiratory medicine: No cures but some advances.** *Lancet* 350 (suppl III), 24.

1997 has brought no cures, but the new category of inhibitors of lipoxygenase or specific leukotrienes continues to show promise in asthma. A new meta-analysis provided further evidence that methotrexate is effective as a steroid-sparing agent and deserves further appraisal as a way of avoiding the long-term side-effects of steroids in people with asthma (Chest 1997; 112: 29-33). Distance from hospital facilities was shown to be a risk factor for asthma mortality (Thorax 1997; 52: 218) and a nurse-led management training programme for parents of young children with asthma reduced subsequent admissions for asthma (Mudge). A meta-analysis showed that rehabilitation training has a great deal to offer patients with COPD (Chest 1997; 111: 1077). Several studies drew attention to the role of diet as a risk factor for asthma, COPD, and lung cancer (Thorax 1997; 52: 628, 166; Am J Epidemiol 1997; 146: 223, 231) and raised the possibility of prevention with an increased intake of fresh fruits and vegetables. Studies in rats showed that retinoic acid, by increasing the number of alveoli, can protect the lung from elastase-induced destruction. This regenerating property could be of potential benefit in emphysema and bronchopulmonary dysplasia (Nat Med 1997; 3: 675). Novel retinoid-related molecules may also have a role in treating lung cancer (Nat Med 1997; 3: 686). Several molecular studies in 1997 have added to our understanding of respiratory disease and may have important therapeutic spin-offs. Inhaled antisense oligonucleotides directed against the messenger RNA of one of the receptors of a specific inflammatory mediator (adenosine A1) downregulated receptor number and improved airway reactivity in a rabbit model of asthma. This innovation may allow the selective targeting of inflammatory response genes in the lung (Nyce). Studies are beginning to shed light on how the complex network of cytokines and mediators contributes to asthma pathophysiology. Studies of transgenic mice have shown that many of the features of human asthma are mimicked in mice engineered to express interleukin-5 constitutively (Lee). The effectiveness of an antidepressant drug, bupropion in helping people to stop smoking, suggests a new approach to the secondary prevention of smoking-related disease (Hurt). Nonetheless, primary prevention through effective tobacco control will remain the priority for the next millennium.

Brown, R. E., Brain, J. D. and Wang, N. (1997) **The Avian Respiratory System: A Unique Model for Studies of Respiratory Toxicosis and for Monitoring Air Quality** *Environmental Health Perspectives*, 105(2), 188-200.

There are many distinct differences (morphologic, physiologic, and mechanical) between the bird's lung-air-sac respiratory system and the mammalian bronchoalveolar lung. In this paper, we review the physiology of the avian respiratory system with attention to those mechanisms that may lead to significantly different results, relative to those in mammals, following exposure to toxic gases and airborne particulates. We suggest that these differences can be productively exploited to further our understanding of the basic mechanisms of inhalant toxicology (gases and particulates). The large mass-specific gas uptake by the avian respiratory system, at rest and especially during exercise, could be exploited as a sensitive monitor of air quality. Birds have much to offer in our understanding of respiratory toxicology, but that expectation can only be realized by investigating, in a wide variety of avian taxa, the pathophysiologic interactions of a broad range of inhaled toxicants on the bird's unique respiratory system. Key words: anatomy, birds, gas uptake, particle deposition, physiology, respiration, toxicology, ventilation.

Browne, G. J., Phung, A. S., and Soo, M. (1997) **Randomised trial of intravenous salbutamol in early management of acute severe asthma in children.** *Lancet*, 349(9048), 1.

The mainstay of treatment for acute asthma in children is nebulised  $\beta_2$ -adrenergic agents such as salbutamol, given with corticosteroids. However, penetration of the drug to the small airways is impeded by obstruction so intravenous salbutamol may be more effective. We assessed the use of intravenous salbutamol in the management of children with acute severe asthma in a double-blind randomised study. Children who presented to the Emergency Department of Westmead Hospital, Sydney, Australia with

asthma were assessed with a clinical assessment scale, and those with severe acute asthma were given nebulised salbutamol at a dose of 2.5 mg (age < 2 years) or 5.0 mg (age >2 years), made up to 4 mL with saline. The recovery time (time to cessation of nebulised salbutamol every 30 min) was 4 h in the 14 children allocated intravenous salbutamol compared with 11.5 h for the 15 children in the control group. 2 (14%) of the intravenous salbutamol group compared with 8 (53%) of the control group needed oxygen to maintain oxygen saturation at 93% room air. The intravenous salbutamol group were ready for discharge from the emergency department 9.7 h earlier than the control group. No clinically significant side-effects were found in either group. Addition of a 10 min infusion of salbutamol in the early treatment of children with acute severe asthma has the potential to curtail the clinical progression of asthma, reduce demand placed on hospital resources, and improve the quality of health care provided to the acutely sick child with asthma.

Browner, C. M., and Inhofe, J. M. (1997) **Are More Rigorous Clean-Air Standards Needed?** *Insight on the News*, April 28, 13(15), 22.

Brownson, R.C., Eriksen M. P., Davis, R. M., and Warner, K. E. **Environmental tobacco smoke: health effects and policies to reduce exposure.** *Ann Rev Public Health*, 18, 163-185.

The health hazards due to exposure to environmental tobacco smoke (ETS) are increasingly established. ETS contains thousands of chemicals including 43 known carcinogens. Known health effects of ETS exposure are lung cancer in nonsmokers, childhood disorders such as bronchitis, and perhaps, heart disease. Workplace exposure to ETS is widespread and is influenced strongly by the type of smoking policy in the workplace. To decrease ETS exposure, efforts to restrict public smoking have proliferated over the past decade. These restrictions have emanated from government as well as voluntary measures by various private industries. Bans on public smoking are effective in reducing nonsmokers' exposure to ETS. Workplace smoking bans also influence the intensity of smoking among employees and may increase quit smoking rates. In addition to the health benefits from smoke-free workplaces, there are likely cost savings to employers who implement such policies.

Bruce, N., Neufeld, L., Boy, E. and West, C. (1998) **Indoor biofuel air pollution and respiratory health: the role of confounding factors among women in highland Guatemala.** *International J of Epidemiology*, 27, 454-458.

This investigation has highlighted a problem which is likely to be common to observational studies in many settings where substantial differences in levels of exposure exist between sub-groupings of the population arising from improved stoves or fuels. In light of this, controlled intervention studies offer a powerful research option, since households using the improved stoves should not then differ (substantially) from those continuing to use open fires. It must be said, however, that despite the uncertainty confounding brings to the question of whether biofuel smoke exposure causes COLD and ALRI, the weight of evidence does represent a reasonable case for this being so. This issue could be argued to be of little policy relevance if either a moderate reduction in exposure from these very high levels guaranteed useful health gain, or large and sustainable reductions in exposure were easy to achieve, but the former is uncertain and the latter very rarely the case. Thus, levels of particulate exposure in homes with so-called improved stoves are reported to be lower than for traditional fires, but still in the range of 1130  $\mu\text{g}/\text{m}^3$  total suspended particulates (TSP) to 4600  $\mu\text{g}/\text{m}^3$  TSP. It is for these reasons that intervention studies involving direct measurement of exposure offer the best means of obtaining the information required to help drive the development and implementation of measures capable of reducing the very substantial global health burden believed to result from biofuel indoor air pollution.

Brunekreef, B., Dockery, D. W., and Krzyzanowski, G. (1995) . **Environmental epidemiology; Health effects of ozone: Perinatal exposure to Dioxins.** *Environmental Health Perspectives*, 103 (Suppl 2) March.

Since the development of the World Health Organization (WHO) Air Quality Guidelines for Europe, a large number of epidemiologic studies have been published documenting effects of major air pollutants on health at concentrations below existing guidelines and standards. In this review, recent studies are discussed that permit some evaluation of short-term health effects observed at exposure levels lower than the current WHO Guidelines or U.S. Environmental Protection Agency (U.S. EPA) standards. Some studies have been conducted at concentration levels that never exceeded existing guidelines or standards. Other studies have been conducted at exposure levels sometimes exceeding current guidelines or standards. The published analyses of several of these studies permit evaluation of low-level health effects either because analyses were restricted to levels not exceeding the guidelines or graphic analyses were reported suggesting effects at these low levels. For ambient ozone, effects on lung function of subjects exercising outdoors have now been documented at 1-hr maximum levels not exceeding 120 micrograms/cubic meter, i.e., half the current U.S. EPA standard. One study even suggests that such effects occur at levels below 100 micrograms/cubic meter. Several studies are now available documenting effects of particulate air pollution on health in the virtual absence of SO<sub>2</sub>. Effects on mortality and hospital admissions for asthma have been documented at levels not exceeding 100 micrograms/cubic meter, expressed as 24-hr average inhalable particles PM<sub>10</sub> concentration. Effects on lung function, acute respiratory symptoms, and medication use have been found at 24-hr average PM<sub>10</sub> levels not exceeding 115 micrograms/cubic meter. When the WHO Air Quality Guidelines and the U.S. EPA standard for PM<sub>10</sub> were developed, there were no studies available on health effects of PM<sub>10</sub>. In this review, we include nine studies documenting health effects of measured PM<sub>10</sub> at low levels of exposure, indicating that there is now an entirely new epidemiologic database that can be evaluated in the process of revising current guidelines and standards. The low levels of exposure at which effects on health were seen underscore the urgent need for such reevaluations. Key words: air pollution, lung function, nitrogen oxides, ozone, particles, respiratory tract, sulfur dioxide.

Brussow, H., Rytz A., Freire W., Rahim H., and Dirren H. (1995) **Risk factors associated with the recall of respiratory diseases in the Ecuadorian children.** *J of Diarrhoeal Dis Res*, 13 (4), 212-8

Risk factors associated with the recall of a recent episode of acute children enrolled into a cross-sectional health and nutrition survey. In a univariate analysis, ARI recall was significantly higher in children living in low altitude regions (Relative Risk, RR = 2.4), in younger children (RR = 1.6), in children from larger families (RR = 1.3), in children with diarrhoea recall (RR = 1.9), in children served with poor quality drinking water (RR = 1.3) and in anaemic children (RR = 1.2) than that in the appropriate control groups. After taking into account the confounding effect of altitude, no association was found between ARI recall and low height-for-age values. Stepwise logistic regression analysis identified living in low altitude regions, diarrhoea recall, and younger age as independent factors associated with a higher recall of ARI. In contrast to the recall of acute diarrhoea, no association between ARI recall and nutritional status was found. The impact of nutritional interventions in children from developing countries may be greater on enteric than on respiratory diseases.

Bukowski, J. A., and Wartenberg, D. (1997) **An alternative approach for investigating the carcinogenicity of indoor air pollution: pets as sentinels of environmental cancer risk.** *Environmental Health Perspectives*, 105(12), 1312-1319.

Traditionally, the cancer risks associated with radon, environmental tobacco smoke (ETS), and similar indoor residential exposures have been evaluated through either laboratory experiments in rodents or

epidemiology studies in people. Traditional epidemiology studies evaluate human risk directly, at the exposure levels present in residences; however, these studies are limited by their potential for misclassification, biased recall, and uncontrolled confounding. The long time intervals involved between exposure and disease (often 30 years or more) make accurate recall particularly problematic. The paper discusses the limitations of these traditional approaches, especially as they relate to residential studies of radon and ETS. The problems associated with the maximum tolerated dose in rodent bioassays and exposure misclassification in traditional epidemiology are particularly examined. A third approach that supplements the traditional approaches and overcomes some of their limitations is suggested. This approach, dubbed pet epidemiology, estimates residential cancer risk by examining the exposure experience of pet dogs with naturally occurring cancers. The history of pet epidemiology is reviewed and its strengths and limitations are examined. Key words: animal sentinel, cancer, epidemiology, indoor air, pets, pollution.

Calderón-Garcidueñas, L. (1994). **Nasal Toxicity in Mexico City.** *Environmental Health Perspectives*, 102(12), 1074-1080.

Calderón-Garcidueñas investigated the effects of atmospheric pollution in Mexico City on the respiratory health of healthy males. The data suggest that cumulative exposure to elevated ozone concentrations as high as 10 ppm for 10 hours per day for 2 weeks was associated with adverse respiratory symptoms and severely irritated nasal mucosa. The toxicity was observed as early as 2 days after exposure, and persisted for up to 2 weeks after departure.

Calderón-Garcidueñas, L., Osnaya-Brizuela, N., Ramírez-Martínez, L., and Villarreal-Calderón, A. (1996) **DNA Strand Breaks in Human Nasal Respiratory Epithelium Are Induced upon Exposure to Urban Pollution.** *Environmental Health Perspectives*, 104(2), 160-168.

All organisms have the ability to respond and adapt to a myriad of environmental insults. The human respiratory epithelium, when exposed to oxidant gases in photochemical smog, is at risk of DNA damage and requires efficient cellular adaptative responses to resist the environmentally induced cell damage. Ozone and its reaction products induce in vitro and in vivo DNA single strand breaks (SSBs) in respiratory epithelial cells and alveolar macrophages. To determine if exposure to a polluted atmosphere with ozone as the main criteria pollutant induces SSBs in nasal epithelium, we studied 139 volunteers, including a control population of 19 children and 13 adult males who lived in a low-polluted Pacific port, 69 males and 16 children who were permanent residents of Southwest Metropolitan Mexico City (SWMMC), and 22 young males newly arrived to SWMMC and followed for 12 weeks. Respiratory symptoms, nasal cytology and histopathology, cell viabilities, and single-cell gel electrophoresis were investigated. Atmospheric pollutant data were obtained from a fixed-site monitoring station. SWMMC volunteers spent >7 hr/day outdoors and all had upper respiratory symptoms. A significant difference in the numbers of DNA-damaged nasal cells was observed between control and chronically exposed subjects, both in children ( $p < 0.00001$ ) and in adults ( $p < 0.01$ ). SSBs in newly arrived subjects quickly increased upon arrival to the city, from 39.8 8.34% in the first week to 67.29 2.35 by week 2. Thereafter, the number of cells with SSBs remained stable in spite of the continuous increase in cumulative ozone, suggesting a threshold for cumulative DNA nasal damage. Exposure to a polluted urban atmosphere induces SSBs in human nasal respiratory epithelium, and nasal SSBs could serve as a biomarker of ozone exposure. Further, because DNA strand breaks are a threat to cell viability and genome integrity and appear to be a critical lesion responsible for p53 induction, nasal SSBs should be evaluated in ozone-exposed individuals. Key words: DNA damage, DNA single strand breaks, human nasal epithelium, ozone, urban pollution.



Casaco, A., Carvajal, D., Noa, M., Gonzalez, R., Garcia, M., and Rodriguez de la Vega, A. (1985) **Effects of kerosene on airway sensitization to egg albumin in guinea pig.** *Allergol Immunopathol (Madrid)*, 13 (3), 235-9.

We undertook a study to determine if pre-exposure to kerosene smoke enhances airway sensitization to egg albumin in the guinea pig. Kerosene vapor inhalation for 15 days, 1 hour daily, in similar conditions to which some housewives who use kerosene as cooking fuel are exposed elicited tracheal damage characterized by signs of dysplasia and inflammatory infiltrate. When these animals were exposed to egg albumin aerosol there was an increase in the antialbumin antibody blood titer and an increased response to egg albumin in the isolated tracheal preparation (Schultz-Dale reaction). We conclude that the airway damage elicited by inhalation of kerosene vapor increase antigen absorption and thereby antibody formation.

Cattaneo, A. (1994) **Current role of vaccination in preventing acute respiratory infections in children in developing countries.** *Monaldi Arch Chest Dis*, 49(1), 57-60.

Acute respiratory infections (ARI) cause more than four million childhood deaths each year in developing countries. In addition to standard case management, vaccines have a great potential for reducing these deaths. Immunization against measles and pertussis, already reaching more than 70% of infants in developing countries, contributes to the prevention of more than one million childhood deaths. New conjugate vaccines against *Haemophilus influenzae* type b, if shown to be effective against pneumonia in developing countries, could reduce acute lower respiratory infection (ALRI) deaths by 4%. A further 10% reduction could be obtained by the availability of an effective conjugate vaccine against *Streptococcus pneumoniae*. A safe vaccine against respiratory syncytial virus could also prevent 10% of ALRI deaths. The potential role of other bacterial and viral vaccines needs to be clarified.

Chan, C. C., Yanagisawa, Y., and Spengler, J. D. (1990) **Personal and indoor/outdoor nitrogen dioxide exposure assessments of 23 homes in Taiwan.** *Toxicol Ind Health*, 6 (1), 173-82.

Indoor and outdoor nitrogen dioxide (NO<sub>x</sub>) concentrations of 23 homes from two areas in Taiwan, the city of Taipei and a rural village in central Taiwan, were measured concurrently from December 1987 to January 1988. NO<sub>2</sub> measurements were carried out by Palmes tube for one week and filter badges for two days. In Taipei, the mean NO<sub>2</sub> concentrations outdoors, in the kitchens, in the livingrooms, and in the bedrooms were 40.1 ppb, 34.4 ppb, 32.1 ppb, and 29.7 ppb for one week, and were 25.7 ppb, 25.6 ppb, 22.6 ppb, and 20.5 ppb for two days. In the village of central Taiwan, the corresponding concentrations were 23.5 ppb, 24.5 ppb, 20.4 ppb, and 17.5 ppb for one week, and 20.3 ppb, 24.7 ppb, 18.8 ppb, and 15.4 ppb for two days. The NO<sub>2</sub> concentrations of all microenvironments in Taipei were significantly higher than those in the village of central Taiwan. The outdoor NO<sub>2</sub> concentrations were significantly higher than the indoor NO<sub>2</sub> concentrations in Taipei. The NO<sub>2</sub> measurements in the kitchens were higher than all other measurements indoors and outdoors in the village of central Taiwan. The houses which used natural gas as cooking fuel had slightly higher indoor NO<sub>2</sub> concentrations than the houses which used LPG as cooking fuel in Taipei city. Cement houses had slightly higher indoor NO<sub>2</sub> concentrations than brick houses. The mean of housewives' exposures was 30.8 ppb in Taipei and 19.9 ppb in the village of central Taiwan. The explanation power of the housewife's exposure to NO<sub>2</sub> was 72% by the time weighted-average model and 70% by the simple linear regression model.

Charpin, D. and Vervloet, D. (1996) **Role of atmospheric pollution in asthma.** *Revue de Pneumologie Clinique*, 52(2), 70-78.

Air pollution can be divided into two basic types, industrial acid pollution (black smoke-dust particles sulfur oxide) and photochemical pollution (nitrogen oxides-ozone from automobile exhausts). In western countries, industrial pollution has greatly decreased while photochemical pollution has remained stable or increased depending on the area. In animal models, all types of air pollution, at high concentration, have an effect on the airways: irritation, facilitation of allergic sensitization, reduced resistance to infections. In humans, is the prevalence of asthma higher in polluted areas? Most surveys have found that the prevalence of respiratory, ear-nose-throat, and bronchial symptoms is higher but not symptoms of asthma. The surveys comparing East and West Germany suggest that irritation (repeated rhinobronchitis) is related to acid-particle pollution. The higher prevalence of allergic diseases in ex-West Germany does not appear to be related to photochemical pollution but rather to western lifestyle in general. In addition, changes in air pollution have an effect on the clinical and functional score in asthma patients, affecting the demand for medication and health care. Of particular importance for health care is the fact that these effects occur at concentrations below 'standard' levels of pollution.

Chen, P.-C., Lai, Y.-M., Wang, Y.-D., Yang, C.-Y., Hwang, J.-S., Kuo, H.-W., Huang, S.-L. and Chan, C.-C. (1988) **Adverse Effect of Air Pollution on Respiratory Health of Primary School Children in Taiwan.** *Environmental Health Perspectives*, 106, 331-335.

This study is a part of the *Study On Air Pollution and Health In Taiwan (SOAP&HIT)*, an ongoing research project involving cooperation of several universities in Taiwan. In this study, the objective was to evaluate the effects of ambient air pollution on respiratory symptoms and diseases of school children, in addition to considering indoor air pollution. Six communities were selected: one community located in a rural area (Taihsi), two in urban areas (Keelung and Sanchung), and the other three in petrochemical industrial areas (Toufen, Jenwu, and Linyuan). We sampled 5,072 primary school students in six communities from the main study population of SOAP&HIT. Respiratory health was assessed by evaluation of the children's respiratory symptoms and diseases using a parent-completed questionnaire. Data were analyzed using logistic regression analysis to compute odds ratios of adverse effect. The school children in the urban communities had significantly more respiratory symptoms (day or night cough, chronic cough, shortness of breath, and nasal symptoms) and diseases (sinusitis, wheezing or asthma, allergic rhinitis, and bronchitis) when compared with those living in the rural community. However, only nasal symptoms of children living in the petrochemical communities were more prevalent than in those living in the rural community. Although the association with ambient air pollution is suggestive, the cross-sectional study cannot confirm a causal relationship; thus further studies are needed.

Chonmaitree, T., Owen, M. J., and Patel, J. (1992) **Effect of viral respiratory tract infection on outcome of acute otitis media.** *The J of pediatrics*, 120(6), 856.

The presence of viral infection in patients with acute otitis media was comprehensively studied. Concurrent viral infection worsened the clinical course of bacterial otitis, and the presence of virus in the middle ear lengthened the duration of disease in those with no identified bacterial pathogens. Data suggest that viruses interact with bacteria and that concurrent viral infection can significantly worsen the clinical course of bacterial AOM. The presence of virus in middle ear fluid may contribute to pathogenesis and outcome of bacterial AOM.

Choudhury, A. H., Gordian, M. E., and Morris, S. S. (1997) **Associations between respiratory illness and PM<sub>10</sub> air pollution.** *Arch Environ Health*, 52(2), 113-117.

In this study, the association between daily morbidity and respirable particulate pollution (i.e., particles with a mass median aerodynamic diameter of < 10 microns (PM<sub>10</sub>)) was evaluated in the general population of Anchorage, Alaska. Using insurance claims data for state employees and their dependents

who lived in Anchorage, Alaska, the authors determined the number of medical visits for asthma, bronchitis, and upper respiratory infections. The number of visits were related to the level of particulate pollution in ambient air measured at air-monitoring sites. This study was conducted during a 3-y period, which included several weeks of higher-level particulate pollution that resulted from a volcanic eruption (i.e., August 1992). The particulate pollution was measured by the Anderson head sampler (24-h accumulation). The medical visits of the population at risk were also tallied daily. To help confirm whether PM<sub>10</sub> exposure was a risk factor in the exacerbation of asthma, we used a regression analysis to regress daily asthma visits on PM<sub>10</sub> pollution levels, controlling for seasonal variability. A significant positive association between morbidity and PM<sub>10</sub> pollution was observed. The strongest association was with concurrent-day PM<sub>10</sub> levels. The relative risk of morbidity was higher with respect to PM<sub>10</sub> pollution during warmer days.

Cleary, G. J., and Blackburn, C. R. B. (1968) **Air pollution in native huts in the Highlands of New Guinea.** *Arch Envir Health*, 17, 785-94.

The degree of air pollution in native huts in the New Guinea Highlands has been assessed. The "average concentrations of smoke density, aldehydes, and carbon monoxide measured in the Eastern highlands, at an altitude of 7,200 feet, were 666  $\mu\text{g}/\text{m}^3$ , 3.8 ppm and 150 ppm which were obtained on one occasion soon after start-up of the fire. Comparable "average" values in the Western Highlands, at 4,000 to 5,2000 feet were 359  $\mu\text{g}/\text{m}^3$ , 0.67 ppm and 11.3 ppm, respectively. Smoke density was highly correlated with aldehyde concentrations in both areas,  $r = +0.93$  and  $+0.88$ , and with carbon monoxide,  $r = +0.87$  and  $+0.72$ . Air pollution may be a contributing factor in the genesis and maintenance of the prevalent nontuberculous lung disease in New Guinea highlanders.

Clifford, P. (1972) **Carcinogens in the nose and throat: Nasopharyngeal carcinoma in Kenya.** *Proc R Soc Med*, 65, 682-686.

This article is a discussion of varying prevalence of nasopharyngeal carcinoma (NPC) in different tribes in Kenya. May be because of altitude, indoor air pollution or possibly nutrition.

Cohen, L. (1995) **Indoor air quality a major public-health issue, workshop told.** *Can. Med. Assoc. J*, 153(1), 92-93.

Indoor pollution is a major public health issue, say representatives from government and the medical profession who participated in a recent workshop in Ottawa. Researchers are certain that indoor pollution causes many of the allergy-related problems and asthma, bronchitis, rhinitis, coughing and other respiratory problems experienced by North Americans. They urge physicians to learn about indoor air quality and to educate patients to improve their environment, particularly with respect to secondhand smoke, dust mites and mould.

Cruz, J. R., Pareja, G., de Fernandez, A., Peralta, F., Caceres, P., and Cano, F. (1990). **Epidemiology of acute respiratory tract infections among Guatemalan ambulatory preschool children.** *Rev Infect Dis*, 12 (Suppl 8), S1029-S1034.

Acute respiratory tract infections (ARI) were studied during a 2-year period in 521 preschool children living in a marginal area of Guatemala City. There were 3,646 episodes of ARI detected during 26,329 child-weeks at risk, for an incidence of 14 per 100 child-weeks or 7.2 episodes per child per year. The median duration of ARI episodes was 11 days. The highest incidence of ARI was observed in children 6-23 months old. Boys had more respiratory tract illnesses than did girls; the presence of a cigarette smoker in the household was associated with higher morbidity. Acute lower respiratory tract illnesses (ALRI) were more common among younger infants 0-5 months old, with nutritional status having no

apparent effect. Parental formal education and crowding in households were found to be directly related to the incidence of ALRI. In general, ARI morbidity interfered with appropriate physical growth.

Dales, R., Miller, D., and McMullen, E. (1997) **Indoor air quality and health: Validity and determinants of reported home dampness and moulds**. *International J of Epidemiology*, 26(1), 120-125.

*Background:* Questionnaire-based surveys from several countries have consistently detected adverse health associated with home dampness and mould growth. *Methods:* To test the validity of questions commonly used to indicate the presence of indoor mould, questionnaires were administered in 403 homes where dust samples were taken for viable fungi and air samples for ergosterol. *Results:* Geometric mean concentrations of the total viable fungi were 255 (SE 116)  $\times 10^3$  CFU/g when mouldy odors were reported and 155 (SE 55) when odours were not reported ( $P=0.01$ ). Similarly reported water damage was associated with 50% increase ( $P= 0.06$ ). Geometric mean concentrations of the predominantly indoor-source fungi, *Aspergillus* plus *Penicillium*, were twice as high when mould or mildew was reported than when not mentioned ( $p=0.01$ ). The presence of reported mould or water damage was unrelated to the presence of detectable levels of ergosterol. There was evidence for reporting bias: in the presence of low concentrations of viable fungi in dust, respondents reporting allergies were more likely to report visible mould growth (odds ratio [OR] = 1.8, 95% confidence interval [CI]: 0.9-3.5,  $P=0.10$ ). IN the presence of elevated concentrations of dust fungi, respondents who smoke were less likely to report visible mould growth, (OR = 0.4, 95% CI: 0.2-0.7,  $P = 0.005$ ). *Conclusions:* Reported mould, water damage, and mouldy odors were associated with elevated levels of indoor fungi. However, accuracy was high and there was evidence of systematic reporting bias. Future research should concentrate on developing accurate objective measures of exposure to fungi, and then use this information to develop valid questionnaires. Currently, objective measures, not questionnaires, are recommended to clarify the health effects of indoor fungi.

Davies, B. H. (1994) **Epidemiology of Building-Associated Illness**. *Immunology and Allergy Clinics of North America*, 14 (3), 483.

In this article, indoor air pollution and various building-related illnesses are described. Emphasis is placed on those illnesses with clear causation and pathogenesis. Examples of common disorders, such as asthma, are compared with rarer responses, such as extrinsic allergic alveolitis. The weakness of many epidemiologic studies in this field also is addressed. It is now clearly recognized that indoor air quality may have many different deleterious effects on health. Clear relationships have been shown for those illnesses mediated either by direct infection or altered immunologic responses. Lessons from industrial environments may not always reflect risks in a more complex cohort with multifactorial illnesses.

Dayal, H. H., Khuder, S., Sharrar, R., and Trieff, N. (1994) **Passive smoking in obstructive respiratory diseases in an industrialized urban population**. *Environ. Res*, 65(2), 161-171.

We examined the risk of obstructive respiratory disease associated with tobacco smoke in indoor air, independent of active smoking, ambient air pollution, and some of the other sources of residential indoor air pollution. Data came from a probability sample survey of nine neighborhoods in Philadelphia conducted in 1985-1986, leading to information on approximately 4200 individuals. While for never-smokers the prevalence of obstructive respiratory conditions was proportional to the level of environmental tobacco smoke, this secondhand smoke was not a factor in the frequency of such problems among current smokers. In a series of analyses restricted to never-smokers, each of the 219 index cases of obstructive respiratory disease was matched by age, gender, and neighborhood to three randomly selected controls where matching by neighborhood effectively controlled for ambient air

pollution. Both matched and unmatched two-sample analyses showed a statistically significant difference ( $P = 0.019$  and  $0.016$ , respectively) between cases and controls with respect to the level of tobacco smoke in the indoor environment. A conditional logistic regression-matched analysis revealed that heating and cooking as sources of indoor air pollution were not associated with the case/control status. However, the odds ratio for passive smoking at a level of more than one pack per day in the house environment was  $1.86$  (95% CI,  $1.21-2.86$ ). The results show that passive smoking is a significant risk factor for obstructive respiratory disease for never-smokers in an industrialized urban population.

Denno, D.M., Bentsi-Enchill, A., Mock, C. N., and Adelson, J. W. (1994) **Maternal knowledge, attitude and practices regarding childhood acute respiratory infections in Kumasi, Ghana.** *Ann Trop Paediatr*, 14 (4), 293-301.

Acute respiratory infections (ARI) are a major cause of paediatric mortality and morbidity, particularly when associated with delays in treatment. A study of mothers' knowledge, attitudes and practices regarding ARI in their children aged less than 5 years was conducted in an urban Ghanaian population. One hundred and forty-three women traders were interviewed in open air markets in Kumasi, Ghana. Based on Western standards, there was a poor maternal understanding of the aetiology of ARI. A variety of herbal and home care therapies, including some which have potentially harmful effects, were routinely employed for the prophylaxis and treatment of ARI. For example, castor oil and enemas (25.9%) were reported as agents to prevent ARI, and antibiotics were prescribed by the parents in 39.9% for treating coughs. While the mothers exhibited an understanding of symptoms which differentiate between mild and severe ARI, a substantial number indicated that they would delay accessing a health care facility in the presence of the following symptoms which signify severe respiratory distress: dyspnoea (11.2%); tachypnoea (18.9%); chest retraction (21.7%); cough, fever and anorexia (30.0%); and cough, fever and lethargy (57.3%). These findings support the need for an ARI health education programme in Ghana.

De Tejada, S. S. (1997) **Management of acute respiratory infections (ARI) in a Kaqchiquel community in Guatemala.** *Pan American J of Public Health*, 1(4), 259-265.

Acute respiratory infections (ARI) are among the principal causes of childhood morbidity and mortality in Latin America. In Guatemala, pneumonia is the leading cause of death in young children and is responsible for approximately one-third of the out-patient visits to pediatric services. A large proportion of these deaths result from deficient management, attributable to a failure to recognize the first signs of pneumonia, the presence of barriers that impede immediate care-seeking, consultation with unsuitable providers, or inappropriate treatment recommendations. The purpose of this brief qualitative study was to investigate the perceptions and behaviors with respect to ARI of the residents of San Juan Comalapa, a Kaqchiquel community in the central highlands of Guatemala. Thirty-two mothers were interviewed in their homes to determine how they classified ARI and what signs and symptoms made them seek medical attention immediately. The results revealed that the mothers could recognize the presence of rapid breathing but not that of chest retraction (two important signs of pneumonia). When they sought care for the child, they usually went to physicians or other providers at health centers and occasionally at private clinics, but rarely did they seek care at an early stage of the illness, owing to poor accessibility of the services and underestimation of the severity of the symptoms. This conduct can be modified by education. The authors make recommendations aimed at improving verbal communication between health care providers and mothers.

Dibley, M. J., Sadjimin, T., Kjolhede, C. L., and Moulton, L. H. (1996) **Vitamin A supplementation fails to reduce incidence of acute respiratory illness and diarrhea in preschool-age Indonesian children.** *J of Nutrition*, 126(2), 434-442.

Vitamin A supplementation of populations of vitamin A-deficient preschool-age children has been shown to reduce childhood mortality, but the primary preventive effects of such supplements on childhood infectious diseases have not been carefully evaluated. We conducted an individually randomized, placebo-controlled, double-masked trial among 1,407 Indonesian preschool-age children, to measure the effects of high dose vitamin A on acute respiratory and diarrheal illnesses. Signs and symptoms of morbidity were monitored using every other day home surveillance by trained interviewers. High dose vitamin A supplements increased the incidence of acute respiratory illnesses (ARI) by 8%, and acute lower respiratory illnesses (ALRI) by 39%. These detrimental effects on acute lower respiratory illnesses were most marked in children with adequate nutritional status (rate ratio 1.83, 95% confidence interval 1.257-2.669). In contrast, vitamin A tended to be protective of ALRI in chronically malnourished children (rate ratio 0.71, 95% confidence interval 0.375-1.331). There was no overall effect of high-dose vitamin A supplements on the incidence of diarrheal disease (rate ratio 1.06, 95% confidence interval 0.920-1.225). However, we found a significant interaction between supplementation and age: vitamin A increased the incidence of diarrhea in children < 30 mo of age, but tended to reduce the incidence in older children. The finding of a significant adverse effect of vitamin A supplements in adequately nourished children highlights the need to review the criteria for selecting populations of preschool-age children for vitamin A supplementation.

Dockery, Douglas; Cunningham, Joan; Damokosh, Andrew; Neas, Lucas; Spengler, John; Koutrakis, Petros; Ware, James; Raizenne, Mark; Speizer, Frank. **Health Effects of Acid Aerosols on North American Children: Respiratory Symptoms.** *Environmental Health Perspectives* 104: 500-505 (1996)

We examined the respiratory health effects of exposure to acidic air pollution among 13,369 white children 8 to 12 years old from 24 communities in the United States and Canada between 1998 and 1991. Each child's parent or guardian completed a questionnaire. Air quality and meteorology were measured in each community for a 1-year period. We used a two-stage logistic regression model to analyze the data, adjusting for the potential confounding effects of sex, history of allergies, parental asthma, parental education, and current smoking in the home. Children living in the community with the highest levels of particle strong acidity were significantly more likely [odds ratio (OR) = 1.66; 95% confidence interval (CI) 1.11-2.48] to report at least one episode of bronchitis in the past year compared to children living in the least polluted community. Fine particulate sulfate was also associated with higher reporting of bronchitis (OR = 1.65; 95% CI 1.12-2.42). No other respiratory symptoms were significantly high reporting of bronchitis (OR = 1.65; 95% CI 1.12-2.24). No other respiratory symptoms were significantly higher in association with any of the air pollutants of interest. No sensitive subgroups were identified. Reported bronchitis, but neither asthma, wheeze, cough, nor phlegm, were associated with levels of particulate strong acidity for these children living in a nonurban environment.

Dodge, R. (1982) **The Effects of Indoor Pollution on Arizona Children.** *Arch Environ Health*, 37, 151-155.

The respiratory health of a large group of Arizona school children who have been exposed to indoor pollutants--tobacco smoke and home cooking fumes--is reported. A significant relationship was found between parental smoking and symptoms of cough, wheeze, and sputum production. Also, children in homes where gas cooking fuel was used had higher rates of cough than children in homes where electricity was used. No differences in pulmonary function or yearly lung growth rates occurred among subjects groups

Douglas R.M.; Woodward A.; Miles H.; Buetow S.; Morris D (1994) **A prospective study of proneness to acute respiratory illness in the first two years of life.** *International J of Epidemiology*, 23(4), 818-826.

**Background:** This study sought explanations for the proneness to respiratory events in young Australian children. **Methods:** Prospective respiratory symptom diaries on 836 children collected data on respiratory symptoms and episodes. Questionnaires to mothers and birth and pregnancy records provided 56 known and possible predictors which were tested against two summary respiratory outcomes in each of the first and second years of life. **Results:** The two summary respiratory variables recorded for first and second year of life give four outcome variables. In fitting multivariate regression models to predict outcomes, use of child-care in early childhood and mothers' experience of respiratory illness in the 12 months before birth were significant predictors for all four outcomes. Number of siblings was a predictor for three of the four outcomes. Sleep difficulty during pregnancy in the mother, and respiratory hospitalization of the infant in the first year, were significant predictors for both first-year outcomes. Unexpected and unexplained findings emerged for alcohol intake during pregnancy, passive smoking and breastfeeding in relation to the second year respiratory outcomes. Less than 9% of variance in outcome scores was explained in any of the four multiple regression models but this rose to between 24% and 31% when a corresponding score from the other year was added to the model. **Conclusions:** Proneness to respiratory illness is an important entity; its determinants are largely unknown and events in pregnancy or the perinatal period explain only a small proportion of the between-infant variability.

Dudley, L., Hussey, G., Huskissen J., and Kessow, G. (1997) **Vitamin A status, other risk factors and acute respiratory infection morbidity in children.** *South African Medical J*, 87(1) 65-70.

**Objective.** This study evaluated the association between vitamin A status and the severity of acute respiratory infections (ARIs) in children, controlling for the influence of other known ARI risk factors. **Design.** Case control study. **Setting.** Ambulatory and hospital-based study. **Patients.** Severe cases (N = 35) were children with ARI who were admitted to hospital for inpatient treatment, while mild cases (N = 32) were children with ARI who were treated as outpatients. The control group (N = 54) was selected from children with non-infectious diseases attending the outpatient department. Cases and controls were matched for age and area of residence. **Main outcome measures.** Serum vitamin A levels and analysis of ARI risk factors. **Results.** The mean (SD) vitamin A levels were 22.09 (7.27) ( $\mu$ )g/dl for the controls, 20.27 (11.11) ( $\mu$ )g/dl for the mild cases and 13.79 (7.60) ( $\mu$ )g/dl for the severe cases. All pairwise comparisons of levels of the three patient groups achieved statistical significance - severe and mild (P < 0.01), severe and control (P < 0.001) and mild and control (P = 0.03). After vitamin A levels were dichotomised, the odds ratios (and 95% confidence intervals) for severe versus mild cases were 2.1 (0.8-5.6), for mild versus controls 2.9 (0.8-10.5) and for severe versus controls 6.0 (2.0-19.4). A  $\chi^2$  for trend across the three groups was 13.2 (P = 0.001). Risk factors significantly associated with disease status included a history of hospital admission in the preceding 6 months, absence of a clinic card, poor housing and lack of electricity for indoor fuel use. Factors associated with poor vitamin A status included low weight for age, previous diarrhoeal disease acid poor housing. Vitamin A status was independently associated with disease status in logistic regression modelling. **Conclusion.** Vitamin A status has a strong association with severity of infection. The gradient of that association suggests a dose-response effect. The multifactorial nature of ARI severity and vitamin A status highlights the need for a comprehensive approach to public health programmes to address ARI. The role of vitamin A supplementation for at-risk groups is supported by this study, but needs to be clearly defined within a broader approach to health.

Eccles, R., Reilly, M., Eccles, K. S. L (1996) **Changes in the amplitude of the nasal cycle associated with symptoms of acute upper respiratory tract infection.** *Acta Otolaryngologica*, 116(1), 77.

There is little information available about the effect of codeine on cough associated with ARI. Codeine is used as a standard antitussive against which new antitussives are compared. The present study investigated the effects of codeine syrup BP on cough frequency and the subjective severity of cough during 3-h lab phase and 4-day home phase of treatment. Cough frequency and subjective scores of cough severity were significantly decreased during the 3-h lab phase but at no point was there a significant difference between the codeine and placebo groups. The results of the 4-day home phase were similar to those of the lab phase as at no time point was there a significant difference between the mean scores of the two groups. The results indicate that codeine either as a single 30 mg dose or in a total daily dose of 120 mg is no more effective than the syrup vehicle in controlling cough associated with upper AI.

Ekwo, E. E., Weinberger, M. M., Lachenbruch, P. A., and Huntley, W. H. (1983) **Relationship of Parental Smoking and Gas Cooking to Respiratory Disease in Children**. *Chest*, 84, 662-668.

In a survey of 1,355 children six to 12 years of age, the risk of hospitalization for respiratory illness among children before age two years was increased when gas was used for cooking at home ( $p < 0.001$ ) or at least one of the parents smoked ( $p < 0.02$ ). The occurrence of cough with colds in children also was significantly increased when one or both parents smoked ( $p < 0.001$ ).

Ellegård, A. (1997) **Tears while cooking: An indicator of indoor air pollution and related health effects in developing countries**. *Environmental Research*, 75, 12-22.

Indicators for cooking fuel pollution are needed to determine the extent of fuel-related problems in developing countries and to assess the success of measures undertaken to reduce such problems. It is proposed that eye irritation in the form of tears or smarting eyes during cooking time (tears while cooking (TWC)) is a useful determinant of indoor air pollution from cooking-related sources. An analysis of data from three cities (Lusaka, Maputo, and Hanoi) showed that TWC is more prevalent in conditions of higher particulate pollution. Persons experiencing TWC were also found to have more respiratory symptoms. The prevalence of TWC provides a good indicator of groups that are at greater risk of health impairment due to indoor air pollution. Surveying for this condition is simple and non-intrusive, which makes it a useful screening indicator, though it cannot replace more thorough investigations in epidemiological studies. It can, however, be used in guiding interventions to the most needy groups. It can also be used to assess the success of measures introduced to reduce pollution hazards relating to the cooking environment, such as improved stoves, chimneys, and kitchen improvement.

Ellegård, A. (1996) **Health effects of cooking air pollution among women using coal briquettes in Hanoi**. *Environmental Technology*, 18, 409-416.

Women using briquettes exhibited more cough symptoms than electricity users, and showed more symptoms on carbon monoxide exposure (dizziness, concentration difficulties, headaches). Eye irritation while cooking was significantly more common among coal users. The peak expiratory flow rate was strongly associated with age and weight but not directly with fuel use. Women using coal briquettes were exposed to somewhat higher levels of pollution (respirable particulates exposure was not statistically significant). Coal users were worse off with respect to infrastructure and socioeconomic conditions. The prevalence of non-cough respiratory symptoms (breathing difficulties, etc.) was not different between coal and electricity users. This may be due to high ambient pollution of all groups and relatively short duration of coal use. Thus, the study does not show that coal is unambiguously associated with respiratory health impairment. Higher prevalences of eye irritation while cooking and cough among coal users may, however, be considered a warning against further promoting this fuel in Hanoi, especially since the groups likely to use coal are disadvantaged economically and socially.



Infrastructural improvements in the urban environment as well as structural improvements of the kitchen are suggested as ways to improve the conditions associated with the health outcomes studied.

Ellegård, A. (1996) **Cooking fuel smoke and respiratory symptoms among women in low-income areas in Maputo.** *Environmental Health Perspectives*, 104 (9), 980-985.

The association between exposure to air pollution from cooking fuels and health aspects was studied in Maputo, Mozambique. Almost 1200 randomly selected women residing in the suburbs of Maputo were interviewed and 218 were monitored for air pollution. The fuels most commonly used were wood, charcoal, electricity, and liquified petroleum gas (LPG). Wood users were exposed to significantly higher levels of particulate pollution during cooking time (1200 g/m<sup>3</sup>) than charcoal users (540 g/m<sup>3</sup>) and users of modern fuels (LPG and electricity) (200-380 g/m<sup>3</sup>). Wood users were found to have significantly more cough symptoms than other groups. This association remained significant when controlling for a large number of environmental variables. There was no difference in cough symptoms between charcoal users and users of modern fuels. Other respiratory symptoms such as dyspnea, wheezing, and inhalation and exhalation difficulties were not associated with wood use. Reducing wood use would likely improve acute respiratory health effects in wood users and possibly improve the ambient air pollution conditions in Maputo. To reduce the health impact of wood smoke exposure, it appears that the least costly and quickest method would be to encourage charcoal use to a greater extent, although high carbon monoxide levels would have to be addressed. Turning to modern fuels is beyond the means of most these households in the short term and could not be shown to be more effective.

Energy and Development Services, The International Institute for Energy Conservation and The Institute for International Education. **Workshop Report: Identifying Avenues of Intervention on Indoor Air Quality in Low-income South African Households.** March 19-20, 1998 The Capital Protea Hotel, Pretoria.

The health effects from cooking and heating with fuels commonly used by developing communities in South Africa range from headaches and respiratory complications to death. Respiratory diseases from chemicals in smoke (wood and coal) have been identified as the leading cause of death in developing communities by the WHO. Numerous South African studies have found unacceptably high levels of indoor and ambient air pollution in the low-income areas of South Africa. To address this urgent and critical problem which contributes to thousands of deaths each year, an integrated approach is required.

This approach would incorporate activities linked to house design, clean fuel promotion, appliance quality and effective communication and information dissemination to communities and stake holders alike.

Engle, P. L., Hurtado, E., and Ruel, M. (1997) **Smoke exposure of women and young children in highland Guatemala: Prediction and recall accuracy.** *Human Organization*, 56(4), 408-417.

In order to measure indigenous Guatemalan and young children's exposure to smoke from cooking fires, three techniques were compared: 1) observation; 2) recall 24 hours later based on duration of activities; and 3) recall 24 hours later based on the time each activity started and stopped (elapsed time). To measure recall accuracy, 43 women and their children under two years were observed during meal preparation and consumption, and the next day were asked to recall these activities. Women were reasonably accurate when recalling durations, but recall was significantly less accurate using elapsed times. Recall accuracy increased when two days' measurements were averaged. Women who are most exposed to smoke recognize its damaging effects-on themselves and on their children. However, there are few options available to them to reduce their exposure. The most significant predictors of lower exposure are type of stove, and type of house configuration-factors which women

usually have little control over. The only behavioral variables that related to lower exposure were absence of a husband, and a cultural pattern associated with speaking Spanish rather than monolingual Kiche. Mothers who recognize the potentially damaging effects of the smoke were not able to protect their young children from it. Many cover the child's head with a cloth, but the strongest predictor of child exposure is the child's age, in addition to the characteristics of the mother. Thus the older children can reduce exposure, but the younger children (less than 17 months old) were significantly more likely to be in the kitchen. A type of stove, called Planchas, are readily available in the region, and are being installed in many homes by family members and NGOs. Unlike gas stoves, they are culturally appropriate and highly valued by families. Unfortunately, they are relatively expensive.

English, I., Punt, J., Mwangi, I., McHugh, K., and Marsh, K. (1996) **Clinical overlap between malaria and severe pneumonia in African children in hospital.** *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 90(6), 658-662.

Data collected from 200 children admitted to a hospital on the Kenyan coast who met a broad definition of severe acute respiratory infection (ARI) indicated that simple clinical signs alone are unable absolutely to distinguish severe ARI and severe malaria. However, laboratory data showed that marked differences exist in the pathophysiology of unequivocal malaria and unequivocal ARI. Children in the former group had a higher mean oxygen saturation (97 vs. 94,  $P < 0.001$ ), mean blood urea level (5.3 vs. 1.9 mmol/L,  $P < 0.001$ ) and geometric mean lactate level (4.5 vs. 2.1 mmol/L,  $P < 0.001$ ), and lower mean haemoglobin level (5.3 vs. 9.0 g/dL,  $P < 0.001$ ) and base excess (-9.4 vs. -2.6,  $P < 0.001$ ) than those in the latter group. Using these discriminatory variables it was estimated that up to 45% of children admitted with respiratory signs indicative of severe ARI probably had malaria as the primary diagnosis. Radiological examination supported this conclusion, indicating that pneumonia characterized by consolidation was uncommon in children with respiratory signs and a high malarial parasitaemia ( $\leq 10\,000/\mu\text{L}$ ). There is no specific radiological sign of severe malaria. In practice, all children with respiratory signs warranting hospital admission in a malaria endemic area should be treated for both malaria and ARI unless blood film examination excludes malaria. In those with malaria and clinical evidence of acidosis, but no crackles, antibiotics may be withheld while appropriate treatment for dehydration and anaemia is given. However, if clinical improvement is not rapid, antibiotics should be started.

Falade, A. G., Tschappeler, H., Greenwood, B. M., and Mulholland, E. K. (1995) **Use of simple clinical signs to predict pneumonia in young Gambian children: The influence of malnutrition.** *Bulletin of the World Health Organization*, 73(3), 299-304.

The current WHO recommendations for the case management of acute respiratory infections (ARI) in children aged 2 months to 5 years in developing countries use fast breathing (respiratory rate of  $\geq 50$  per minute in children under 12 months and  $\geq 40$  in children aged 12 months to 5 years) and lower chest wall indrawing to determine which child is likely to have pneumonia and should therefore receive antibiotics. We have evaluated these and other physical signs in 487 malnourished children and 255 well nourished children who presented with a cough or breathing difficulty. Pneumonia, defined as definite radiological pneumonia or probable radiological pneumonia associated with crackles on auscultation, was present in 145 (30%) of the malnourished children and 68 (26%) of the well nourished children. The respiratory rate predicted pneumonia equally well in the two groups, but to achieve an appropriate sensitivity and specificity the respiratory rate cut-off required in malnourished children was approximately 5 breaths per minute less than that in well nourished children. Intercostal indrawing was more common and lower chest wall indrawing was less common in the malnourished children, with or without pneumonia. These results suggest that fast breathing, as defined at present by WHO, and lower chest wall indrawing are not sufficiently sensitive as predictors of pneumonia in malnourished children.

As the latter are a high-risk group, we should like to recommend that children with malnutrition who present with a cough, fast breathing or difficult breathing should be treated with antibiotics.

Farrow, J., Correggia, R., and Abebe, S. (1996) **Management of children with ARI and/or diarrhoea in Addis Ababa, Ethiopia.** *Ethiopian Medical J*, 34(4), 225-231.

This study, conducted between May 9 and May 19, 1994 in twenty health centres in Addis Ababa, looks at the quality of care provided for children presenting to public sector health centres in Addis Ababa with ARI and/or diarrhoea. As has been documented in other countries, both developing and developed, inappropriate prescription of medications is common in Addis Ababa. Forty four per cent of children received useless or potentially harmful drugs; in 97 of 99 cases of 'sore throat', antibiotics were prescribed; only 14 of 116 children with the diagnosis of 'common cold' received no medication. While 88 percent of children with diarrhoea received ORS, and 39 per cent of children with pneumonia were given appropriate medications, few caretakers knew how to use them properly. Caretakers' knowledge of appropriate home care of children with ARI and diarrhoea (feeding, use of fluids and indication for return to the clinic) was found to be deficient. Causes for poor quality of care are discussed, and recommendations for solving some of the problems identified, and for further research, are presented.

**Forum.** *Environmental Health Perspectives*, 105(4), April.

*New Model for Ozone Transport* With the EPA proposing more stringent standards for ozone, understanding how this air pollutant is formed and transported is of major importance to creating effective ozone controls. Ozone is produced when volatile organic chemicals (VOCs)—both natural and manmade—combine in the presence of warm sunlight with nitrogen oxide emissions from vehicle exhaust and smoke stacks. While local production of ozone is a problem, newly developed computer analyses have shown that ozone may also travel from distant locations to damage air quality and harm lungs...*Biocultural Perspectives on Women's Health.* *Children and the Environment* The first national conference addressing the latest research findings in pediatric environmental health convened 21023 February 1997. The conference, "Children's Environmental Health: Research, Practice, Prevention, and Policy," was held in Washington, DC and hosted by the Children's Environmental Health Network, and a national non-partisan project to protect the environmental health of children.

Florey, C. V., Melia, R. J. W., Chinn, S., Goldstein, B. D., Brooks, A. G. F., John, H. H., Craighead, I. B., and Webster, X. (1979). **The relation between respiratory illness in primary schoolchildren and the use of gas for cooking. III. Nitrogen dioxide, respiratory illness, and lung function.** *Int J Epidemiol*, 8, 347-53.

We examined the relation between lung function and respiratory illness in a population of 808 primary school children aged 6-7 years and the levels of nitrogen dioxide (NO<sub>2</sub>) in the kitchens and bedrooms in their homes. Complete data were collected on about 66% of the population. The children lived in a defined 4 square km area in Middlesbrough, Cleveland, UK. One week average outdoor levels of NO<sub>2</sub> varied little over the area (14-24 ppb).

Gachanja, A. N., and Worsfold, P. J. (1993) **Monitoring of polycyclic aromatic hydrocarbon emissions from biomass combustion in Kenya using emissions from biomass combustion in Kenya using liquid chromatography with fluorescence detection.** *Sci. Total Environ*, 138(1-3), 77 - 89.

Sampling and reversed-phase liquid chromatographic analysis with fluorescence detection of polycyclic aromatic hydrocarbons (PAHs) released from biomass combustion sources is presented. PAH

emissions from charcoal obtained from *Acacia mearnsii* and *Newtonia buchananii* trees, combusted in two charcoal burning stoves commonly used in Kenya (traditional metal and ceramic lined) are compared. Particulate bound and gaseous PAH were sampled onto a glass microfibre filter and an XAD-2 resin cartridge, respectively.

Garay, J. E. (1997) **Clinical presentation of pulmonary tuberculosis in under 10s and differences in AIDS-related cases: A cohort study of 115 patients.** *Tropical Doctor*, 27(3), 139-142.

One hundred and fifteen cases of pulmonary tuberculosis (PTB) in children under 10 were reviewed, including a case control retrospective study between HIV positive (+ve) and HIV negative (-ve) children. Overall, respiratory symptoms not responding to acute respiratory infection (ARI) protocol and >10% weight loss or failure to thrive during 3 months were the main presenting symptoms, but chronic fever alone is also common in HIV infected children with PTB. Hilar enlargement is the most frequent radiologic pattern, although lobar infiltrates are common when HIV infection coexists. Gastric lavage culture was an important diagnostic tool but Mantoux test, gastric lavage direct smear and erythrocyte sedimentation rate (ESR) levels, were not helpful in diagnosing PTB. Our findings suggest that when HIV infection is suspected or confirmed, chronic fever and lower lobe infiltrates should also be considered as PTB warning signs.

Garcia, M.M., Casaco Parada, A., Arruzazabala Valmana, L., Gonzalez Alvarez, R., and Rodriguez de la Vega, A. (1988) **Role of chemical mediators in bronchoconstriction induced by kerosene.** *Allergol Immunopathol (Madrid)*, 16 (6), 421-423.

Kerosene is a by-product of petroleum used in some countries for cleaning, lighting and cooking purposes. Rodriguez de la Vega *et al* (1981) have presented evidences of the relation between bronchial asthma and the manipulation of kerosene. Since the experiments performed by our group showed that the acute inhalation of the aerosol of kerosene induces bronchoconstriction in rabbits (Casaco *et al* 1982), we investigated its effect on guinea pig respiratory physiology. In order to elucidate the implication of histamine and arachidonic acid metabolites in kerosene induced bronchoconstriction, we investigated the influence of the administration to guinea pig of a single dose of the histamine H1 antagonist mepyramine (0.1 mg/kg i.v.) 10 minutes before the aerosol and also the effect of the steroidal antiinflammatory drug triamcinolone in rabbits (5 mg/kg i.m.) daily during 4 days before the inhalation of kerosene. The histamine concentrations in guinea pig blood before and after the aerosol were also compared. The inhalation of kerosene during 5 min. (20.4 mg/L) by guinea pigs resulted in an increase of airway resistance without increase of blood histamine concentration. On the other hand, the bronchoconstrictive effect of kerosene in guinea pigs and rabbits was not modified by the previous treatment with mepyramine or triamcinolone respectively. The results suggest that the acute bronchoconstriction induced by kerosene is mediated neither by stimulation of histamine H1 receptors nor by the release of chemical mediators.

Gielen, H., van der Zee, S., van Wijnen, J., van Steen, C., and Brunekreef, B. (1997) **Acute Effects of Summer Air Pollution on Respiratory Health of Asthmatic Children.** *American J of Respiratory Critical Care Medicine*, 155, 2105-2108.

In the early summer of 1995, the acute respiratory effects of ambient air pollution were studied in a panel of 61 children, ages 7-13 years, of whom 77% were taking asthma medication. Peak flow was measured twice daily with MiniWright (R) meters at home and the occurrence of acute respiratory symptoms and medication use was registered daily by the parents in a diary. Exposure to air pollution was characterized by the ambient concentrations of ozone, PM10, and black smoke. During the study period, maximal 1-h ozone concentrations never exceeded 130 $\mu\text{g}/\text{m}^3$ , and 24-hr black smoke and

PM<sub>10</sub> concentrations were never higher than 41 and 60 μg/m<sup>3</sup> respectively. Association of air pollution and health outcomes were evaluated using time series analysis. After adjusting for pollen, time trend, and day of the week, black smoke in particular was associated with acute respiratory symptoms and with medication use. Less strong associations were found for PM<sub>10</sub> and ozone. These results suggest that in this panel of children, most of whom had asthma, relatively low levels of particulate matter and ozone in ambient air are able to increase symptoms and medication use.

Gil L; Adonis M; Caceres D; Moreno G. **Impact of outdoor pollution on indoor air quality. The case of downtown Santiago (Chile) EHP Network Report.**

The influence of outdoor pollution on indoor air quality was studied in downtown Santiago (Bandera street). Carbon monoxide (CO), nicotine, particulate matter, respirable fraction (PM<sub>5</sub>) and total and carcinogenic polyaromatic hydrocarbons (PAHs) were simultaneously monitored indoors and outdoors in restaurants, offices and other places. The levels of CO changed simultaneously outdoors and indoors ( $r = 0.89$ ) specially during traffic rush hours, demonstrating the importance of outdoor infiltration into the indoor air quality and masking the contribution of other CO indoor sources. The maximum CO concentrations were over 800% and over 1000% higher indoors and outdoors respectively than the 9 ppm CO National Ambient Air Quality. The PM<sub>5</sub> concentrations were very high and showed no significant differences ( $p > 0.05$ ) from indoors to outdoors, or between indoor levels in restaurants, offices and other places. Total and carcinogenic PAHs levels were also very high outdoors and indoors, outdoor levels being generally higher than those indoors and no significant differences ( $p > 0.05$ ) were found for the indoor levels between restaurants, offices and other places. Nicotine levels showed significant differences ( $p < 0.05$ ) between indoor and outdoor levels. In addition, great differences ( $p < 0.05$ ) in indoor levels, were found between offices and restaurants, and offices and other places. Among indoor sources cigarette smoke seems to be a minor source since nicotine concentrations, being 2.3 times higher in restaurants and other places than in offices, do not contribute to enhance significantly PM<sub>5</sub> and total and carcinogenic HAPs in the first ones. These results suggest that in downtown Santiago, infiltration might be the main source of indoor pollution. This is supported by two evidences: a) coronene, a tracer of vehicle emissions was found in high concentration indoors and b) in restaurants (in which PAHs emissions might be higher indoor) a correlation coefficient of 0.987 for the indoor and outdoor concentrations of carcinogenic PAHs was found. Furthermore a survey asking for different symptoms and effects probably related to air pollution was made to people working in Bandera and in a rural area located 40 Km from Santiago. The results showed that excluding smoking as a confoundend factor, people working in Bandera showed a significantly greater ( $p < 0.05$ ) risk of ill effects on their health than people working in the rural area.

Gordian, M. E., Ozkaynak, H., Xue, J., Morris, S. S., and Spengler, J. D. (1996) **Particulate air pollution and respiratory disease in Anchorage, Alaska.** *Environ. Health Perspect*, 104(3), 290-297.

This paper examines the associations between average daily particulate matter less than 10 (μm) in diameter (PM<sub>10</sub>) and temperature with daily outpatient visits for respiratory disease including asthma, bronchitis, and upper respiratory illness in Anchorage, Alaska, where there are few industrial sources of air pollution. In Anchorage, PM<sub>10</sub> is composed primarily of earth crustal material and volcanic ash. Carbon monoxide is measured only during the winter months. The number of outpatients visits for respiratory diagnoses during the period 1 May 1992 to 1 March 1994 were derived from medical insurance claims for state and municipal employees and their dependents covered by Aetna insurance. The data were filtered to reduce seasonal trends and serial autocorrelation and adjusted for day of the week. The results show that an increase of 10 (μg)/m<sup>3</sup> in PM<sub>10</sub> resulted in a 3-6% increase in visits

for asthma and a 1-3% increase in visits for upper respiratory diseases. Winter CO concentrations were significantly associated with bronchitis and upper respiratory illness, but not with asthma. Winter CO was highly correlate with automobile exhaust emissions. These findings are consistent with the results of previous studies of particulate pollution in other urban areas and provide evidence that the coarse fraction of PM<sub>10</sub> may affect the health of working people.

Graham, N. M. H., Woodward, A. J., Ryan P., Douglas R. M. (1990) **Acute respiratory illness in Adelaide children II: The relationship of maternal stress, social supports and family functioning.** *International J of Epidemiology* 19(4): 937-944.

In a community-based study we investigated the relationships between maternal stress, maternal social supports, family functioning and proneness to acute respiratory illness (ARI) in childhood. 'Prone' and 'not prone' children were identified from the responses to a mail questionnaire sent to the addresses of a randomly selected group of Adelaide children who had been born in 1983. 'Prone' children (n = 255) were defined by a respiratory score (based on frequency and severity of reported symptoms in the preceding 12 months) in the top quintile of the distribution, while 'not prone' children (n = 227) were defined by a score in the bottom 20% of the range. Further information was obtained from a questionnaire administered at a home visit. Maternal stress levels were determined from a combination of major life events, minor life events and psychological distress. Maternal stress was significantly associated with respiratory proneness in a stepwise multiple logistic regression (adjusted odds ratio/high versus low = 3.8; 95% confidence interval 2.0-7.2; p = 0.000), while controlling for the effects of maternal smoking, group child care, early chest illness, number of siblings, breastfeeding, occupation, sex, age, home heating, birthweight and parental history of respiratory illness. Family dysfunction was associated with respiratory proneness in bivariate analyses but not after adjustment for the effects of other psychosocial factors in multivariate analyses. Lack of maternal social support was not associated with having a child who was prone to respiratory illness. These findings raise a number of questions about the nature and direction of the relationship between parental psychological status and child health.

Gratton, M., Manning, K., Dixon, J., Morey, F., Torzillo, P., Hanna, J., Erlich, J., Asohe, V., and Riley, I. (1994) **Upper Airway Carriage by *Haemophilus influenzae* and *Streptococcus pneumoniae* in Australian aboriginal children hospitalised with acute lower respiratory infection.** *The Southeast Asian J of Tropical Med*, 25(1), 123-31.

When nasopharyngeal secretions from 171 Australian Aboriginal children hospitalised with acute lower respiratory tract infection were cultured selectively for streptococcus pneumoniae and Haemophilus influenzae 79.5% and 88.3% children yielded 166 and 254 isolates of S pneumoniae and H Influnzae respectively. In colonized subjects multiple populations of S pneumoniae and H influenzae were common. More than one half of children tested were excreting antibiotics at the time of admission to hospital. Significantly fewer children with serum antibiotic residues were colonized with S pneumoniae than were antibiotic free children. Antibiotic usage had no measurable impact on the isolation rate of H influenzae.

Hammerschlag, M. R., Chirgwin, K. Roblin, P. M. (1992) **Persistent Infection with Chlamydia pneumoniae following Acute Respiratory Illness.** *Clinical Infectious Diseases*, 14 (1), 178.

Chlamydia pneumoniae is emerging as a significant cause of respiratory disease, including pneumonia and bronchitis in humans. In this study of infection due to Chlamydia pneumoniae in patients presenting with pneumonia to SUNY Health Center at Brooklyn, we identified two individuals for whom cultures were positive over a 1 year period. To determine the frequency of persistent respiratory infection with C pneumoniae follow-up specimens were obtained from nine individuals with culture dominated C pneumoniae infection. Five of these individuals had persistent infection: four had a flulike illness characterised by

pharyngitis, and one had bronchitis. All five appeared to have acute *Chlamydia pneumoniae*. Observations suggest that persistent infection with *Chlamydia pneumoniae* may follow acute infection and may persist for many months. Infection with *Chlamydia pneumoniae* may be very difficult to eradicate with use of currently available antibiotics even if there is a clinical response to therapy.

Harrison, L. H., Moursi, S., Guinena, A. H., Gadowski, A. M., El-Ansary, K. S., Khallaf, N. and Black R. E. (1995) **Maternal reporting of acute respiratory infection in Egypt.** *International J Epidemiology*, 24 (5), 1058-1063.

**Background.** Acute respiratory infection (ARI) is a major cause of childhood morbidity and mortality in developing countries. Community surveys are used to determine the proportion of children with ARI for whom care is sought by questioning mothers about the signs and symptoms of illness episodes. The validity of this approach has been studied infrequently. **Methods.** We evaluated maternal reporting of signs and symptoms 2 and 4 weeks after diagnosis among 271 Egyptian children <5 years old. Children with ARI were evaluated by physical examination, chest radiography, and pulse oximetry, and were alternately assigned for a maternal interview about the episode 14 or 28 later. **Results.** For radiographically-defined acute lower respiratory infection (ALRI), the sensitivity of several symptoms for combined open- and close-ended questions was relatively high: nahagan (deep or rapid breathing) (80%), nafas saris (fast breathing) (66%), and kharfasha (coarse breath sounds) (63%). The specificity of these terms was 50-68%. The specificity was inversely related to the follow-up time. No term provided both a sensitivity and specificity of >50% at day 28 across the radiographically, clinically- and pulse oximetry-based definitions of ALRI. Spontaneously mentioned karshet nafas (difficult or rapid breathing) at 14 days had a specificity and sensitivity for radiographic ALRI of 87% and 41%, respectively, suggesting that this term is a good choice for community surveys. **Conclusions.** Maternal reporting of ARI symptoms is non-specific 2 and 4 weeks after diagnosis but may be useful for monitoring trends in the proportion of children with pneumonia who receive medical care. To maximize specificity, ARI programmes should generally use a recall period of 2 weeks.

Hasselblad, V., Humble, C. G., Graham, M. G., and Anderson, H. S. (1981) **Indoor Environmental Determinants of Lung Function in Children.** *Am Rev Respir Dis*, 123, 479-485.

Using pulmonary function and family respiratory questionnaire data for 16,689 white children 6 to 13 yr of age from 7 geographic areas, the investigators examined the effect of several environmental and other factors on performance in a standard test of breathing. As expected, FEV<sub>0.75</sub> was correlated most strongly with age, height, and sex. A dose-response relationship was observed with maternal smoking habits and explained 0.1% of the variance. No effect caused by the father's smoking habits was observed. A decrease ( $p = 0.0524$ ) in FEV among older girls was associated with the presence of a gas cooking stove in the home. Although the statistical significance of the decreases was largely attributable to the size of the sample, the decreases in FEV, even though small, were thought to be biologically significant.

Hazlett, D. T. G., Bell, T. M., Tukei, P. M., Ademba, G. R., Ochieng, W. O., Magana, J. M., Gathara, G. W., Wafula, E. M., Pamba, A., Ndinya-Achola, J. O., Siongok, T. K. A. (1988) **Viral etiology and epidemiology of acute respiratory infections in children in Nairobi, Kenya.** *Am J. Trop Med Hyg*, 39(6), 632-640.

Acute respiratory infection (ARI) is the most common cause of illness and death in young children worldwide. Because of inadequate laboratory facilities and financial resources the etiological agents responsible for most cases in developing countries remain unknown, thus obviating appropriate management. Therefore, an ARI program was commenced at the Kenyatta Hospital, Nairobi, Kenya in

1981 with the objectives of establishing the microbial causes, clinical presentations, and diagnoses of ARI in children under 5 years of age and of developing simple, rapid, and inexpensive diagnostic techniques. Viruses were demonstrated in 54% of the 822 children studied, but over half of the viruses identified were types not commonly associated elsewhere with the causation of severe ARI. Respiratory syncytial, parainfluenza, and adenoviruses occurred in the same age groups and during similar weather conditions as elsewhere. Measles virus occurred most frequently in those 7 to 9 months old. Herpes simplex, rhino-, and enteroviruses play causative roles in some cases of severe ARI in Kenyan children. A combination of immunofluorescent and cell culture techniques were shown to be essential for the detection of viruses.

He, X., Chen, W.; Liu, Z., and Chapman, R. S. (1991) **An epidemiological study of lung cancer in Xuan Wei County, China: Current progress. Case-control study on lung cancer and cooking fuel.** *Environmental Health Perspectives*, 94, 9-13.

In Xuan Wei County, Yunnan Province, lung cancer mortality rates are among China's highest in males and females. Previous studies have shown a strong association of lung cancer mortality with air pollution from "smoky" coal combustion. In the present quantitative risk assessment of indoor air pollution study, the result strongly shows an obvious on-site exposure-response relationship between benzo(a)pyrene concentration in indoor air and lung cancer mortality and strongly supports the hypothesis that indoor air pollution is the main risk factor in inducing lung cancer in Xuan Wei County. In the present case-control study, the result shows that in females, the presence of lung cancer is statistically significantly associated with chronic bronchitis and family history of lung cancer. The results also suggest an association of lung cancer with duration of cooking food, but not with passive smoking. In males, the presence of lung cancer is associated with smoking, bronchitis, family history of lung cancer, and personal history of cooking food.

Hecht, S. S. (1997) **Approaches to chemoprevention of lung cancer based on carcinogens in tobacco smoke.** *Environmental Health Perspectives*, 105 (Supplement 4), 955 – 963.

Chemoprevention may be one way to prevent lung cancer in smokers who are motivated to quit but cannot stop. The approach to chemoprevention of lung cancer described in this article is based on an understanding of the lung carcinogens present in tobacco smoke. The available data indicate that the compounds in cigarette smoke most likely involved in the induction of lung cancer in humans are the complex of polynuclear aromatic hydrocarbons typified by benzo[a]pyrene (B[a]P) and the tobacco-specific nitrosamine 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK). A large number of compounds are now available that inhibit lung tumorigenesis by B[a]P or NNK in rodents. Inhibition of NNK-induced lung carcinogenesis by phenethyl isothiocyanate (PEITC) and inhibition of B[a]P-induced lung carcinogenesis by benzyl isothiocyanate (BITC) are discussed as examples. Studies with PEITC in rodents clearly demonstrate that it inhibits NNK-induced lung tumorigenesis by inhibiting the metabolic activation of NNK. Similar changes appear to occur in humans according to data generated in smokers who ate watercress, a source of PEITC. It is likely that mixtures of chemopreventive agents with activity against carcinogens in tobacco smoke, such as NNK and B[a]P, will be useful in chemoprevention of lung cancer in smokers. Furthermore, there is a need to develop suppressing agents for lung cancer that might be applicable in both smokers and ex-smokers.

Higgins, B. G., Francis, H. C., Yates, C. J., Warburton, C. J., Fletcher, A. M., Reid, J. A., Pickering, C. A. C., and Woodcock, A. A. (1995) **Effects of air pollution on symptoms and peak expiratory flow measurements in subjects with obstructive airways disease.** *Thorax*, 50(2), 149-155.

Background - Evidence from laboratory studies suggestst that air pollution can produce bronchoconstriction and respiratory symptoms in selected subjects, but the relevance of these findings



to exposure to natural pollution is unclear. This study was performed to determine whether air pollution at typical levels found in the UK has demonstrable effects on respiratory function and symptoms in subjects with airways disease. Methods - Seventy five adult patients with diagnoses of asthma or chronic obstructive pulmonary disease (COPD) were studied for a period of four weeks during which they kept records of their peak expiratory flow (PEF) rates, symptoms (wheeze, dyspnoea, cough, throat and eye irritation), and bronchodilator use. Thirty six patients in whom the provocative dose of methacholine causing a 20% fall in FEV<sub>1</sub> was below 12.25 ( $\mu$ )mol were classified as reactors. Ambient air pollution was measured with absorption spectroscopy. Results - There were modest but significant increases in PEF variability, bronchodilator use, and wheeze with increasing sulphur dioxide levels; bronchodilator use, dyspnoea, eye irritation, and minimum PEF readings were related to ozone levels. In the subgroup of reactors falls in mean and minimum peak flow and increases in wheeze, dyspnoea, and bronchodilator use were associated with increases in levels of both sulphur dioxide and ozone. Some associations were seen with pollution levels on the same day, but for others the pollution effects appeared to be delayed by 24 or 48 hours. Pollution levels did not breach the WHO guide levels during the course of the study. Conclusions - Increases in environmental levels of ozone and sulphur dioxide are associated with adverse changes in peak flow measurements and both ocular and respiratory symptoms in subjects with obstructive airways disease. Although the peak flow and symptom changes were modest, they occurred at pollution levels below current WHO guide levels.

Ho, D. P., Hojer, B., and Persson, L. A. (1997) **Are there social inequities in child morbidity and mortality in rural Vietnam?** *J of Tropical Pediatrics*, 43(4), 226-231.

This study was conducted to investigate the relationship between various socio-economic factors, and child morbidity and mortality during a period of rapid social change in Vietnam. One-thousand-one-hundred-and-thirty-two rural mothers with children under 5 years of age were interviewed regarding their reproductive history, survival of their children, and morbidity of their children under 5 years of age. Causes of child death were established by a verbal autopsy technique. Fifty-seven percent of the children were reported to have suffered from some illness during the preceding 2 weeks. Acute respiratory infection (ARI) (46 per cent of all children) was most common. Two-thirds of the sick children had been treated with antibiotics. Eighty-one children under 5 years of age had died during the 10-year period 1982-1992. Two thirds of these deaths occurred in infancy, most of them were related to prematurity, asphyxia or tetanus. ARI was more common in poor families while neither education nor occupation were associated with ARI occurrence. No significant relationship between education or occupation of the mother and mortality was found. The low under-5 mortality (U5MR) in spite of the high morbidity may be related to good child health care both by families and by the health care system.

Hoek, G. and Brunkeef, B. (1994) **Effects of Low-Level Winter Air Pollution Concentrations on Respiratory Health of Dutch Children.** *Environmental Research*, 64, 136-150.

During three consecutive winters acute effects of air pollution on respiratory health of more than 1000 children living in four nonindustrial communities in the Netherlands have been investigated. Each child performed between 6 and 10 pulmonary function tests on predetermined days. The occurrence of acute respiratory symptoms in children was registered in a daily diary filled out by the parents of the children for periods of 3 months. Exposure to air pollution was characterized by the ambient concentration of sulfur dioxide, winter air pollution episodes occurred during these winters. Concentrations of acid aerosol were low. A weak negative association between the concentrations of nitrogen dioxide, PM<sub>10</sub>, aerosol sulfate, aerosol nitrate, nitrous acid, and pulmonary function was found. Sulfur dioxide concentration was not associated with pulmonary function. No association of the concentration of the measured pollutants with daily incidence and prevalence of acute respiratory symptoms was found.

Hofmann, D., and Zielen, S. (1997) **The bronchial asthma in childhood.** *Z Arztl Fortbild Qual Sich*, 91(3), 251-256.

Bronchial asthma in childhood is defined as a disease presenting with wheezing, dyspnea and cough on the basis of an inflammatory bronchial hyperreagibility. It is the most common chronic disease in childhood. There are a variety of causes for asthma. Certainly allergy is the most common cause in childhood but also environmental pollution is of importance. Asthmatic attacks, episodes of asthma and asthmatic cough are the most frequent clinical manifestations where as the malignant, hypoxemic asthma crisis is of special importance since its mortality is as high as 0.5-0.8/100000. Special notice has to be taken on the evaluation of obstructive bronchitis in infancy and childhood which might be very difficult. During the past years, the use of inhalative steroids in the long term treatment has gained increasing importance also in childhood, since it could be demonstrated that side effects of clinical relevance are hardly to be expected.

Holland, W. W. (1988) **Chronic obstructive lung disease prevention.** *Br. J. Dis. Chest*, 82(1), 32-44.

In many countries, as exemplified by the UK, mortality from chronic obstructive lung disease (COLD) is declining. The USA is an exception for mortality from chronic obstructive lung disease, although it is still lower than the UK, appears to be increasing. This difference in trend over time is difficult to explain; however, it may simply reflect differences in diagnostic practice. The diagnosis of chronic obstructive lung disease has become popular in the USA only in recent years. Diagnosis and methods of certification for respiratory disease have been more stable in the UK than in most countries and the marked drop in mortality rates over time probably reflects a real fall in disease incidence. This fall can probably be attributed to (a) a change in smoking habit and (b) improvements in the control of air pollution. Chronic obstructive lung disease, however, is still an important burden in terms of morbidity and mortality in many economically developed countries. There is a good understanding of the epidemiology of this condition and many risk factors for the development of COLD have been identified, but the gaps that remain in our knowledge severely limit efforts to introduce effective preventive measures. The call for research needs to be renewed, given that we are discussing a condition that is amenable to palliative therapy only.

Huchon G. (1991) **Risk factors for chronic bronchitis and chronic obstructive lung disease** *Respiration*, 58 (Suppl. 1), 10-12.

Among the risk factors for chronic bronchitis and chronic obstructive lung disease, only smoking and (alpha)[1]-antitrypsin deficiency effects have been well demonstrated. Other factors, as air pollution, occupational exposure and childhood lung diseases may have an influence, but on a lower scale. The prevention of chronic bronchitis and chronic obstructive lung disease remains mainly based on antismoking programs.

Hui L.; Li X.-S.; Zeng X.-J.; Dai Y.-H.; Foy H.M. (1997) **Patterns and determinants of use of antibiotics for acute respiratory tract infection in children in China.** *Pediatric Infectious Disease J*, 16(6), 560-564.

**ABSTRACT:** Background. Use of antibodies for acute respiratory infection (ARI) of presumed viral etiology is a worldwide problem. The World Health Organization (WHO) has provided guidelines for diagnosis and treatment of ARI for developing countries. Methods. Specially trained observers applied the WHO criteria to study the diagnosis and treatment of ARI given by 100 randomly selected health care workers (HCWs) in a rural county in China. A total of 760 cases of ARI were evaluated. Results. Before the parents sought medical care, 47% of children in the county hospitals, 25% of those in the

townships and 18% of those in the villages had already received antibiotics, available without prescription. Among the HCWs, antibiotic abuse (antibiotics for presumably viral disease) was detected in the treatment of 97% of cases, and severe abuse (such as prescription of two incompatible antibiotics) was detected in 27%. Most (197 of 200) patients with bacterial disease received antibiotics, but inappropriate antibiotic (dose or type) was observed in 63% of these cases. HCWs with university training and those with higher test scores on knowledge and attitude prescribed antibiotics more judiciously than those lacking those attributes. Conclusions. Abuse of antibiotics for ARI is a serious and costly problem in rural China, potentially leading to widespread antibiotic resistance. Educating HCWs in the management of ARI and proper use of antibiotics has high priority in China.

Hussain, R., Lobo, M. A., Inam, B., Khan, A., Qureshi, A. F. and Marsh, D. (1997) **Pneumonia perceptions and management: An ethnographic study in urban squatter settlements of Karachi, Pakistan.** *Social Science & Medicine*, 45(7), 991-1004.

Childhood pneumonia continues to be the second highest contributor to childhood morbidity and mortality in all ethnic groups in Pakistan. Information on community perceptions and management is largely limited to the Punjabi populace. In this study, ethno-specific illness terminologies, recognition and severity indicators and resort to treatment options for childhood pneumonia are explored among the two main ethnic groups in Sindh. Results are based on focus group discussions with 90 caretakers and 16 case history interviews. The findings indicate that pneumonia recognition is almost universal. The main recognition and severity indicator was *pasli chalna* (chest indrawing) followed by signs and symptoms relating to the quality of breathing and presence of high fever, lethargy and anorexia. Recognition of rapid breathing was low and mostly associated with fever. Exposure to *thand* (cold) through a variety of mechanisms was perceived to be the dominant causal model. The concept of contagion was virtually non-existent. Despite this, belief in efficacy of allopathic care was very high. Most caretakers reported seeking outside care within one to three days of the onset of symptoms. However, unrealistic expectations of cure often led to change in physicians and treatment regimen, if no improvement was observed by the second day. On the other hand, the quality of care provided by the physicians (both licensed and unlicensed) left much to be desired. Female autonomy and mobility did not appear to be a major constraint in seeking outside care other than for hospitalisation. Implications of these findings for the national acute respiratory infections control programme and future research are discussed.

Imai, M., Yoshida, K., Tomita, Y., *et al.* (1981) **Air pollution levels and death from chronic obstructive lung diseases in Yokkaichi.** *Japan J. Hyg.*, 36(4), 671-677.

In order to clarify the relationship over time, between air pollution and chronic obstructive lung diseases in Yokkaichi, Japan, certificates of death from disease for the years 1963 to 1979 were studied. Several years after the frequency of chronic obstructive lung disease had increased, the mortality rates from such diseases also began to rise. With the reduction of pollution as a result of measures taken to control its sources, the mortality rate for asthma fell first, and then, those for chronic bronchitis and emphysema also fell to the levels observed in the control areas. When levels of pollution in the polluted areas were highest, deaths from bronchial asthma occurred at increasingly younger ages.

Iqbal, I., Pervez, S., and Baig, S. (1997) **Management of children with acute respiratory infections (ARI) by general practitioners in Multan - An observational study.** *J of the Pakistan Medical Association.* 47(1), 24-28.

A knowledge, attitude and practices (K.A.P.) survey was conducted among doctors working as general practitioners (GP) in Multan, for diagnosis and management of acute respiratory infections (ARI) in children under five years of age. GPs in Multan were not familiar with national ARI control Program and rational drug use guidelines. They rarely asked about symptoms describing severity of disease while

taking patient histories and did not look for signs of severe pneumonia during physical examinations. Most patients diagnosed as URTI (upper respiratory tract infection) received oral antibiotics and those with pneumonia received injectable antibiotics. Other drugs prescribed included cough syrups, antihistamines and antipyretics. The average number of drugs prescribed per patient was 3.4. The doctors were deficient in providing home care advice for sick children to the caretakers. Average time spent by doctors on each patient was two minutes and twenty-three seconds. A combination of biomedical and social factors help to perpetuate this irrational prescribing behavior of the GPs. Continuing education programs for doctors in general practice about ARI management in children and rational use of drugs and health education of the public may improve the current prescribing practices (JPMA 47:24, 1997).

Iyun, B.F. and Tomson, G. (1996) **Acute respiratory infections--mothers' perceptions of etiology and treatment in south-western Nigeria.** *Soc Sci Med*, 42 (3), 437-45.

The focus of this research was on what mothers do when their children suffer from ARI at household level in rural settlements in Oyo State, Nigeria. A total of 419 mothers were interviewed. The study has combined three research methods, namely semi-structured questionnaire, in-depth interview and focus group discussion to get an insight into their perceptions in relation to cause and treatment of the disease. Most mothers regard ARI episodes as ordinary coughs and colds. They strongly believe that these are mostly caused by exposure to cold and perceive coldness of the body as a causal 'agent', whereas none of them mention viral or bacterial agents. The reported dominating practice of mothers was either the use of irritants to get rid of the cause of the disease ('coldness') through vomiting, by forcing the child to swallow bitter remedies such as cow urine, or to use a remedy with warming and soothing properties. 'Robb', a methyl salicylate--probably the most popular Nigerian ointment--appeared to be the drug of choice to 'warm the chest, both from outside and inside', either applied topically or dissolved in hot water to drink. The paper emphasizes the importance of behavioural and social science type studies to get closer to community perceptions of disease etiology and practices as a prerequisite for contextualized health education. The use of inappropriate administration of remedies should be discouraged. Marketing of medicinal drug products for inappropriate indications also needs to be controlled.

Jacobs, J., Kreutzer, R., Smith, D. (1997) **Rice burning and asthma hospitalizations, Butte County, California, 1983-1992.** *Environmental Health Perspectives*, 105(9), 980 – 985.

We investigated the association between rice burning and daily asthma hospitalizations in Butte County, California, from 1983 to 1992. Eighty-two percent of planted rice was burned, with a mean of 555 acres burned on days when burning was permitted. For 60% of the days during this period, no rice burning occurred. Peak burning occurred in fall and spring but was not correlated with criteria pollutants. Asthma admissions averaged 0.65/day and peaked in March. In the basic Poisson model with daily asthma hospitalizations as the outcome of interest, burn acreage showed a small but statistically significant elevation of risk for hospitalization per acre of rice burned [relative risk (RR) = 1.0001; 95% confidence interval (CI), 1.00004-1.0002], after adjusting for maximum daily temperature, seasonal factors, and yearly population. In this model, burn acreage showed a doseresponse effect as acreage burned increased. Days with the greatest acreage burned (>499 acres) had the largest risk of hospitalization (RR = 1.23; CI, 1.09-1.39), and days with moderate burning (between 100 and 499 acres) had a slightly lower risk of admission (RR = 1.2; CI, 1.05-1.37). Elevations of air pollutants were not associated with days of increased rice burning; however, rice burn acreage was shown to have a small but statistically significant effect on asthma morbidity in Butte County. This evidence suggests that further limitations on the daily amount of rice straw permitted to be burned should be considered to reduce pulmonary morbidity related to asthma. Key words: agricultural burning, asthma, particulate matter, PM10, poisson regression, rice burning, time-series analysis.

Jaffar, S., Leach, A., Greenwood, A. M., Jepson, A., Muller, O., Ota, M. O. C., Bojang, K., Obaro, S., and Greenwood, B. M. (1997) **Changes in the pattern of infant and childhood mortality in Upper River Division, The Gambia, from 1989 to 1993.** *Tropical Medicine and International Health*, 2(1), 28-37.

A surveillance system was used to detect births and deaths in children in a large, rural, West African population from 1989 to 1993. Cause of death was investigated using post-mortem questionnaires. Overall infant (age 0-11 months) and child (age 1-4 years) mortality rates of 80.1 and 18.8 per 1000 per year were recorded. These were reasonably consistent over the period of surveillance. The most frequent cause of death in infants was acute respiratory infection (ARI), whereas in children it was malaria: these two conditions accounted for 41% of the deaths in children under 5 years old. Other leading causes of death were acute gastroenteritis, malnutrition, and septicaemia. Deaths attributed to ARI decreased over the 5-year period, but mortality rates from other causes were either unchanged or increased slightly. Mortality from all causes peaked in the rainy season and was slightly higher in villages which were part of a primary health care programme than in those which were not. There were also no differences between male and female mortality rates beyond one year of age. Despite the introduction of a number of health interventions, there has been no major change in the overall pattern of mortality in children in a rural area of The Gambia. Malaria and ARI remain the main causes of death.

Jain, A., Pande, A., and Misra, P. K. (1991) **An Indian hospital study of viral causes of acute respiratory infection in children.** *J of Medical Microbiology*, 35 (4), 219.

From Sept 1986 to Jan 1989 a hospital-based study was conducted on 736 children, under 5 years of age, with acute respiratory infection. Nasopharyngeal secretions were examined for viruses by culture and by immunofluorescence. Viruses were detected in 22% of specimens: respiratory syncytial (5%), parainfluenza (5%), influenza A (4%), influenza B (2%), adenovirus (3%), measles (3%). The highest rates of detection were with patients diagnosed clinically as pneumonia or upper respiratory tract infection. The case fatality rate was very high (43%), in children with measles virus infection.

Jantos, C., Artelt, P., and Schiefer, H. G. **Acute Lower Respiratory Tract Infection Associated with Chlamydia pneumoniae in Germany.** *European J of Clinical Microbiology Infection*, 12, 133.

Serum specimens from 223 patients with acute lower respiratory tract infection were examined for antibodies to chlamydia pneumoniae using microimmunofluorescence test. Antibodies to chlamydia pneumoniae were detected in 20% of 91 children and 48% of 132 adults. Among those individuals, 4% children and 11% adults had elevated IgG antibody titres indicating acute or recent infection. These results suggest that a significant proportion of lower respiratory tract infections in Germany is caused by chlamydia pneumoniae.

Jarvis, D. (1996) **Association of respiratory symptoms and lung function in young adults with use of domestic gas appliances.** *Lancet*, 347, 426-31.

*Background:* There is evidence from some studies that people living in homes with gas stoves and other unvented gas appliances experience more respiratory symptoms than those who use other fuels for cooking and heating, by other studies have found no such association. We have investigated whether the use of gas appliances is associated with an increased risk of respiratory symptoms and whether sensitisation to common environmental allergens modifies any such association. *Methods:* A stratified random sample of 15,000 adults aged 20-44 years, living in 3 towns in East Anglia, UK were sent a questionnaire on asthma and hay fever. From those who responded, a random sample of 1864 were

invited to complete an extended questionnaire that included questions on use of gas appliances, to give blood samples for measurements of total IgE and specific IgE to common allergens, and to undergo tests of respiratory function. 659 women and 500 men agreed to an interview. The association of the use of gas appliances with respiratory symptoms, total IgE, specific IgE, and respiratory Function was assessed by logistics and multiple regression models. *Findings* Women who reported they mainly used gas for cooking has and increased risk of several asthma-like symptoms during the past 12 months including wheeze (odds ratio 2.07 [95% CI 1.41-3.05] ), walking with shortness of breath (2.32 [1.25-4.34] ), and asthma attacks (2.60 [1.20-5.65] ). Gas cooking increased the risk of symptoms more in women who were atopic than in non-atopic women but the difference did not reach an open gas fire and reduced lung function (forced expiratory volume in 1s [FEV1]) and increased airways obstruction (FEV1 as a percentage of forced vital capacity) compared with women who did not. These associations were not observed in men. *Interpretation* In East Anglia, the use of gas cooking is significantly associated with subjective and objective markers of respiratory morbidity in women but not in men. Women may be more susceptible than men to the products of gas combustion or they may have greater exposure to high concentrations of these products because they cook more frequently than men.

Jedrychowski, W., and Flak, E. (1997) **Maternal smoking during pregnancy and postnatal exposure to Environmental tobacco smoke as predisposition factors to acute respiratory infections.** *Environmental Health Perspectives*, 105(3), 302-306.

This study compared susceptibility to respiratory morbidity in a cohort of 9-year-old children exposed congenitally and postnatally to environmental tobacco smoke (ETS) to susceptibility in a cohort of unexposed children. The epidemiologic study included 1129 children: 594 boys and 535 girls attending the second grade of grammar schools in Krakow, Poland. We found strong evidence that children exposed to ETS in their homes were more susceptible to acute respiratory tract illnesses than unexposed children. A dose-response relationship between degree of exposure (for lower ETS exposure, odds ratio (OR) = 1.32; for higher ETS exposure, OR = 1.74) supports a causal explanation for the association observed. The significant trend of increased risk of respiratory infections due to ETS level in nonatopic children whose mothers did not smoke cigarettes during pregnancy suggests a direct effect of ETS exposure on the child's respiratory health. ETS combined with allergy nearly tripled the risk of acute respiratory tract illness (OR = 3.39; 95% CI, 1.93-5.93), and maternal smoking during pregnancy had a modifying effect on the risk of respiratory illnesses due to ETS after accounting for atopy. The stronger effect of ETS in atopic children and in those whose mothers smoked during pregnancy may be a result of biologic interaction of endogenous and environmental factors. The results of this study are of relevance to public health policy, as children with higher risk of respiratory infections may be more susceptible to environmental hazards later in adolescence or in adulthood. Respiratory infections also increase demands for medical interventions in terms of outpatient services and hospital admissions. In addition, respiratory illnesses cause missed school days, and caring for a sick child may lead to absenteeism from work.

Jekat, K. (1987) **The significance of social and family factors in respiratory illness** *Zentralbl Bakteriol Mikrobiol Hyg*, 185(3), 291-301

In the epidemiological group-diagnostic investigations of children taking place in the areas of Rhein/Main, Freiburg and Starnberg in 1982-1986, we registered supplementary characteristics of the familiar and social environments of the children by questionnaires in the years 1982/1983. From the results of the statistical evaluations we see that the health of the examined children responds equally to the social and familiar surroundings, such as housing space, indoor pollution, and social stimulants to the air quality or the meteorological and geographical characteristics of the different regions.

Jin, C. J., and Rossignol, A. M. (1993) **Effects of passive smoking on respiratory illness from birth to age eighteen months, in Shanghai, People's Republic of China.** *J Pediatr*, 123(4), 553-558.

The objective of this study was to evaluate the effects of exposure to nonmaternal, passive household cigarette smoke on the incidence of respiratory illness (bronchitis and pneumonia) among children from birth through age 18 months in the Lu-Wan District, Shanghai City, People's Republic of China. A secondary objective was to evaluate the effects of other environmental factors, such as the fuel used for cooking and whether the child was breast fed, on the incidence of respiratory illness.

Kammen, D. M. (1995) **From energy efficiency to social utility: Improved cookstoves and the Small is Beautiful Model of development**, in *Energy as an instrument for socio-economic development*, Goldemberg, J. and Johansson, T. B. (eds.) (United Nations Development Programme: New York), 50 - 62.

*Introduction.* The evolving tools and continuing pitfalls of technology transfer and implementation projects can be critically examined through an analysis of the changing project goals, and implementation strategies for improved cookstove design and dissemination efforts. In this paper I will summarize the changes in both the technology of improved cookstoves and the resulting opportunities for economic, health, and environmental conservation and social empowerment. Notable in this process are the expanding degree of communication and cooperation between project implementation and end-user groups, the growth of market-based technology transfer mechanisms, the analysis of the rural vs. urban market potential, and the design of multi-objective efforts that integrate disparate actors in the development process. It is the evolution in the understanding and interaction of these factors in the cookstove design, development, dissemination, and adoption chain that provides the clearest lessons for the role of household energy management in social change, empowerment and development planning generally. *Summary.* We begin with an overview of the technical evolution of cookstove designs, and a look at the Kenyan and more generally the East African experience with a multiplicity of stove types and economic, health, and environmental goals. These sections illustrate the technical potential of improved stoves to measurably conserve fuel and economic resources, and thus begin the process of development intervention and social empowerment.

Kane, D. N. (1976) **Bad air for children.** *Environment*, 18(9), 26-33.

The effects of air pollution on children are discussed. Certain factors play a role in the air pollution difficulties experienced by many children: higher breathing rate than adults, greater activity, smaller size, play activity, mouth breathing, more frequent respiratory tract infections and development factors. The influence and magnitude of exposure to air pollution is described, although there are limitations to the accuracy of predicting exposure levels. The importance of contaminated indoor air (from tobacco smoke, aerosol sprays, heating, ventilating, cooking, and household dust) is stressed. It has been found that air pollution affects mortality from respiratory disease and other conditions in the first year of life; air pollution depresses lung function, with such decrease in ventilatory performance in early life being considered a risk factor for later respiratory disorders; air pollution increases the incidence of acute lower respiratory tract illness in children; air pollution may impair the multiple defence mechanisms of the respiratory tract, increasing susceptibility to bacterial and viral infections; and it may contribute to the development of chronic bronchitis and aggravate asthmatic conditions.

Kawamoto, T., Matsuno, K., Arashidani, K., Yoshikawa, M., Kayama, F., and Kodama, Y. (1993) **Personal exposure to nitrogen dioxide from indoor heaters and cooking stoves.** *Arch Environ Contam Toxicol*, 25 (4), 534-8.

The personal exposure to NO<sub>2</sub> generated from various heaters and cooking stoves were studied, using 85 university students. The students attached NO<sub>2</sub> filter badges to their chests or collars and wrote down the period of time for heating and cooking for 1 week. Types of heaters and smoking habits were described through a questionnaire. The urinary hydroxyproline/creatinine ratio (HOP/C) was examined as a biomarker for health effects. The outdoor NO<sub>2</sub> concentration during the study period was 13.5-13.7 micrograms/m<sup>3</sup>. Smoking and the usage of electric heaters did not affect the exposure to NO<sub>2</sub>. Exposure increased according to the length of time kerosene heaters or oil fan heaters were used. The NO<sub>2</sub> concentration during the heating by a kerosene heater and an oil fan heater was calculated to be 219 and 474 micrograms/m<sup>3</sup>, respectively. The correlation between the period of cooking and personal exposure was also observed. The NO<sub>2</sub> levels during cooking were calculated to be 290 micrograms/m<sup>3</sup>. Using these calculated values of NO<sub>2</sub> concentration, it is possible to presume the personal exposure levels from the length of time heaters and cooking stoves are used even if the subjects do not attach the filter badges. Neither smoking nor exposure to NO<sub>2</sub> were associated with the increase of urinary HOP/C.

Karzon D. T. (1991) **Control of acute lower respiratory illness in the developing world: An assessment of vaccine intervention.** *Reviews of Infectious Diseases* 13 (SUPPL. 6), S571-S577.

The major bacterial and viral causes of morbidity and death due to acute lower respiratory infection (ALRI) in the developing world are amenable to control by vaccines. Initially, full use of measles, pertussis, and diphtheria vaccines, in appropriately scheduled programs, can make an immediate contribution to the reduction of severe respiratory infection. Emerging technologies offer the promise of vaccines against bacterial and viral respiratory pathogens that are suitable for infants and children in developing countries. These technologic advances include the use of protein-polysaccharide conjugates of endemic serotypes of *Haemophilus influenzae* and *Streptococcus pneumoniae* vaccines and new approaches to the use of purified protein components or attenuated live virus with respiratory syncytial virus and paramyxovirus vaccines. Such vaccines should soon be available for evaluation in developing countries. It is timely to embark upon a program of development, evaluation, and worldwide deployment of vaccines for the control of ALRI.

Keiding, L. M., Rindel, A. K., Kronborg, D. (1995) **Respiratory illnesses in children and air pollution in Copenhagen.** *Arch Environ Health*, 50(3), 200-206.

The relationship between air pollution and the daily number of contacts (i.e., telephone calls and home visits) with or at Copenhagen Emergency Medical Service for children with and without respiratory illnesses was studied during a 91-d period (i.e., January 14, 1991, to April 14, 1991). A total of 12,132 contacts occurred. Diagnoses, which were recorded on the invoices for 5,307 contacts, revealed that 3,974 contacts were the result of respiratory illnesses. Regression analysis was used to investigate the short-term relationship between pollutants (i.e., carbon monoxide, nitric oxide, nitrogen dioxide, NO<sub>x</sub>, sulfur dioxide, ozone, and black smoke), measured at monitoring stations, and both the number of all contacts for children and the number of contacts for children with respiratory illnesses. Temperature and systematic effects that were the result of holidays and weekends were controlled for, after which only nitric oxide and NO<sub>x</sub> were associated significantly with the number of contacts for children who had respiratory illnesses. Nitric oxide and NO<sub>x</sub>, as indicators of traffic pollution, appeared, at low levels, to slightly exacerbate respiratory illnesses among children.

Keller, M. D., Lanese, R. R., Mitchell, R. I., and Cote, R. W. (1979) **Respiratory illness in households using gas and electricity for cooking. II. Symptoms and objective findings.** *Environ Res*, 11, 504-515.



An earlier study examined the incidence of reported respiratory illness in members of households cooking with gas or electricity. The present investigation extends that study in order to confirm and validate the reports of illness, and to determine the frequency distribution of reported symptoms among parents and children in the two settings. One hundred twenty households with school-age children were selected from the gas and electric cohorts. Reports of respiratory illness and symptoms were obtained.

Khan, A. S. *et al.* (1996) **Comparison of US inactivated split-virus and Russian live attenuated, cold-adapted trivalent influenza vaccines in Russian schoolchildren** *J of Infectious Diseases*, 173(2), 453-456.

In a blinded, placebo-controlled study, the reactogenicity, immunogenicity, and clinical efficacy of single doses of US inactivated split-virus and Russian live attenuated, cold-adapted influenza vaccines were compared in 555 schoolchildren in Vologda, Russia. Serial serum samples were collected and school absenteeism was assessed. Systemic reactions were rare, but local reactions (primarily erythema at the injection site) were observed in 27% of the inactivated vaccine group, and coryza (12%) and sore throat (8%) were observed in the attenuated vaccine group. At 4 weeks after vaccination, a 4-fold rise in titer of hemagglutination inhibition antibody to A (H1N1), A (H3N2), and B was noted, respectively, among 78%, 88%, and 53% of children who received inactivated vaccine and among 55%, 79%, and 30% of children who received attenuated vaccine. The vaccine efficacy for preventing school absenteeism due to acute respiratory illness during the period of peak influenza activity was 56% for inactivated vaccine and 47% for attenuated vaccine.

Khan, A. Z., Tickoo, R., Arif, T., and Zaheer, M. (1995) **Mothers' attitudes to children's chest infections in India.** *J of the Royal Society of Health*, 115(5), 314-317.

Acute Respiratory Infections (ARIs) account for a very high morbidity and mortality amongst children in the developing countries. A knowledge, attitude and practice study in relation to the literacy status of mothers whose children suffered from ARI was conducted. A sample of 140 mothers who had 265 children were selected for the study. The majority of literate mothers (75%) had complete knowledge regarding management of ARI. Literacy alone was not the only factor responsible for developing a positive attitude and adopting correct practices during ARI. Mass media and health personnel played an equally important role. Most women (83.3%) had obtained their knowledge regarding ARI through media and paramedical staff. Most mothers (36.4%) were concerned about the health of their children when they suffered from episodes of ARI and the majority of them (87.2%) were worried because they felt that their children or contacts could be adversely affected. Nearly 72% of mothers took early action during an episode of ARI. The majority of the medical practitioners practised non-allopathic medicine but all of them were prescribing allopathic drugs. Most of the mothers (70%) had no problem in taking their children to the desired health centres when needed.

Kinouchi, T., Nishifuji, K., Tsutsui, H., Hoare, S.L., and Ohnishi, Y. (1988) **Mutagenicity and nitropyrene concentration of indoor air particulates exhausted from a kerosene heater.** *Jpn J Cancer Res*, 79 (1), 32-41.

The particulates in a room warmed with a radiant kerosene heater were collected, extracted and fractionated into diethyl ether-soluble neutral, acidic and basic fractions. The mutagenicity of these fractions was measured with *Salmonella typhimurium* strains TA98, TA98NR, TA98/1,8-DNP6 and TA100 in the presence and absence of S9 mix. Room air without the heater showed very low mutagenicity. However, a sample from a room at the beginning of the burning period showed very high mutagenicity (237 His+ revertants/plate/m<sup>3</sup> of air in strain TA98 in the absence of S9 mix). In contrast, emissions from the heater after it was burning stably showed low mutagenicity (9 His+

revertants/plate/m<sup>3</sup>). The crude extract of particulates from the heater at the beginning of the burning period was analyzed by high-pressure liquid chromatography (HPLC) and showed a considerable amount of nitropyrenes (NPs); the concentrations of 1-NP and 1,6-diNP were 1.62 ng and 0.149 ng/m<sup>3</sup> of air, respectively, and accounted for 1.2% and 17.6%, respectively, of the mutagenicity in strain TA98 in the absence of S9 mix. In addition, an HPLC-Ames histogram showed that peaks of mutagenicity corresponding to 1-NP and diNPs accounted for 75.7% (1-NP, 4.9%; 1,6-diNP, 17.1%; 1,8-diNP, 46.3%; 1,3-diNP, 7.4%) of the HPLC-recovered mutagenicity for strain TA98 without S9 mix. These results that kerosene heaters, especially immediately after ignition, create mutagenic substances such as NPs.

Klima, H., and Junker, E. (1985) **Indoor air quality and bronchitis.** *Atemwegs-Lungenkrankh*, 11(3), 125-127.

The quality of air in a room depends on the temperature of the air in the room and the area surrounding the room (radiation), the speed, the humidity of the air, and the air reversal. With regard to the amount of biological and chemical influence on the quality of indoor air, one can distinguish between outdoor air noxa and intramural noxa. The gaseous intramural pollutants, for instance pentachlorophenols (PCP), aldehydes etc., are of special importance for the development of bronchitic illness. Increased concentrations of nitrogen dioxide and carbon monoxide which may, for instance, appear in not properly working gas-households do also lead to an increase of illness in the respiratory passages. Smoking plays, of course, a decisive part in the development of a bronchitis: Children of smokers fall ill more often with bronchitides and pneumonias than children of non-smokers.

Koeck, M., Pichler-Semmelrock, F. P., and Schlacher, R. (1996) **Formaldehyde - Study of Indoor air pollution in Australia.** *Central European J of Public Health*.

As part of a long-term study of indoor air pollution, formaldehyde concentrations were determined in 792 apartments following complaints by inhabitants. Measurements were carried out using Draeger tubes as well as acetyl acetone method. In 157 apartments, HCHO concentrations of more than 0.1 ppm, exceeding the recommended standard values for indoor air concentrations were determined.

Kofler, W., and Lercher, P. (1985) **Chronic bronchitis - Relation to air pollution and socio-demographic variables.** *Atemwegs-Lungenkrankh*, 11(3), 122-124.

An epidemiologic analysis of 86,116 participants of the 'Gesundenuntersuchung' in the Tyrol, Salzburg, and Carinthia revealed a statistically significant relation of the prevalence of chronic bronchitis to air pollution and educational level. In agreement with earlier studies smoking, age and sex were established as important risk factors.

Kolsteren P. W. V., Kusin J.A., Kardjati S. (1997) **Morbidity and growth performance of infants in Madura, Indonesia. Report..**

Between January 1987 and July 1988, all children born in two villages on the island of Madura, Indonesia were visited weekly by a field worker trained to interview mothers on disease symptoms. The maximum recall period was 1 week. All infants were measured (weight and height) at monthly intervals. Information on growth and morbidity is analysed for infants from birth until the age of 11 months. Morbidity, defined as acute respiratory tract infection (ARI), diarrhoea, fever and other diseases, is analysed over 4-week periods and related to growth performance. In total, there are 1373 4-week reporting periods with morbidity information from birth to the age of 12 months. Of all the diseases recorded (1021), 47% were ARI, 13% diarrhoea, 14% fever and 26% other diseases. The average (SD) duration of diarrhoea was 7 (11) days, ARI 14 (9) days, fever 6 (4) days and 16 (10) days for

other diseases. The most striking results in this analysis are: (i) the lack of a relationship between morbidity and growth (either linear or weight) during the 1st 6 months of life; (ii) the existence of a relationship between illness and weight increment for which only ARI showed significant influence for infants of 6 months and more; (iii) the lack of a relationship between morbidity and linear growth performance at all ages; and (iv) the fact that no cumulative effect of disease on growth performance was found to explain the observations.

Koo, L. C., Ho, J. H., Ho, C. Y., Matsuki, H., Shimizu, H., Mori, T., and Tominaga, S. (1990) **Personal exposure to nitrogen dioxide and its association with respiratory illness in Hong Kong.** *Am Rev Respir Dis*, 141(5), 1119-26.

In 1985, 362 primary schoolchildren and their 319 mothers were surveyed in Hong Kong to study the possible relationship of air pollution to respiratory illnesses. Using nitrogen dioxide (NO<sub>2</sub>) measured by personal samplers as a measure of air pollution, the study aimed to identify the major sources of NO<sub>2</sub> in the indoor environment and see whether its increased presence was associated with respiratory symptoms. The levels of NO<sub>2</sub> among the mothers was found to increase by 21% if dust exposure was reported from the workplace, 18% if they used such cooking fuels as liquid petroleum gas or kerosene, 11% when kitchens did not have ventilating fans, and 10% when incense was burned at home. In terms of respiratory symptoms, an increase in NO<sub>2</sub> levels of 19% was reported among those with allergic rhinitis and 18% among those with chronic cough. The levels of NO<sub>2</sub> among children were correlated with levels measured in classrooms, all of which had opened windows so that the NO<sub>2</sub> came from outdoors. No association was found between children's NO<sub>2</sub> levels and respiratory symptoms. With the exception of smoking by the father and the children's NO<sub>2</sub> levels, no association was found between smoking at home and NO<sub>2</sub> levels.

Krzyzanowski, M., and Kauffmann, F. (1988) **The relation of respiratory symptoms and ventilatory function to moderate occupational exposure in a general population. Results from the French PAARC study of 16,000 adults.** *Int j. Epidemiologists*, 17(2) 397-406

Data from the French PAARC (Pollution Atmospherique et Affections Respiratoires Chroniques) study were used to assess the effect of a priori moderate occupational exposure to dust, gases or chemical fumes on the prevalence of respiratory symptoms and ventilatory function. In this community-based population, without households 'headed' by manual workers, 34% of the 8692 men and 23% of the 7772 women, 25-59 years of age, ever occupationally active, reported some exposure. The studied relationships were adjusted for age, height, smoking habits, socio-occupational class, education and air pollution by logistic or linear regression methods. For men and women, some 50% increase ( $p < 0.01$ ) in chronic cough, chronic bronchitis, dyspnoea grade 2 and wheezing prevalence was observed in the exposed group compared to the never exposed, with the strongest association for wheezing. FEV<sub>1</sub> and FEF(25-75%) were not associated with occupational exposure. Among men, FEV<sub>1</sub>/FVC and FEF(25-75%)/FVC were significantly lower ( $p < 0.001$  and  $p < 0.05$ ) among the exposed compared to never exposed, but FVC was significantly greater ( $p < 0.05$ ). Among women, occupational exposure was significantly related to a lower FEV<sub>1</sub>/FVC in the subgroup with a history of asthma or wheezing. Results suggest that occupational exposures of relatively low intensity, encountered in the non-industrial work places may constitute a non-negligible risk for respiratory health.

Kucukbay, H., Yakinci, C., Kucukbay, F. Z., Turgut, M., and Turkey, H. (no date) Report from the Inonu Universitesi, Fen-Edebiyat Fakultesi, Kimya Bolumu, 44069 Malatya. **Serum vitamin A and beta-carotene levels in children with recurrent acute respiratory infections and diarrhoea in Malatya.**

Deficiency of serum vitamin A is one of the widespread public health problem among pre-school children in developing countries. A limited number of studies have been done about this problem in Turkey and there is no similar work done in Malatya. Serum vitamin A and beta-carotene levels in 56 pre-school age children who had recurrent acute respiratory infections (ARI) or recurrent diarrhoea were determined by a UV/VIS spectrometer. The results obtained were compared with 35 healthy pre-school age children. Serum vitamin A ( $51.66 \pm 8.10$  (mu)g/dL) and beta-carotene ( $82.88 \pm 18.5$  (mu)g/dL) levels in children with ARI's were found significantly lower than the control group ( $58.14 \pm 9.07$  (mu)g/dL and  $131.43 \pm 22.38$  (mu)g/dL, respectively) ( $P < 0.001$ ). Serum vitamin A ( $47.21 \pm 8.27$  (mu)g/dL) and beta-carotene ( $81.63 \pm 15.41$  (mu)g/dL) levels in children with recurrent diarrhoea were also found significantly lower than the control group ( $58.14 \pm 9.07$  (mu)g/dL and  $131.43 \pm 22.38$  (mu)g/dL, respectively) ( $P < 0.001$ ).

Kundi, M., Anjum, M., Mull, D. S., and Mull, J. D. (1993) **Maternal Perceptions of Pneumonia And Pneumonia Signs In Pakistani Children.** *Social Science & Medicine*, 37(5), 649-660.

Fifty mothers of children attending a hospital outpatient clinic with non-severe pneumonia (fast breathing but no chest indrawing) were interviewed in depth. Maternal perceptions and practices with clinical significance were documented. Results showed that most mothers initially tried "heat-producing" home remedies designed to counterthe "coldness" of the disease, allowed only 2 days for any particular allopathic medicine to work, and did not go to the same practitioner twice. When mothers were asked what had alarmed them enough to come to the hospital, the symptoms named most frequently were persistent severe cough and high fever, inability to sleep and excessive crying. Fast breathing was spontaneously mentioned by only a few, although when questioned, 32/50 said that they had noticed it. The mothers who had prior experience with child pneumonia were more likely to notice fast breathing and also came to the hospital earlier than those who were inexperienced. Relatively higher levels of maternal education and income were suggestively associated with bringing a female child rather than a male child for pneumonia treatment. Fewer than half of the mothers knew where air goes when a person breathes in and where the lungs are located. Most held treatment preferences at odds with the protocols proposed for the national ARI program currently being initiated in Pakistan, e.g. they said that a doctor should use a stethoscope, should prescribe suspensions rather than tablets and should give injections. This study provides baseline data on attitudes and behaviors that can either be built on in that program or addressed through public education campaigns.

Lafaix, C., and Reinert, P. (1997) **Worldwide morbidity and mortality of acute respiratory infections in children under five years of age.** *Medicine and Maladies Infectieuses*, (27) Speical Issue, 507-512.

Acute respiratory infections (ARI) are among the most prevalent factors of morbidity in the world. Related mortality is a major issue in children under five years of age in developing countries. According to WHO, estimated mortality averages four million deaths per year, mainly due to pneumonia, bronchiolitis, and obstructive laryngitis. One million deaths due to measles, 350,000 to pertussis, and 8,000 to diphtheria are to be added. Infectious agents are first, *S. pneumoniae*, *H. influenzae* and respiratory syncytial virus, second, *S. aureus*, influenza, and para influenzae viruses, adenovirus. Control programs of ARI are based upon adequate medical care in primary health care centers, training of health workers, maternal education, and immunizations. Such programs set up in some developing countries enabled a 20% decrease of infant mortality and a 25% decrease in children under five years of age.

Lambert, W. E., Samet, J. M., Skipper, B. J., Cushing, A. H., Hunt, W. C., Young, S. A., McLaren, L. C., Schwab, M., and Spengler, J. D. (1994) **Nitrogen dioxide and respiratory illness in**

**children: Part III: Quality assurance in an epidemiologic study.** *Health Effects Institute, Research Report Number 58.*

This volume contains Part III of a report on Nitrogen Dioxide and Respiratory Illness in Children. Part I, which describes the health outcomes, and Part II which presents the exposure data, were published together with a Commentary by HEI's Health Review Committee in June 1993. Part III describes the Quality Assurance and Quality Control procedures used, and provides supporting documentation for the other parts of this Research Report.

Leaderer, B .P., Zagraniski, R. T., Berwick, M., and Stolwijk, J.A. (1986) **Assessment of exposure to indoor air contaminants from combustion sources: methodology and application.** *Am J Epidemiol*, 124(2), 275-89.

A methodology for assessing indoor air pollutant exposures is presented, with specific application to unvented combustion by-products. This paper describes the method as applied to a study of acute respiratory illness associated with the use of unvented kerosene space heaters in 333 residences in the New Haven, Connecticut, area from September 1982 to April 1983. The protocol serves as a prototype for a nested design of exposure assessment which could be applied to large-scale field studies of indoor air contaminant levels. Questionnaires, secondary records, and several methods of air monitoring offer a reliable method of estimating environmental exposures for assessing associations with health effects at a reasonable cost. Indoor to outdoor ratios of NO<sub>2</sub> concentrations were found to be 0.58 +/- 0.31 for residences without known sources of NO<sub>2</sub>. Levels of NO<sub>2</sub> were found to be comparable for homes with a kerosene heater only and those with a gas cooking stove only. Homes with a kerosene heater and a gas stove had average two-week NO<sub>2</sub> levels approximately double those with only one source. Presence of tobacco smokers had a small but significant impact on indoor NO<sub>2</sub> levels. Two-week average levels of indoor NO<sub>2</sub> were found to be excellent predictors of total personal NO<sub>2</sub> exposure for a small sample of adults. Residences with kerosene space heaters had SO<sub>2</sub> levels corresponding to the number of hours of heater use and the sulfur content of the fuel. Formaldehyde levels were found to be low and not related to unvented combustion sources. NO<sub>2</sub>, SO<sub>2</sub>, and CO<sub>2</sub> levels measured in some of the residences were found to exceed those levels specified in current national health standards.

Leal, A. L., and Castaneda E. (1997) **Antibiotic susceptibility of Streptococcus pneumoniae colonizing the nasopharynx of Colombian children with pneumonia** *Pan American J of Public Health*, 1(4), 266-272.

*Streptococcus pneumoniae* is one of the principal causal agents of acute respiratory infection (ARI) in children, and its resistance to antibiotics has increased worldwide. This study examined the patterns of susceptibility to antibiotics of *S. pneumoniae* that had colonized the upper respiratory tract of 272 children hospitalized for pneumonia in two hospitals in Santafe de Bogota. *S. pneumoniae* was isolated from 114 patients (42%). Diminished susceptibility to penicillin was noted in 19 isolations (17%), with 12 (11%) showing an intermediate level of sensitivity and 7 (6%) outright resistance. Only 1 of the 19 isolates resistant to penicillin also showed resistance to ceftriaxone. There was diminished sensitivity to erythromycin in 3 isolations (3%), to chloramphenicol in 6 (5%), and to cotrimoxazole (trimethoprim + sulfamethoxazole) in 46 (40%). Resistance to multiple drugs was found in 7 isolations (6%). The most commonly encountered penicillin-resistant serotype was 23F (68.4%). An association was observed among age, previous use of antibiotics, and colonization by *S. pneumoniae* with reduced penicillin susceptibility or multiple-drug resistance. This study confirmed the presence of antibiotic-resistant *S. pneumoniae* in Colombia and highlights the importance of the rational use of antibiotics and of the implementation of epidemiologic surveillance for this agent.

Leduc, D., Lheureux, P., Joannes, D., van Muylem, A., Peche, R., Hecq, W., Askenasi, R., and Yernault, J.-C. (1997) **Relationship between respiratory morbidity and urban atmospheric pollution: Study in an emergency department.** *Reanim Urgences*, 6 (2), 85-90.

In urban area, atmospheric pollution is principally caused by sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO and NO<sub>2</sub>), and suspended particulates and ozone (O<sub>3</sub>). The major sources of emission are directly or indirectly related to automobile traffic, local industry and domestic heating. While high concentrations of atmospheric pollutants are clearly associated with increased respiratory morbidity, the association between atmospheric pollution at and more usual level(s) and respiratory disease remains controversial. Comparing requirement of an emergency department in an urban hospital and levels of atmospheric pollution, we studied the relationship between air pollution and acute respiratory morbidity. We analysed 549 cases of respiratory disease during 1 year and assessed levels of atmospheric pollutants daily (NO, NO<sub>2</sub>, SO<sub>2</sub>, O<sub>3</sub>, suspended particulates, CO) during this year. Because of major confounding factors (tobacco, indoor pollution, etc.), low levels of pollutants and limited number of cases, the relationship was difficult to assess. However in our study, concentration of SO<sub>2</sub> was correlated with an increased incidence of respiratory diseases ( bronchitis exacerbations and pneumonia). These data suggest that SO<sub>2</sub> could increase sensitivity to respiratory infections as it was already demonstrated in animal models. These data need to be confirmed by other investigations.

Leikauf, G. D., Simpson, L. G., Santrock, J., Zhao, Q., Abbinante-Nissen, J., Zhou, S, and Driscoll, K. E. (1995) **Airway Epithelial Cell Responses to Ozone Injury.** *Environmental Health Perspectives*, 103(Suppl 2), 91-95.

The airway epithelial cell is an important target in ozone injury. Once activated, the airway epithelium responds in three phases. The initial, or immediate phase, involves activation of constitutive cells, often through direct covalent interactions including the formation of secondary ozonolysis products—hydroxyhydroperoxides, aldehydes, and hydrogen peroxide. Recently, we found hydroxyhydroperoxides to be potent agonists of bioactive eicosanoid formation by human airway epithelial cells in culture. Other probable immediate events include activation and inactivation of enzymes present on the epithelial surface (e.g., neutral endopeptidase). During the next 2 to 24 hr, or early phase, epithelial cells respond by synthesis and release of chemotactic factors, including chemokines—macrophage inflammatory protein-2, RANTES, and interleukin-8. Infiltrating leukocytes during this period also release elastase, an important agonist of epithelial cell mucus secretion and additional chemokine formation. The third (late) phase of ozone injury is characterized by eosinophil or monocyte infiltration. Cytokine expression leads to alteration of structural protein synthesis, with increases in fibronectin evident by in situ hybridization. Synthesis of epithelial antiproteases, e.g., secretory leukocyte protease inhibitor, may also increase locally 24 to 48 hr after elastase concentrations become excessive. Thus, the epithelium is not merely a passive barrier to ozone injury but has a dynamic role in directing the migration, activating, and then counteracting inflammatory cells. Through these complex interactions, epithelial cells can be viewed as the initiators (alpha) and the receptors (omega) of ozone-induced airway disease. Key words: air pollution, asthma, bronchitis, cytokines, inflammation, eicosanoids, aldehydes, hydroxyhydroperoxides, hydrogen peroxide.

Leynard, B., Liard, R., Bousquet, J., Mesbah, H., and Neukirch, F. (1996) **Gas cooking and respiratory health in women.** *Lancet*, 347, 1052-1053.

Jarvis and co-workers (Feb 17, p 426), reported that in young women, but not in men, the use of gas for cooking is associated with an increased risk of respiratory symptoms and impaired lung function. We have also addressed this issue with data for 441 men and 506 women aged 20-44 years, from the Paris and Montpellier centers of the European Community Respiratory Health Survey (ECRHS). We also found no significant relation between gas cooking and respiratory symptoms in men, whereas in

women gas cooking was associated ( $p < 0.05$ ) with an increased risk of awakening with shortness of breath, with having asthma, with taking asthma medication (odds ratio 2.1, 3.3, and 4.9 respectively, after adjustment for age, smoking and town of residence). There was not association between gas cooking and allergy (atopy, IgE, nasal allergies), and the relations between gas cooking and symptoms were similar in atopic and non-atopic women.

Lipsett, M.; Hurley, S.; Ostro B. (1997) **Air Pollution and Emergency Room Visits for Asthma in Santa Clara County, California.** *Environmental Health Perspectives*, 105(2), 216-222.

During the winters of 1986-1987 through 1991-1992, rainfall throughout much of Northern California was subnormal, resulting in intermittent accumulation of air pollution, much of which was attributable to residential wood combustion (RWC). This investigation examined whether there was a relationship between ambient air pollution in Santa Clara County, California and emergency room visits for asthma during the winters of 1988-1989 through 1991-1992. Emergency room (ER) records from three acute-care hospitals were abstracted to compile daily visits for asthma and a control diagnosis (gastroenteritis) for 3-month periods during each winter. Air monitoring data included daily coefficient of haze (COH) and every-other-day particulate matter with aerodynamic diameter equal to or less than 10 microns (PM<sub>10</sub>, 24-hr average), as well as hourly nitrogen dioxide and ozone concentrations. Daily COH measurements were used to predict values for missing days of PM<sub>10</sub> to develop a complete PM<sub>10</sub> time series. Daily data were also obtained for temperature, precipitation, and relative humidity. In time-series analyses using Poisson regression, consistent relationships were found between ER visits for asthma and PM<sub>10</sub>. Same-day nitrogen dioxide concentrations were also associated with asthma ER visits, while ozone was not. Because there was a significant interaction between PM<sub>10</sub> and minimum temperature in this data set, estimates of relative risks (RRs) for PM<sub>10</sub>-associated asthma ER visits were temperature-dependent. A 60 g/m<sup>3</sup> change in PM<sub>10</sub> (2-day lag) corresponded to RRs of 1.43 (95% CI = 1.18-1.69) at 20°F, representing the low end of the temperature distribution, 1.27 (95% CI = 1.13-1.42) at 30°F, and 1.11 (95% CI = 1.03-1.19) at 41°F, the mean of the observed minimum temperatures. ER visits for gastroenteritis were not significantly associated with any pollutant variable. Several sensitivity analyses, including the use of robust regressions and of nonparametric methods for fitting time trends and temperature effects in the data, supported these findings. These results demonstrate an association between ambient wintertime PM<sub>10</sub> and exacerbations of asthma in an area where one of the principal sources of PM<sub>10</sub> is RWC.

Liu B.-K. (1996) **Lung X-ray changes in skeletal fluorosis caused by coal combustion.** *Fluoride Q. Rep.* 29(1), 33-35.

Lung X-ray findings are reported in 45 cases with skeletal fluorosis in an area contaminated by coal combustion. The findings include chronic bronchitis, with diffuse interstitial fibrosis and pulmonary emphysema. The degree of pulmonary pathological findings and skeletal fluorosis is correlated with patient age. Among the 45 cases were 5 with cardio-pulmonary disease and 5 with tuberculosis.

Lopez Bravo, I. M., Sepulveda, H., and Valdes, I. (1997) **Acute respiratory illnesses in the first 18 months of life.** *Rev. Panam. Salud Publica Pan Am. J. Public Health*, 1(1), 9-17.

To help assess the causes and frequency of acute respiratory illnesses (ARI) during the first 18 months of life in Chile, a cohort of 437 children born in good health between May 1991 and April 1992 was followed at an urban health clinic in northern Santiago. Information was obtained from medical checkups performed at the clinic, from emergency health care services, from private physicians, and from interviews with each child's mother when the child was enrolled in the study and when it was 6, 12, and 18 months old. Follow-up was completed for 379 (87%) of the children. ARI accounted for 67% of all

3762 episodes of illness recorded for these children in the 18-month study period, 1384 (55%) of the ARI episodes affecting the upper respiratory tract and the remaining 1144 (45%) affecting the lower. The overall rate of ARI observed was 33 episodes per 100 child-months of observation. The incidences of upper, lower, and total ARI episodes decreased significantly in the third six months of life. A statistically significant association was found between upper ARI ( $\leq 2$  episodes) and maternal smoking ( $\leq 5$  cigarettes per day), but no significant associations were found with any of the other risk factors studied. However, lower ARI ( $\leq 2$  episodes) was significantly associated with maternal schooling ( $< 8$  years), a family history of atopic allergn, and substandard housing conditions; and lower ARI ( $\leq 4$  episodes) was significantly associated with these factors and also with the existence of one or more siblings, birth in a cold season, limited breast-feeding ( $< 4$  months), and low socioeconomic status. Significant associations were found between obstructive bronchitis episodes and most of the risk factors studied (gender, siblings, season of birth, duration of breast-feeding, maternal schooling, smoking, use of polluting fuels in the home, and a family history of atopic allergy); similarly, significant associations were found between the occurrence of pneumonia and many risk factors (including siblings, season of birth, duration of breast-feeding, maternal schooling, smoking, and socioeconomic level). Overall, 42 of the study children were hospitalized during the study period for lower tract ARI, and two children died of pneumonia at home during their first 6 months of life. The rate of hospitalization fell significantly with increasing age.

Love, G. J., Lan, S.-P., Shy, C. M., and Struba, R. J. (1981) **The incidence and severity of acute respiratory illness in families exposed to different levels of air pollution, New York metropolitan area, 1971-1972.** *Arch. Environ. Health*, 36(2), 66-74.

The incidence and severity of acute respiratory disease was studied in families in three New York communities with different ambient levels of SO<sub>2</sub> and particulate air pollution. Upper, lower, and total respiratory disease rates in fathers, mothers, and school children tended to be higher in the communities with higher pollution levels. Similar higher rates, however, were not observed among preschool children. Regression analyses were used to adjust rates for socioeconomic status, parental smoking, chronic bronchitis in parents, and possible indoor pollution resulting from the use of a gas stove for cooking. After these adjustments the community differences were still significant ( $P < .01$ ), for schoolchildren. The indoor pollution related to gas stoves was a significant covariate among children. The effects of smoking were inconsistent. It was not possible to attribute the higher rates observed to any specific pollutant, since both SO<sub>2</sub> and particulate matter levels were higher in the high pollution communities, nor was it possible to attribute the excesses to current levels of exposure or to a residual effect of previous higher exposure concentrations. The fact that young children did not follow the pattern suggests the latter. It was concluded, however, the current or previous exposures to the complexity of air pollutants in New York City was at least partially responsible for increased incidences of acute respiratory disease.

Lozano J. M. (1994) **Vaccines and acute respiratory infections.** *Pediatrics*, 14 (7), 319-324.

Acute respiratory infections (ARI) are the most frequent diseases suffered by human beings. A child living in an urban area may suffer between four and nine episodes of ARI during his first year of life, and between one and 5 per year in the four subsequent years. Incidence of ARI is similar in industrialized and developing countries, but with a higher relative severity of lower ARI, mainly pneumonia. This article reviews the current situation and expected developments of three of the vaccines that are likely to have greater impact in the morbidity and mortality of lower ARI, that is, Haemophilus Influenzae type S, Streptococcus Pneumoniae, and respiratory Syncytial Virus.

Lui, Y. L., Lin, L. M., Zhu, J., Zhang, Z. J., and Li, Z. (1991) **Case-control study on pathogenesis of pneumonia in children aged 0-2 years.** *Chinese Medical J (English Edition)* 104(1), 22-26.



In order to know the incidence of risk factors predisposing children to pneumonia, case control study was carried out in six MCH Model Counties in 1986. Single factor analysis showed 29 factors were responsible for the increasing incidence of pneumonia. 13 of 29 factors were major pneumonia risk factors by the standard of  $OR \geq 15$  and  $OR \geq 3$ . They were malnutrition, anemia, rickets, pneumonia history, repeated colds, chronic diarrhoea, congenital malformation, asphyxia neonatorum, amniotic fluid aspiration, artificial feeding, too much clothing, family member with acute respiratory illness (ARI) and contact with ARI patients. Among them 7 factors were related to individual health condition. Therefore, it is important to improve general health of children so as to reduce the incidence of pneumonia.

Luo, R.-X., Wu, B., Yi, Y.-N., Huang, Z.-W., and Lin, R.-T. (1996) **Indoor burning coal air pollution and lung cancer - A case-control study in Fuzhou, China.** *J Lung Cancer* 14(SUPPL), S113-S119.

A case-control study on risk factors for lung cancer was carried out in Fuzhou, China. One-hundred and two newly-diagnosed primary lung cancer cases in urban Fuzhou (78 male and 24 female cases) were matched with 306 population-based controls. The primary histological types were adenocarcinomas (57 cases, 55.9%) and squamous cell carcinomas (39 cases, 38.2%). Controls were obtained from the general population by random, stratified sampling and consisted of noncancer cases matched for sex, ethnicity and age. Cases and controls were interviewed by trained professionals using a standardized questionnaire. Information was obtained on: smoking habits, living conditions, history of respiratory diseases, air pollution, and 40 other variables. The data were evaluated by conditional logistic regression analysis. The major risk factors for lung adenocarcinoma were: indoor air pollution from burning coal, chronic bronchitis, and high economic income. The risk factors for lung squamous cell carcinoma were: amount of cigarettes smoked per day, 'deep inhalation', a history of exposure to environmental tobacco smoke (ETS) before 20 years of age, burning coal indoors, and high economic income. The results showed that the major risk factors for lung cancer in Fuzhou were: burning coal indoors, smoking, exposure to ETS before 20 years of age, chronic bronchitis, and high economic income. Cigarette smoking significantly increased the risk of lung squamous cell carcinoma, but had no significant association with the risk of lung adenocarcinoma. In summary, our research supports the hypothesis that smoking and indoor air pollution are the major risk factors for lung cancer in Fuzhou. Burning coal indoors and smoking were associated with lung cancer mortality in a major city in southern China.

Lye, M. S., Deavi, U., and Choo, K. E. (1994) **Acute Respiratory Infection in Malaysian Children.** *J of Tropical Pediatrics*, 40 (6), 334.

A cross-sectional community-based survey was conducted to determine the prevalence of ARI in children below 7 years of age and to obtain baseline information for an intervention program. A total of 6190 households comprising 38632 persons with 12273 children below 7 years of age were surveyed. Information of socio-demographic variables, environmental sanitation, occurrence of ARI, and diarrhoea, treatment seeking behavior during episodes of those illnesses and immunization among children were obtained. 30% of children had experienced ARI in the 2 week period prior to the interview, and 94% had mild ARI, 1 per cent had moderate and 5% had severe ARI. There was lack of concurrence between mothers' perception of severity and interviewers'. 24 and 39 % of severe and moderate ARI respectively, were reported by mothers to be mild. There is cause for concern as these children may not receive timely and appropriate treatment. The findings from this study contribute to identification of target population and priority areas for health education of the population. The survey has provided useful baseline data for the implementation of an intervention program for the control of ARI in children.

Lye, M. S., Nair, R. C., Choo, K. E., Kaur, H., Lai, K.P.F. (1996) **Acute respiratory tract infection: A community-based intervention study in Malaysia.** *J of Tropical Pediatrics*, 42(3), 138-143.

A community-based intervention trial was conducted in Kelantan, Malaysia with the aim of reducing severe acute respiratory tract (ARI) infection in children. Interventions included health education of mothers on childhood pneumonia and training of health staff on case management. In a house-to-house survey 1382 and 1107 children less than 5 years of age in the intervention and control areas, respectively, were followed up every 2 weeks over a 62-week period. The reduction in the incidence of severe ARI cases in the intervention area was significantly greater than in the control area ( $P < 0.05$ ). The ARI mortality rates were low in both the intervention and control areas ( $< 0.1\%$ ). Our results indicate that with relatively inexpensive methods and simple interventions, reduction of severe ARI may be effectively achieved. This has important implications for an ARI control programme in Malaysia and other developing countries.

MacNaughton, S. J., Jenkins T. L., Alugupalli, S., and White, D. C. (1997) **Quantitative Sampling of Indoor Air Biomass by Signature Lipid Biomarker Analysis: Feasibility Studies in A Model System.** *American Industrial Hygiene Assoc. J*, 58(4), 270-277.

Standard methods for characterizing the microbial content of indoor air rely on detection of viable microbes that are collected in water or impacted onto growth substrata. Viable counts consistently underestimate microbial numbers in environmental samples by 90- 99.9 %. Assays of biochemical components characteristic of all cells provide assessment method independent of the ability to culture the organisms. This article provides evidence that lipid analysis provides quantitative recovery of known volumes of culturable bacteria. Monocultures of *Escherichia coli*, *Bacillus Subtilis*, and *Legionella bozemanii* and two mixtures of these organisms were deposited onto glass fiber filters using an air test stand constructed as a modification of the ASTM 1215 standard. Filter deposited biomass was determined by three methods : (1) viable count of bacteria sampled using an impinger, (2) phospholipid ester-linked fatty acid (PLFA) analysis, and (3) hydroxy fatty acid (OHFA analysis) . Sample efficiency and mechanical dehydration stresses to the bacteria during aerosolization could have caused the decreased culturable viable counts in comparison to PLFA analysis of viable cells. Signature lipid analysis provides insight into the community composition. Analysis of the glass filters after aerosolization showed that capture was not selective, and monocultures and mixtures gave the expected signature lipid patterns enabling differentiation between species.

Magnussen, H. (1990) **The effect of air pollution on patients with airway diseases.** *Pneumologie Sonderh [in German]*, 44(1), 387-389.

Maier, W. C., Arrighi, H. M., Morray, B., Llewellyn, C., and Redding, G. J. (1997) **Indoor Risk Factors for Asthma and Wheezing Among Seattle School Children.** *Environmental Health Perspectives*, 105(2), 208-214

Indoor risk factors for physician-diagnosed asthma and wheezing in the past 12 months without previous asthma diagnosis were assessed in a survey of parents of 5-9-year-old Seattle primary school students. Among the 925 respondents, 106 (11%) reported a physician diagnosis of asthma, 66 (7%) had wheezing without diagnosis, and 753 (82%) were asymptomatic. After adjusting for age, sex, gender, ethnicity, medical history, socioeconomic status (SES) and parental asthma status, an increased risk of physician diagnosis of asthma was associated with household water damage, the presence of one or more household tobacco smokers, and at least occasional environmental tobacco smoke (ETS) exposure. Similarly, an increased risk of wheezing in the past 12 months among children without

diagnosed asthma was associated with household water damage, presence of one or more household tobacco smokers, and occasional or more frequent ETS exposure. No increased risk of either condition was associated with gas, wood, or kerosene stove use, household mold, basement water, or wall/window dampness. Similarities in the indoor risk factors patterns between diagnosed asthma and wheezing without diagnosis suggested a similar etiology of these two conditions. The slightly higher association between ETS and asthma may indicate that parents of diagnosed asthmatics were more conscious of ETS, and were more likely to prohibit household smoking by resident smokers. Future research is needed to quantify which aspects of household water damage are related to respiratory illness. Key words: asthma, childhood, environmental tobacco smoke, gas stove, household dampness, wheezing.

Objectives: To evaluate the diagnostic accuracy of the clinical examination in detecting hypoxemia in infants with lower respiratory tract illness. Design: Cross-sectional study. Setting: Three university pediatric outpatient departments and one private pediatric practice. Patients: Healthy infants less than 1 year of age seen between December and March 1989 and 1990, with symptoms suggesting acute lower respiratory tract illness. Main outcome measures: The test characteristics of 27 elements of the clinical examination, as well as the accuracy of the overall examination and the components of the examination in detecting oxygen saturation  $\leq 95\%$  measured by pulse oximetry. Reliability of clinical examination findings. Results: None of the 27 clinical findings had sensitivities that would make them useful diagnostic tests for hypoxemia. By combining all the clinical findings, however, we found good diagnostic accuracy (area under the receiver operator characteristic curve 0.90). Three groups of clinical findings-social interactiveness, respiratory effort, and physical appearance-accounted for much of the diagnostic accuracy of the examination. Auscultatory findings contributed little. In these three groups, five clinical findings accounted for almost all the accuracy: attentiveness, consolability, respiratory effort, color, and movement. Together, these findings also had good accuracy (area under the receiver operator characteristic curve 0.95). Conclusions: A small number of clinical observations may be mostly responsible for the diagnostic value of the clinical examination of infants with symptoms of LRI. Concentrating on a limited group of findings appears to enhance the accuracy of the examination in detecting hypoxemia.

Martin, B. W., Ackermann-Liebrich, U., Leuenberger, P., Kunzli, N., *et al.* (1997) **SAPALDIA: Methods and participation in the cross-sectional part of the Swiss Study on Air Pollution and Lung Diseases in Adults.** *J Soz- Praventivmed*, 42 (2), 67-84.

SAPALDIA - the Swiss Study on Air Pollution and Lung Diseases in Adults - focuses on the long term health effects of low to moderate levels of air pollutants as typically seen in different parts of Switzerland. The aim of the SAPALDIA cross-sectional study carried out in 1991 was to determine the prevalence of bronchial asthma, chronic bronchitis and allergic conditions in the adult population of Switzerland and to identify and to determine the respective importance of potentially influencing factors. These could be both personal (smoking habits, allergy status, family history, occupation) and environmental (outdoor and indoor pollution, aeroallergens, climate). A further aim of the cross-sectional study consisted in the identification of individuals susceptible to present symptoms during a two year observation period and to be included in the SAPALDIA follow-up study. This technical report represents the methodological documentation for the cross-sectional study of SAPALDIA. The instruments and the methods of standardisation are presented and discussed. The medical examination consisted of a computerised interview using a standardised questionnaire, the taking of a blood sample for serological tests, allergy skin testing, the measurement of end-expiratory CO and body height, and pulmonary function testing followed by methacholine challenge testing or bronchodilatation testing. The pattern of participation and the 9651 participants of the study, representing 59.3% of the sample, are described. Based on information on non-participants gained by telephone interviews and mailed short questionnaires, possible selection biases are quantified and discussed.

A number of epidemiologic studies have emphasized the relationship between air pollution and the frequency of respiratory symptoms in patients with underlying airway diseases. On the basis of acute controlled exposure studies, SO<sub>2</sub> causes transient airflow obstruction in patients with asthma, but not necessarily in patients with bronchitis or lung fibrosis. The photochemical oxidants (ozone, NO<sub>2</sub>) induce an increase in airway responsiveness, ozone being of greater potential hazard than NO<sub>2</sub>. These effects have been described for healthy subjects and asthmatics. Acid aerosols may produce transient bronchoconstriction in asthmatics. In general, the harmful effects of polluted air will first affect the most sensitive persons in the population, such as asthmatics.

Martinez, H., Suriano, K., Ryan, G. W., and Pelto, G. H. (1997) **Ethnography of acute respiratory illnesses in a rural zone of the Mexican central highlands.** *Salud Publica de Mexico*, 39(3), 207-216.

Objective was to identify the terms used by mothers to refer to diseases, signs and symptoms related to acute respiratory illnesses (ARI), alarming signs which should motivate them to seek medical attention, and to describe common home practices of disease care and treatment. Material and methods. An ethnographic study was performed in six rural communities of the Mexican central highlands. Interviews were collected from 12 key informers, six mothers of children who had died from ARI and 24 mothers of children younger than five years of age, with several ethnographic techniques to complement information ('triangulation'). Results. The most commonly identified diseases were cold, sore throat, cough, bronchitis, pneumonia and 'broncomonia'. Key signs to establish diagnosis included nasal discharge, sore throat, cough, head and body ache, fever, 'bubbling' chest, general malaise and shortness of breath. Tachypnea was referred to as 'strong breathing', 'much breathing', 'rapid breathing' or 'sizzle'; intercostal depression as 'the chest sinks', stridor as 'chest moan or chest snore', sibilance as 'chest snore' and cyanosis as 'he turns purple'. Home treatments include herbal teas, lemon, green or red tomato or potato applied to the throat externally, as well as creams applied to chest or back. Antibiotic prescription was not common, contrary to antipiretics. Most mothers recognized mild illnesses: severe illnesses were recognized less frequently. Then faced with a severe ARI, mothers sought attention firstly at The project clinic, second in frequency with a private physician in the capital of the province and then at the Health Ministry of the district. The reasons to choose these possibilities were mainly proximity and lower costs. Conclusions: This information can be useful to improve communication with mothers.

Matkovic, V., Kontosic, I., Grubisic-Greblo, H., Matkovic, N., and Micovic, V. (1995) **The effects of air pollution on ventilatory lung functions.** *Arh Hig Rada Toksikol*, 46(2), 225-236.

The prevalence of chronic bronchitis was studied among female subjects aged 18-63 years from three areas with different ambient air quality: Bakar and Krasica with SO<sub>2</sub> concentrations above the WHO guideline and Viskovo where the SO<sub>2</sub> concentrations were below the guideline. The subjects were examined and administered a questionnaire. Differences in their ventilatory lung functions were tested and related to air quality. The subjects from the two regions with a higher pollution level had lower FVC and FEV<sub>1</sub> values than those from the Viskovo region. However, no statistically significant differences in the prevalence of chronic bronchitis between the subjects from regions with different ambient air quality were found. The same applies to the occurrence of pathological restrictive ventilation disturbances. In the Krasica region the occurrence of pathological obstructive ventilatory disturbances was significantly higher than in the Viskovo and Bakar regions; a correlation between the duration of residence and ventilatory lung function was also observed.

McCracken, J., and Smith, K. (1997). **Emissions and efficiency of improved cookstoves in Guatemalan Highlands.** (Submitted to Environmental Pollution Oct. 1997)

A comparison was made of the thermal efficiency and emissions of traditional three-stone fire and the "Plancha Mejorada" improved stove burning wood. Simultaneous measurements of efficiency and emissions of suspended particulates and carbon monoxide (CO) were taken in order to incorporate both of these factors into a single standard of performance emissions per standard task. These factors were measured during both a Water Boiling Test (WBT) and a Standardized Cooking Test (SCT). No statistical difference in efficiency between the Plancha and traditional stove was found. The Plancha required more time to perform both of the tests, and this difference was statistically significant ( $p=0.048$ ) for the WBT. The Plancha emitted 87% less suspended particles less than 2.5 $\mu$ m in diameter (PM<sub>2.5</sub>) and 91% less CO per kJ of useful heat delivered compared to the open fire during the WBT. The relative environmental performance of the Plancha improved during the SCT, resulting in a 99% reduction of total suspended particulates (TSP) emissions and a 96% reduction of CO emissions per standardized cooking task. A strong correlation ( $r^2 = 0.87$ ) was found between the average kitchen concentrations of CO and PM<sub>2.5</sub> during the Water Boiling Tests, indicating the usefulness of CO measurements as an inexpensive and accurate way of estimating PM<sub>2.5</sub> concentrations.

Meister R. (1990) **Environmental pollutants and passive smoking [Allgemeine Umweltnoxen Und Passivrauchen]**. *J Pneumologie Sonderh*, 44 (1), 378-386.

Epidemiological studies - especially data from smog episodes - indicate that anthropogenous outdoor air pollution exercises a deleterious effect on health and particularly on the respiratory organs. Controlled exposure tests in animals and man confirm this. The main pollutants are SO<sub>2</sub>, suspended dust particles (dust aerosols or solid atmospheric condensation nuclei) as well as NO<sub>2</sub> (NO(x)) and O<sub>3</sub>. The adverse influence of quite a number of meteorological factors such as low temperature and inversion cannot be denied. During smog conditions in January 1985 in the Federal Republic of Germany there was a highly significant negative correlation between atmospheric temperature and the rate of exacerbations of bronchitis. Indoor air pollution is gaining in importance. Airtight sealing of buildings associated with reduced indoor ventilation results in novel health upsets ('sick building syndrome'). Interiors are characterised by an accumulation of CO<sub>2</sub>, CO, NO<sub>2</sub>, dust aerosols and various organic substances such as benzene, benzpyrene, formaldehyde, nitrosamines etc. Cigarette smoke is a frequent cause of indoor air pollution. The possible unhealthy effects of passive smoking (mainly the inhalation of sidestream smoke) have been frequently studied. Infants of smoking parents are more often affected by respiratory diseases than non-exposed children. The same applies to schoolchildren: the incidence of bronchial signs and symptoms increases with increasing smoke consumption of the parents. However, no definitely established effect on lung function has been seen in children, adults and asthmatics. The important question as to whether passive smoking increases lung cancer risk is still a subject of controversial discussion among experts.

Melia, R. J. W., Florey, C. du V., Altman, D. G., and Swan, A. V. (1977) **Association between gas cooking and respiratory disease in children**. *Br Med J*, 2, 149-152.

Melia, R. J. W., Florey, C. du V., and Chinn, S. (1979) **The Relation between Respiratory Illness in Primary Schoolchildren and the Use of Gas for Cooking. I -- Results from a National Survey** *Int J Epidemiol*, 8, 333-338.

The relation between the prevalence of respiratory illness and use of gas for cooking in the home has been investigated in a 5 year longitudinal study of primary schoolchildren from England and Scotland. 4827 boys and girls aged 5 to 10 years from 27 randomly selected areas were examined in 1977, the last year of the study. The prevalence of one or more respiratory symptoms or diseases was higher in children from homes where gas was used for cooking than in those from homes where electricity was used.

Melia, R. J. W., Florey, C. du V., Morris, R. W., Goldstein, B. D., John, H. H., Clark, D., Craighead, B., and Mackinlay, J. C. (1982) **Childhood Respiratory Illness and the Home Environment II. Association between Respiratory Illness and Nitrogen Dioxide, Temperature and Relative Humidity.** *Int J Epidemiol*, 11, 164-69.

The relation of respiratory illness to nitrogen dioxide (NO<sub>2</sub>), temperature and relative humidity in homes with a gas cooker was investigated in five and six year old children living in an urban area of northern England. NO<sub>2</sub> was measured for one week in the child's bedroom and living room of each home, and temperature and relative humidity were measured in the bedroom only.

Mitra A. K., Akramuzzaman, S. M., Fuchs, G. J., Rahman, M. M., Mahalanabis D. (1997) **Long-term oral supplementation with iron is not harmful for young children in a poor community of Bangladesh.** *J of Nutrition*, 127(8), 1451-1455.

The effect of long-term oral iron supplementation on morbidity due to diarrhea, dysentery and respiratory infections in 349 children, aged 2-48 mo, living in a poor community of Bangladesh, was evaluated in this double-blind study. The treatment group received 125 mg of ferrous gluconate (15 mg elemental iron) plus multivitamins and the controls received only multivitamins, daily for 15 mo. House-to-house visits were made on alternate days by trained community health workers for recording symptoms and duration of illnesses and for monitoring medicine intake. Seventy-six percent of the children continued the syrup for over 1 y. No untoward effects were noticed in either treatment group. The attack rates for diarrhea, dysentery and acute respiratory tract infections (ARI) were 3, 3 and 5 episodes per child per year, respectively. Each episode of diarrhea lasted a mean of 3 d, and those of dysentery and ARI, 5 d. The two treatment groups did not differ in the number of episodes, mean duration of each episode, or total days of illnesses due to diarrhea, dysentery and ARI. However, a 49% greater number of episodes of dysentery was observed with iron supplementation in a subset of the study children who were less than 12 mo old (P = 0.03). The results of this study suggest that long-term oral iron supplementation is not harmful for older children in a poor community. Further studies are needed to demonstrate the safety and efficacy of iron administration in young infants.

Mizuta, K., Oshitani, H., Saijo, M., Mpabalwani, E. M., Kasolo, F. C., Suzuki, H., and Numazaki, Y. (1997) **Epidemiology of influenza virus infections in children with acute respiratory infections in Zambia.** *Annals of Tropical Pediatrics*, 17(2), 115-119.

A viral aetiological and epidemiological study of acute respiratory infections (ARI) in children was carried out in Lusaka, Zambia between June 1993 and September 1995. A total of 3760 throat swab specimens were collected for virus isolation from children under 5 years of age who had ARI and were attending three health centres in Lusaka. Between June and November 1993, 52 cases of the influenza A/H3N2 viruses were isolated. Between May and July 1994, 34 influenza B cases were isolated. In 1995, one A/H3N2 influenza virus was isolated in January and then the same type of influenza virus was isolated from 55 samples between June and August. The isolation rate of influenza virus was highest at 14.3% (20/139) in August 1993, at 15.1% (18/119) in June 1994 and at 25.4% (43/169) in July 1995. This is the first report of a consecutive study of influenza virus infections in Zambia and the results reveal that influenza virus infections are one of the most important pathogens of ART in children in the cool, dry season (June-August) in this country.

Moxon, E. R., and Wilson, R. (1991) **The role of Haemophilus influenzae in the pathogenesis of pneumonia.** *Rev Infect. Diseases*, 13(Supplement 6), S518-S527.

*Haemophilus influenzae*, one of the bacteria comprising the commensal flora of the human upper respiratory tract, is also pathogenic and causes both localized and invasive (septicemic) infections. The major focus of attention and research has been on infections caused by serotype b organisms, which cause several life-threatening illnesses in children, including meningitis and acute respiratory infection (ARI; e.g., epiglottitis, pneumonia). Type b polysaccharide-protein conjugate vaccines are at an advanced stage of development and implementation; however, these vaccines will not protect against noncapsulated (nontypable) strains of *H. influenzae* or strains expressing capsular polysaccharides other than serotype b, strains which cause a substantial proportion of ARI (especially pneumonia) among infants, particularly in developing countries. The magnitude of this problem, which contributes to many thousands - perhaps millions - of deaths each year, emphasizes the need for research on the epidemiology, pathogenesis, virulence factors, immune mechanisms, and forms of treatment relevant to ARI caused by *H. influenzae* in infants and implies that such studies should be given a high priority.

Muhe L. (1996) **Mothers' perceptions of signs and symptoms of acute respiratory infections in their children and their assessment of severity in an urban community of Ethiopia.** *Annals of Tropical Medicine*, 16(2), 129-135.

Standard case management strategy has been recommended to reduce the high mortality rate in children with acute respiratory infections (ARI). Appropriate case management has been shown to prevent such deaths, but only if families recognize signs of possible pneumonia and seek care promptly from a trained health worker. The purpose of the present study was to assess mothers' perception and interpretation of ARI signs and symptoms in relation to that of a physician in an urban community in Addis Ababa. Two hundred and twenty-two mothers who brought their children to hospital with cough or difficulty in breathing and an equal number of control mothers were studied. Most mothers did not recognize these signs, including the key signs of pneumonia-rapid breathing and chest indrawing. While it was shown that between two physicians there was good agreement on kappa values above 70% for most ARI signs, there was little agreement between physicians and mothers or between mothers whose children came for ARI problems and mothers of hospital controls. The few mothers who recognized these signs did not interpret them as serious. The study concludes by recommending intensive health education and further ethnographic studies on community beliefs about ARI in children, with particular emphasis on documentation of the terms, signs and symptoms by which families recognize the illness.

Muhling, P., Bory, J., and Haupt, H. (1984) **Effects of air pollution on respiratory tract diseases in young children. Morbidity rate in residual areas with varying degrees of pollution.** *Fortschr. Med*, 102(34), 831-834.

In a retrospective study of hospitalised patients (children aged between 0 and 4 years) covering four years the dependence of the incidence of croup (infectious laryngitis) and obstructive bronchitis on air pollution was investigated. For this reason the incidences of morbidity in residual areas with various levels of SO<sub>2</sub> and sedimenting dust were compared. The results show a definitive connection between a high level of SO<sub>2</sub> and dust, and a high rate of morbidity. This connection was particularly marked in areas with simultaneous high levels of both SO<sub>2</sub> and dust. The effects of confounding factors, such as infection incidence, meteorological influences, distances from hospital, social status, especially the percentage of foreign worker's families and population density were investigated and separated from air pollution effects.

Mumford, J. L., He, X. Z., Chapman, R. S., Cao, S. R., Harris, D. B., Li, X. M., Xian, Y. L., Jiang, W. Z., Xu, V. W., Chuang, J. C., Wilson, W. E., and Cooke, M. (1987) **Lung cancer and indoor air pollution in Xuan Wei, China.** *Science*, 235, 217-230.

In Xuan Wei County, Yunnan Province, lung cancer mortality is among China's highest and, especially in females, is more closely associated with indoor burning of "smoky" coal, as opposed to wood or "smokeless" coal, than with tobacco smoking. Indoor air samples were collected during the burning of all three fuels. In contrast to wood and smokeless coal emissions, smoky coal emission has high concentrations of submicron particles containing mutagenic organics, especially in aromatic and polar fractions.

Mumford, J. L., Lewtas, J., Williams, K., Tucker, W. G., and Traynor, G. W. (1992) **Mutagenicity of organic emissions from unvented kerosene heaters in a chamber study.** *J Toxicol Environ Health*, 36 (2), 151-9.

A study was conducted to assess the mutagenicity of semivolatile organics and particle-bound organics emitted from unvented kerosene space heaters. The units tested included a well-tuned radiant heater and a maltuned convective heater. The tests were conducted in a 27-m<sup>3</sup> chamber with a prescribed on/off heater usage pattern. The organic emissions were collected on Teflon-coated glass filters backed by XAD-2 resin. The dichloromethane-extractable organics from both the filters and the XAD were analyzed for nitropolycyclic hydrocarbons using gas chromatography/mass spectrometry, and were bioassayed for mutagenicity in microsuspension assays using *Salmonella typhimurium* strains TA98 with and without S9 and TA98NR (a nitroreductase-deficient strain) without S9. The results showed that both the semivolatile and particle-bound organics emitted from the kerosene heaters were mutagenic, and the presence of nitropolycyclic hydrocarbons in these organic emissions substantiated these findings.

Nicolai T. (1997) **Epidemiology of pollution-induced airway disease: Urban/rural differences in East and West Germany.** *Allergy Eur J Allergy Clin Immunol Suppl.* 52(38), 26-29.

The prevalence of asthma and allergic disorders was assessed in 9-11 year-old children in Leipzig and Halle in East Germany, as well as in Munich, West Germany. Both East German cities are heavily polluted due to private burning of coal and industrial emissions, while Munich has low smoke emissions but heavy road traffic. All fourth grade pupils in Munich were compared with those in Leipzig and Halle. Non-specific airway disease (bronchitis), cough, and autumn/winter nasal symptoms were most prevalent in Leipzig and Halle. Hay fever and skin test reactivity to aeroallergens were higher in West Germany compared with East Germany. Furthermore, the prevalence of asthma was also higher in the West German study area. Increased skin prick test reactivity in the West explained the increased prevalence of asthma. Longitudinal analysis showed increased respiratory symptoms on days with high mean levels of sulphur dioxide and oxides of nitrogen, as well as on days with a high peak level of 10 ( $\mu$ ) respirable particles (PM10) in East Germany. The effects of these pollutants were additive. Exposure to heavy road traffic in Munich was related to decreased pulmonary function and non-specific airway symptoms, but not to allergic sensitization and asthma.

Nolte D. (1994) **Chronic bronchitis - A widespread disease of multifactorial origin**TITLE: **Chronic bronchitis - A widespread disease of multifactorial origin.** *Atemwegs- Lungenkr.*, 20(5), 260-267.

Norpoth, K. (1997) **Latest information on the interaction between environment and airway diseases exercising an influence on the legal assessment of occupational obstructive airway diseases as an occupational disease.** *Zentralbl. Arbeitsmed. Arbeitssch. Ergonomie*, 47(5) 200-204.

Obstructive airway diseases can be induced and influenced by the exposure at the workplace as well as by numerous environmental factors. Tobacco smoke, but also industrial gases, vapours and dusts can



induce chronic bronchitis and emphysematous bronchitis. They all may exercise an unfavourable influence on asthmatic diseases, which could be proved for NO<sub>x</sub>, SO<sub>2</sub>, ozone, diesel soot and asbestos fibres. Although these environmental noxae seem to be of no causal importance as regards bronchial asthma, they have to be taken into account within the framework of preventive measures because of the increasing incidence rate of this disease in highly industrialized regions.

**NOX-Modelling and Experimental Results from Wood Stove Combustion**, in *Developments in Thermochemical Biomass Conversion*, Blackie Academic & Professional, 1462-1476.

Based on cross-sectional and longitudinal epidemiologic studies prevalence, natural history and mortality of chronic bronchitis ('descriptive epidemiology') as well as the significance of main risk factors as cigarette smoking, occupational dust exposure, age, sex or air pollution ('analytical epidemiology') are discussed in detail.

Ogston, S. A., Florey, C. du V., and Walker, C. H. M. (1985) **The Tayside infant morbidity and mortality study: Effect on health of using gas for cooking.** *Br Med J*, 290: 957-60.

The relation between respiratory illness and the use of gas for cooking was examined from data on 1565 infants born to mothers who were primigravidas living in Dundee in 1980. Episodes of, and admissions to hospital for, respiratory illness were recorded during the first year of life. Both admissions and episodes were more common in infants from families using gas for cooking or heating than in infants from families using any other type of cooking or heating, but the differences were not significant.

Ono, M.; *et.al.* (no date) **Epidemiological studies of air pollution and health effects in areas near roadways with heavy traffic in Tokyo**, Environmental Health Sciences Division, National Institute for Environmental Studies.

Recent concern regarding health effects of air pollution in Japan has concentrated mainly on traffic-induced air pollution and its health effects in large cities. In Japan, where many people in large cities have been living near major roadways, the increase of automobile exhaust due to heavy traffic congestion will predictably cause a greater impact on people living near major roadways. We surveyed the characterization of residential suspended particulate matter (SPM) and nitrogen dioxide (NO<sub>2</sub>) concentrations along the major roadways in Tokyo, along with a health survey on the respiratory conditions of residents living in the same area, to examine the relationships between indoor pollutant levels, prevalence of respiratory symptoms and distance from roadways. The environmental monitoring was conducted in five phases. Using a newly developed SPM sampler and NO<sub>2</sub> filter badge, continuous 4 day (96 hours) measurements were conducted in two hundred residential homes for four weeks. NO<sub>2</sub> was measured in the living room, kitchen and outside of each home, while SPM was monitored in the living room. Health information was collected in October 1987 using ATS-DLD self-administered questionnaires. Of the 1,093 homes investigated, responses from 805 homes were received. The following results were obtained. SPM and NO<sub>2</sub> concentrations showed large variations. Indoor pollution levels mostly depended on indoor sources, i.e. cigarette smoking and unventilated space heaters, and the effects of those indoor sources were influenced by the building structure with respect to air tightness. An association between increase in pollutant levels and the distance from the roadway was observed. However its effect is small compared to indoor source effects. The prevalence rate of respiratory symptoms was higher in those areas nearest roadways with heavy traffic both in children and adults. These results suggest the presence of a relationship between automobile exhaust and health effects.

Ory, F. G., Rahman, F. U., Katagade, V., Shukla, A., and Burdorf, A. (1997) **Respiratory Disorders, Skin Complaints, and Low-Back Trouble Among Tannery Workers in Kanpur, India.** *American Industrial Hygiene Association J*, 58, 740.

Abstract: In a cross-sectional survey health complaints among 418 laborers in 15 Indian tanneries were studied. Low-back pain (61%), asthma (38%), dermatitis (23%), and chronic bronchitis (14%) were the most frequently reported complaints in the 12 months prior to the survey. In general, beam house workers reported the highest prevalence but only chronic low-back pain was significantly elevated compared with workers in the finishing departments. When using individual exposure estimates, clear associations were presented among manual lifting over 20 kg and low-back pain (OR = 3.5) and skin exposure and dermatitis (OR = 2.6). Frequent lifting of loads was also associated with self-reported asthma. About 44% of the laborers reported at least one period of sickness absence, and 17% were involved in a serious occupational accident that required a visit to the local physician. Logistic regression analysis showed that sickness absence occurred more often in small tanneries (OR = 2.7) and also was significantly associated with low-back pain (OR = 3.3) and occupational accidents (OR = 2.2). This epidemiologic survey on health complaints in tannery workers is among the few in occupational populations in low-income countries. For many reasons these populations are easily overlooked. The results of this descriptive study indicate that there is a clear need for epidemiologic surveys in these countries to obtain information on working conditions and associated health problems.

Osinusi, K., and Oyejide, C. O. (1990) **Child care practices with respect to acute respiratory tract infection in a poor, urban community in Nigeria.** *Rev Infect Dis*, 12 (Suppl. 8), S1039-S1041.

A longitudinal study conducted over a 3-year period in a poor, urban community in Nigeria, a developing country, found that acute respiratory tract infection (ARI) was common, in particular among infants and boys. Between 81% and 95% of the children treated for ARI over the 3-year period were brought to the clinic by their mothers. About 32% of these children had been treated with cough medicines, 42% with antipyretics, 5% with antibiotics, and 10% with hematinics before they were brought to the clinic. The source of such medications included medicines left over from previous prescriptions and those bought from chemists' shops and street vendors. Up to 64% of the children treated for ARI had been force-fed local herbal teas by their mothers; herbal teas were used for both preventive and curative purposes.

Oyejide, C. O. and Oke, E. A. (1995) **An ethnographic study of acute respiratory infections in four local government areas of Nigeria.** *Afr J Med Med Sci*, 24 (1) 85-91.

An ethnographic study was conducted in four local government areas of Nigeria. The techniques of informal unstructured interviews and participant observation were used. A total of 104 focus group discussions with 53 groups of mothers, 21 groups of grandmothers, and 30 groups of fathers were conducted. Perception of causes of ARI ranged from cold water, to heredity, poor hygiene, exposure to smoke and dust and the supernatural forces. Preventive measures described were related to the perceived causes. For those groups that discussed home remedies to the treatment of ARI, the remedies described for cough included herbal drinks (39% of groups); honey with lemon (19.5%); eating specific vegetables believed to relieve cough (8.4%); and preparations containing palm oil (21.7%). Remedies described for measles included herbal drinks (62%); local tropical creams (24%); and palm wine (13.7%). Those for ear infections included drops of herbal mixtures in the ear (29.4%); putting various type of oil in the ear (38%); plugging the ear with cotton wool previously dipped in honey, or alcohol (17%). The findings of this study have implications for the Health Education Component of the National ARI Control Program which Nigeria recently embarked

upon. There is also the need for research on the efficacy and any possible adverse effects of identified home remedies.

Melia, R. J. W., Florey, C. du V., Altman, D. G., and Swan, A. V. (1977) **Association between gas cooking and respiratory disease in children.** *Br Med J*, 2, 149-152.

A four-year longitudinal study of the prevalence of respiratory symptoms and disease in schoolchildren and reported environmental and socio-economic factors is in progress. We report results for the first year of this study (1973). A total of 5758 children aged 6 to 11 years from 28 randomly selected areas of England and Scotland were examined. In an analysis of the effects on health of possible indoor pollutants, boys and girls from homes in which gas was used for cooking were found to have more cough, "colds going to the chest", and bronchitis than children from homes where electricity was used. The girls also had more wheeze if their families used gas for cooking.

Padmavati, S. and Aora, R. (1976) **Sex differences in chronic cor pulmonale in Delhi.** *Br J Dis Chest*, 70, 251-259.

Chronic cor pulmonale is more prevalent in northern India than in the south. It is equally common in men and in women and accounts for 20% of all admissions for heart disorder in Delhi. In a study of 766 patients (239 men and 527 women) carried out over a 15-year period there were some striking sex differences. Some 75% of men and 10% of women smoked. The women came from the poorest class and all of them cooked from an early age over smoky and primitive fireplaces in ill-ventilated huts.

Pandey, M. R., Neupane, R. P., Gautam, A., and Shrestha, I. B. (1989) **Domestic smoke pollution and acute respiratory infections in a rural community of the hill region of Nepal.** *Environ Int*, 15(1), 337-340.

Acute respiratory infections (ARI) are the cause of death for at least five million children per year under five years of age. Most of these deaths occur in developing countries. Domestic smoke pollution is very common in many parts of the developing world, and appropriate technology, such as smokeless stoves, is available to reduce this type of pollution. The present study has been undertaken in a rural community of the hill region of Nepal to find out if there is any association between domestic smoke pollution and ARI in infants and children younger than two years of age. This preliminary study showed that episodes of moderate and severe ARI increased with increases in the level of exposure to domestic smoke pollution, thus suggesting domestic smoke pollution to be an important, preventable risk factor of ARI.

Pandey, M. R., Sharma, P. R., Gubhaju, B. B., Shakya, G. M., Neupane, R. P., Gautam A., and Shrestha, I. B. (1989) **Impact of a pilot acute respiratory infection (ARI) control programme in a rural community of the hill region of Nepal.** *Ann Trop Paediatr*, 9(4), 212-220.

A prospective study was conducted to determine the magnitude of morbidity and mortality caused by acute respiratory infection (ARI) among children under 5 years of age and to assess the feasibility of reducing mortality owing to ARI by the use of community health workers. Villages selected for this study were situated on the south-west edge of Kathmandu Valley, about 24 km from the city centre. The study group consisted of 1,019 children under the age of 5 years at the beginning of the study and followed for 3 years. During the 1st year, baseline information was collected. During the 2nd and 3rd years, intervention measures (health education, immunization and antibiotics for children with signs suggesting pneumonia) were taken and their effect assessed. There was a 59% reduction in the ARI-specific death rate among study children between surveillance year and intervention year I and a further 25% reduction in the ARI-specific death rate between intervention years I and II. Despite a substantial

reduction in ARI mortality with the interventions, there was still an unacceptably high mortality from chronic diarrhoea, malnutrition and other factors. This implies that the programme to control ARI, diarrhoea, malnutrition and immunizable diseases should be integrated into one, within the framework of a primary health care strategy.

Paoletti P. (1995) **Application of biomarkers in population studies for respiratory non-malignant diseases.** *Toxicology*, 101(1-2), 99-105.

Though the use of biomarkers has been mainly suggested for cancer studies, the possibility of its use in non-malignant disease is considered. Markers of internal dose, markers of biologically effective dose and markers of early biological effect have been typically used in basic research and, more recently, in epidemiology to characterize genotoxic carcinogenic agents. These markers (e.g. adducts to DNA or proteins) may be used mainly in the presence of chronic exposure to toxic agents (e.g. benzene or benzopyrene), additional markers such as carboxyhemoglobin, expired air to measure various VOC and heavy metals in biological fluids are also considered in the paper. Since airway obstructive disease (asthma, chronic bronchitis, emphysema) are the main disorders influenced by environmental factors (including air pollution), markers of individual susceptibility, such as atopy increased responsiveness of airways, initial level of lung function, must be considered for a more precise evaluation of the relationship between environmental exposure and health effects. Currently, the application of the determination of markers of exposure

in non malignant disorders is very limited. In fact, the relationships between acute adverse respiratory effects and the exposure to air pollutants appears difficult since markers for common air pollutants are not available, and their detection appears difficult in acute conditions. Characterization of long term exposure may be performed in organ fluids (blood, urine, saliva) however it is important to recognize that concentration at that level may not reflect that observed in the target organ (e.g. lung).

Parker, R. L. (1987) **Acute respiratory illness in children: PHC responses** *Health Policy Planning*, 2(4), 279-288.

Acute respiratory illness (ARI) is one of the major health problems and killers of young children. Along with diarrhoea, immunizable diseases, malnutrition and antenatal and intranatal insults, ARI contributes to about 75% of child mortality in developing countries. Evidence is clear that much of the mortality and morbidity from ARI is preventable. Specific efforts to decrease risks of ARI have been proposed and the development of new vaccines is being pushed. The use of antibiotics for lower respiratory tract infections is well accepted and of known efficacy in bacterial infections. The evidence from developing countries demonstrating that a high proportion of pneumonias involve bacterial infection and the documentation of the effectiveness of simple antibiotic regimens have convinced many that the time is ripe to introduce control efforts for ARI much more actively into primary health care programmes. This involves a number of controversial issues including making antibiotics more available at the primary care level, special training of health care workers to give injections, potentials for misuse and development of antibiotic resistance. But the deaths of 4 million children a year demand that we move as rapidly into this programme as possible, all the while striving to identify more effective approaches.

(1998) **Passive Smoke Linked to Abnormal HDL in Children** (editorial), *Environmental Health Perspectives*, 106(1), January.

Environmental, or passive, cigarette smoke has been linked with a number of serious health problems in children including upper respiratory infections, chronic cough, asthma, chronic ear infections, and sudden infant death syndrome. Now it appears that exposure to environmental tobacco smoke may also cause children with abnormal cholesterol levels--already at risk for future heart disease--to be even more likely to develop the disease at some point. A study published in the 2 September 1997 issue of

Circulation showed that children who were exposed to environmental cigarette smoke at home had high-density lipoprotein (HDL) cholesterol levels that were as much as 10% lower than those of children who came from nonsmoking households. The findings also suggest that a child's HDL level can be raised by 10% if the smoky environment is cleaned up. The study was conducted by Ellis J. Neufeld, director of clinical hematology at Boston Children's Hospital, and colleagues, who examined a group of 103 children aged 2-18. With high cholesterol, and most of them had family members in the early stages of coronary disease. A remarkable correlation between tobacco smoke exposure and HDL levels emerged. Just over one-fourth of the children lived in households where some cigarette smoking was reported. It was unknown exactly how much smoke the children encountered in their homes, but one thing seemed clear: the children from smoking households had HDL levels averaging 38 milligrams per deciliter (mg/dl) of blood, compared to HDL levels averaging 43 mg/dl for children from nonsmoking households. Because the study subjects all had some form of cholesterol abnormality, it is not possible to extrapolate the findings to all children. The next step will be to replicate the study with the goal of quantifying the amount of actual smoke exposure received by each study subject. Comparison of fluctuations in cotinine levels and blood HDL levels could therefore establish that a correlation exists between the occurrence of the two substances. Cholesterol disorders are largely hereditary. Since 1991, Neufeld says, the clinic has urged its young patients' parents to stop smoking within the house. Indeed, according to a study published in the *Environmental J* in 1986, it takes approximately two weeks for the nicotine to clear out of the air in a room where people have smoked.

Pelletier, D. L., Frongillo, Jr., E. A., Schroeder, D. G., and Habicht, J. P. (1995) **The effects of malnutrition on child mortality in developing countries.** *Bulletin of the World Health Organization*, 73(4), 443-448.

Conventional methods of classifying causes of death suggest that about 70% of the deaths of children (aged 0-4 years) worldwide are due to diarrhoeal illness, acute respiratory infection, malaria, and immunizable diseases. The role of malnutrition in child mortality is not revealed by these conventional methods, despite the long-standing recognition of the synergism between malnutrition and infectious diseases. This paper describes a recently-developed epidemiological method to estimate the percentage of child deaths (aged 6-59 months) which could be attributed to the potentiating effects of malnutrition in infectious disease. The results from 53 developing countries with nationally representative data on child weight-for-age indicate that 56% of child deaths were attributable to malnutrition's potentiating effects, and 83% of these were attributable to mild-to-moderate as opposed to severe malnutrition. For individual countries, malnutrition's total potentiating effects on mortality ranged from 13% to 66%, with at least three-quarters of this arising from mild-to-moderate malnutrition in each case. These results show that malnutrition has a far more powerful impact on child mortality than is generally appreciated, and suggest that strategies involving only the screening and treatment of the severely malnourished will do little to address this impact. The methodology provided in this paper makes it possible to estimate the effects of malnutrition on child mortality in any population for which prevalence data exist.

Pereira, L. A. A., Loomis, D., Conceição, G. M. S., Braga, A. L. F., Arcas, R. M., Kishi, H. S. Singer, J. M., Böhm, G. M., and Saldiva, P. H. N. (1998) **Association between air pollution and intrauterine mortality in São Paulo, Brazil,** *Environmental Health Perspectives*, 106, 325-329.

The associations among daily counts of intrauterine mortality and pollutant concentrations (NO<sub>2</sub>, SO<sub>2</sub>, CO, O<sub>3</sub>, and particulate matter <10 µm) were investigated for the period ranging from January 1991 to December 1992 in the city of São Paulo, Brazil. We used Poisson regression techniques, adjusted for season and weather. The association between intrauterine mortality and air pollution was strong for NO<sub>2</sub> (coefficient = 0.0013/µg/m<sup>3</sup>; p<0.01) but lesser for SO<sub>2</sub> (coefficient = 0.0005/µg/m<sup>3</sup>; p<0.10) and CO (coefficient = 0.0223/ppm; p<0.10). A significant association was observed when an index that combined these three pollutants was considered in the models instead of considering each pollutant

individually ( $p < 0.01$ ). These associations exhibited a short time lag, not over 5 days. In addition, some evidence of fetal exposure to air pollution was obtained by disclosing a significant association between the levels of carboxyhemoglobin of blood sampled from the umbilical cord and ambient CO levels in children delivered by nonsmoking pregnant women in the period from May to July 1995. Our results suggest that air pollution in São Paulo may promote adverse health effects on fetuses.

Peters, A., Döring, A., Wichmann, H. E., and Koenig, W. (1997) **Increased plasma viscosity during an air pollution episode: a link to mortality?** *Lancet*, 349, 1582-87.

Background Air pollution episodes have been consistently associated with increased mortality, and most strikingly with mortality due to cardiovascular disease. One hypothesis to explain this association is that inflammation of the peripheral airways caused by pollution might increase blood coagulability. We have tested this hypothesis in a cross-sectional study by comparing measurements of plasma viscosity during a severe episode of air pollution during 1985 with those made on less polluted days. Plasma viscosity was measured as part of the MONICA Augsburg survey during the winter of 1984-85 in 3256 randomly selected men and women aged 25-64 years. In January, 1985, high concentrations of sulphur dioxide (mean 200  $\mu\text{g}/\text{m}^3$ ) and total suspended particles (mean 98  $\mu\text{g}/\text{m}^3$ ) were recorded during a 13-day period in Augsburg. In men, the odds ratio for plasma viscosity above the 95th percentile of the distribution (1.38 mPa s) was 3.6 (95% CI 1.6-8.1) comparing measurements during the air pollution episode with non-episode measurements after adjustment for cardiovascular risk factors and meteorological variables. The corresponding odds ratio for women (95th percentile of plasma viscosity 1.37 mPa s) was 2.3 (1.0-5.3). High concentrations of carbon monoxide were also associated with increased plasma viscosity in women. During the 1985 air pollution episode, an increased risk of extreme values of plasma viscosity was observed in both men and women. Altered blood rheology due to inflammatory processes in the lung that induce an acute-phase reaction might therefore be part of the pathological mechanisms linking air pollution to mortality. *Lancet* 1997; 349: 1582-87

Peters, A., Dockery, D. W., Heinrich, J., and Wichmann, H. E. (1997) **Medication Use Modifies the Health Effects of Particulate Sulfate Air Pollution in Children with Asthma.** *Environmental Health Perspectives*, 105(4), 430-435.

Previous controlled studies have indicated that asthma medication modifies the adverse effects of sulfur dioxide ( $\text{SO}_2$ ) on lung function and asthma symptoms. The present report analyzed the role of medication use in a panel study of children with mild asthma. Children from Sokolov ( $n = 82$ ) recorded daily peak expiratory flow (PEF) measurements, symptoms, and medication use in a diary. Linear and logistic regression analyses estimated the impact of concentrations of sulfate particles with diameters less than 2.5  $\mu\text{m}$ , adjusting for linear trend, mean temperature, weekend (versus weekday), and prevalence of fever in the sample. Fifty-one children took no asthma medication, and only 31 were current medication users. Most children were treated with theophylline; only nine used sprays containing beta-agonist. For the nonmedicated children, weak associations between a 5-day mean of sulfates and respiratory symptoms were observed. Medicated children, in contrast, increased their beta-agonist use in direct association with an increase in 5-day mean of sulfates, but medication use did not prevent decreases in PEF and increases in the prevalence of cough attributable to particulate air pollution. Medication use was not a confounder but attenuated the associations between particulate air pollution and health outcomes. Key words: air pollution, asthma, asthma medication, beta2-agonist, children, particles, peak expiratory flow, respiratory symptoms, sulfates.

Pio, A., Leowski, J., and Luelmo, F. (1984) **Bases for WHO programme on acute respiratory infections (ARI) in children.** *Bull Int Union Tuberc*, 58(3-4), 199-208.

Because of the high incidence of acute respiratory infections in children and the associated high mortality, the development of control strategies in developing countries is essential to improving the quality of health and the life expectancy in the next two decades. Owing to the scarcity of specific and effective preventive measures and considering the huge discrepancy in case-fatality between children in developed and developing countries, the main immediate purpose of the WHO programme is to reduce mortality from ARI in children by proper recognition of severe cases and rational use of existing treatment.

Pisacane, A., Graziano, L., and Mazzeola, G. (1994) **Breast feeding and acute lower respiratory infection.** *Acta Paediatrica*, 83(7), 714-718.

The association between Breast feeding and acute lower respiratory infection was studied in a case control study in Southern Italy., Two groups of children were studied: the first group comprised of 73 infants aged 0-6 months, whose diagnosis was pneumonia or bronchiolitis; the second group included 88 infants less than 12 months of age with a diagnosis of pertussis-like illness. Control infants were two groups of infants admitted to the same ward. Compared with controls, infants in the first group were less likely to have been breast fed (odds ratio 0.42, 95% CI = 0.19 - 0.9). The protection conferred by breastfeeding was stronger among infants receiving human milk at the time of admission (odds ratio 0.22, 95% CI 0.09 - 0.55) and was absent among those infants who had stopped breast feeding for two or more weeks before admission. Among infants who were severely ill, breast feeding was less likely than among those with milder diseases. The results suggest that breast feeding has a strong protective effect against ALRI

Ponka A., and Virtanen M. (1994) **Chronic bronchitis, emphysema, and low-level air pollution in Helsinki, 1987-1989.** *Environmental Res*, 65 (2), 207-217.

The effects of low levels of air pollution and weather conditions on the number of patients admitted to hospitals for exacerbation of chronic bronchitis or emphysema (n = 2807) was studied in Helsinki during a 3-year period, 1987-1989. The daily number of admissions via the emergency room was significantly associated with prevailing levels of sulfur dioxide (SO<sub>2</sub>) and nitrogen dioxide (NO<sub>x</sub>) in Poisson regressions controlled for weather, season, time trends, and day of the week, whereas the total number of admissions (via the emergency room and otherwise) was not significantly associated with these pollutants. The effect of SO<sub>2</sub> was observed only among those under 65 years old; a significant peak of admissions was seen during the same day (RR, 1.31 for a 2.7-fold increase in SO<sub>2</sub>; 95% CI, 1.01-1.70; P = 0.039), and another after a 3-day lag (RR, 1.39; 95% CI, 1.05-1.86; P = 0.021). The effect of NO<sub>x</sub> was strongest after a 6-day lag and was significant only among those over 64 years old (RR, 1.31; 95% CI, 1.03-1.66; P = 0.022). The average of mean 24-hr concentrations of NO<sub>2</sub> was 39 (µg/m<sup>3</sup>) (0.021 ppm) and that for SO<sub>2</sub> was 19 (µg/m<sup>3</sup>) (0.0067 ppm). No relationship was found between admissions and the concentrations of total suspended particulates (TSP) or ozone (O<sub>3</sub>), the temperature, or the relative humidity. However, the number of admissions among those over 64 years of age was significantly lower, irrespective of temperature, during the summer than during other seasons. The mean daily concentration of O<sub>3</sub> was fairly low (22 (µg/m<sup>3</sup>) or 0.011 ppm), but that of TSP was high, 76 (µg/m<sup>3</sup>). The mean temperature was low, +4.7(Degree)C. These results suggest that SO<sub>2</sub> and NO<sub>2</sub> concentrations lower than those given as guidelines in many countries, and lower than previously shown, may increase the incidence of symptoms in some patients with chronic bronchitis or emphysema.

Pope, C. A. III. (1997) **Respiratory hospital admissions associated with PM10 pollution in Utah, Salt Lake, and Cache Valleys.** *Archives Environmental Health*, 46(2), 90 – 97.

Hospital admissions and PM10 pollution in Utah, Salt Lake, and Cache valleys during April 1985 through March 1989. Utah and Salt Lake valleys had high levels of PM10 pollution that violated both the annual and 24-h standards issued by the Environmental Protection Agency (EPA). Much lower PM10 levels occurred in the Cache Valley. Utah Valley experienced the intermittent operation of its primary source of PM10 pollution: an integrated steel mill. Bronchitis and asthma admissions for preschool-age children were approximately twice as frequent in Utah Valley when the steel mill was operating versus when it was not. Similar differences were not observed in Salt Lake or Cache valleys. Even though Cache Valley had higher smoking rates and lower temperatures in winter than did Utah Valley, per capita bronchitis and asthma admissions for all ages were approximately twice as high in Utah Valley. During the period when the steel mill was closed, differences in per capita admissions between Utah and Cache valleys narrowed considerably. Regression analysis also demonstrated a statistical association between respiratory hospital admissions and PM10 pollution. The results suggest that PM10 pollution plays a role in the incidence and severity of respiratory disease.

Pauwels, R. **The clinical relevance of airway inflammation.** EUR. J. RESPIR. DIS. 1986 69/SUPPL. 147 (88-92)

Inflammation forms an integral part of the normal defense mechanisms of the airways. Airway inflammation is therefore in essence beneficial, although prolonged exposure to noxious stimuli, overwhelming damage or insufficient control of the inflammatory process may lead to clinical disease. However, the factors contributing to the type and magnitude of airway inflammation, including the level at which damage occurs, the individual difference in sensitivity and inflammatory response to noxious stimuli and the evolution from acute to chronic inflammation, are insufficiently characterized. Clinical, pathological and experimental investigations clearly show that airway inflammatory disorders are heterogenous. Mucus hypersecretion and bronchial hyperresponsiveness are different characteristics of airway diseases with distinct clinical manifestations and prognostic significance. Epidemiological studies have shown that bronchial hyperresponsiveness is associated with a worse prognosis in obstructive airway disease. Further efforts are needed to understand the impact of different parts of the airway inflammatory process on the physiological and clinical manifestations of airway diseases. Understanding the mode of action of existing and newly developed therapeutic agents on airway inflammation will teach us more about its role in these frequent disorders.

Qazi, S. A., Rehman, G. N., and Khan, M. A. (1996) **Standard management of acute respiratory infections in a children's hospital in Pakistan: Impact on antibiotic use and case fatality.** *Bulletin of the World Health Organization*, 74(5), 501-507.

Acute respiratory infections (ARI) are a leading cause of childhood morbidity and mortality in Pakistan. The National ARI Control Programme was launched in 1989 in order to reduce the mortality attributed to pneumonia, and rationalize the use of drugs in the management of patients with ARI. WHO's standard ARI case management guidelines were adopted to achieve these objectives. The medical staff at the Children's Hospital, Islamabad, were trained in such management in early 1990; further training sessions were conducted when new staff arrived. Data on outpatients were obtained from special ARI abstract registers, which have been maintained in the outpatient department since January 1990. Details on inpatients who were admitted with ARI were obtained from hospital registers. During the period 1989-92, the use of antibiotics in the outpatient department decreased from 54.6% to 22.9% ( $P < 0.0001$ ). The case fatality rate (CFR) in children admitted with ARI fell from 9.9% to 4.9% ( $P < 0.0001$ ), while the overall case fatality rate fell from 8.7% to 6.2%. Our results from a tertiary health care facility show that standard ARI case management reduced both antibiotic use and expenditure on drugs. Although the ARI case management criteria, which are more sensitive than the conventional diagnostic criteria of auscultation and radiography, led to more admissions, we believe that this strategy contributed to a significant reduction in the ARI case fatality rate.



Raaschou-Nielsen, O., Nielsen, M. L., and Gehl, J. (1995) **Traffic-related air pollution: Exposure and health effects in Copenhagen street cleaners and cemetery workers.** *Arch Environ. Health*, 50(3), 207-213.

This questionnaire-based study found a significantly higher prevalence of chronic bronchitis, asthma, and several other symptoms in 116 Copenhagen street cleaners who were exposed to traffic-related air pollution at levels that were slightly lower than the 1987 World Health Organization-recommended threshold values, compared with 115 Copenhagen cemetery workers exposed to lower pollution levels. Logistic regression analysis, controlling for age and smoking, was conducted, and odds ratios and 95% confidence intervals were calculated to be 2.5 for chronic bronchitis (95% confidence interval = 1.2- 5.1), 2.3 for asthma (95% confidence interval = 1.0-5.1), and 1.8-7.9 for other symptoms (95% confidence interval = 1.0-28.2). Except for exposure to air pollution, the two groups were comparable, i.e., they had similar terms of employment and working conditions. The exposure ranges during an 8-h work day, averaged from readings taken at five monitored street positions, were: 41-257 ppb nitric oxide (1-h max: 865 ppb); 23-43 ppb nitrogen dioxide (1-h max: 208 ppb); 1.0-4.3 ppm carbon monoxide ( 8-h max: 7.1 ppm); 14-28 ppb sulfur dioxide (1-h max: 112 ppb); and 10-38 ppb ozone (1-h max: 72 ppb).

Raaschou-Nielsen, O; *et.al.* (no date) **Exposure of Danish children to traffic exhaust fumes.** Danish Cancer Society, Division for Cancer Epidemiology Danish Cancer Society - Division for Cancer Epidemiology Strandboulevarden.

This exposure study addresses the validity of the exposure assessment method of an epidemiological study of traffic-related air pollution and childhood cancer. In particular, this paper concerns the question of whether the concentration of nitrogen dioxide (NO<sub>2</sub>) outside the front door is a valid marker of the exposure of the child living at the address. The study includes 100 children living on streets with dense traffic in central parts of Copenhagen and 100 children living in rural areas. Preliminary results, based on 25 of the study subjects, suggest that both the outdoor NO<sub>2</sub>-concentration and the exposure of the children are two to three times higher in Copenhagen than in the rural districts. Moreover, the results suggest that the NO<sub>2</sub>-concentration outside the front door is a poor marker of the exposure of the children in Copenhagen, but a marker of some relevance for the exposure of the children in rural districts. The preliminary results must be treated with caution, as among other things, the analysis did not consider seasonal changes and indoor NO<sub>2</sub>-sources such as passive smoking, candles, and gas appliances.

Ragland, K. W., Andren, A. W., and Manchester, J. B. (1985) **Emissions from unvented kerosene heaters.** *Sci Total Environ*, 46, 171-179.

Vapor-phase polynuclear aromatic hydrocarbon (PAH) emissions from unvented kerosene heaters were measured. During normal heater operations, tri- and tetra-cyclic PAHs were observed, whereas penta-, hexa- and hepta-cyclic PAHs were not observed. The convective-type heaters had significantly less PAH emissions than the radiant-type heaters. Emissions of particulate soot were also measured. The soot did not contain PAH. A two-compartment model is presented and used to simulate heater operation in a home. Certain simulated PAH levels are similar to that measured in the ambient air of large cities.

Ramakrishna, J., Durgaprasad, M. B., and Smith K. R. (1989) **Cooking in India: The impact of improved stoves on indoor air quality.** *Environ Int*, 15(1), 341-352.

Cooking period kitchen concentrations of carbon monoxide (CO) and exposure rates to total suspended particulates (TSP), experienced by household cooks were monitored in nearly 200 households in 13 villages in three regions of India. Roughly half used traditional open-combustion stoves and the other half used one of seven different kinds of improved stoves disseminated in these areas. In all cases except one, CO concentrations were significantly lower in kitchens using improved stoves, whether fitted with flues or not. Because of high sample variability, no conclusions could be drawn about the degree of TSP exposure rate improvement, if any, represented by three improved stoves. In the case of three other improved stoves with larger sample sizes, no significant differences were found. Only in one case, the combination of traditional stove with a fireplace-like hood, were TSP exposure rates significantly lower. There are a number of important lessons from this work to be considered in designing and conducting these kinds of field measurements in the future.

Raza, S. H., Shylaja, G., Murthy, M. S. R., and Bhagyalakshmi, O. (1991) **The contribution of plants for CO<sub>2</sub> removal from indoor air.** *Environ Int*, 17(4), 343-347.

This paper deals with the ability of certain succulent plants in absorbing CO<sub>2</sub> in different types of rooms inhabited by household members. Plants, generally, are known to remove CO<sub>2</sub> in daytime in the presence of sunlight but certain succulent plants, which have a crassulacean acid metabolism (CAM), have a specialized mechanism of stomatal opening and closing which help in the reduction of CO<sub>2</sub> during night. A study, using Bryophyllum and Agave, has been carried out in rooms used mostly for resting and sleeping. The number of persons, along with many other parameters, plays a prominent role in the maintenance of CO<sub>2</sub> levels in indoor conditions. These plants, grown in pots, were placed in the bedrooms. They lowered CO<sub>2</sub> levels to a considerable extent, thus establishing the ability of succulents and CAM plants in lowering CO<sub>2</sub> in indoor environments.

Rehman, G.N., Qazi, S.A., Mull, D.S., Khan, M. A. (1994) **ARI concepts of mothers in Punjabi villages: a community-based study.** *J Pak Med Assoc*, Aug.

Pneumonia is a major child killer in the developing world; to prevent such deaths, mothers must be able to differentiate pneumonia from common cold. Local concepts regarding these illnesses were studied by interviewing 315 mothers of young children in their homes in Punjabi villages. Mothers described pneumonia differently from cough-and-cold but only a few volunteered fast breathing as a sign of pneumonia. Both illnesses were thought to be caused by "coldness," and were initially treated with "heat-producing" home remedies and feeding was continued in both. Spiritual healers were not consulted for cough-and-cold or pneumonia. Virtually all mothers said that allopathic medicines were necessary for both illnesses and 2/3rd said that if a child did not improve after 2 days of a given medicine, they would change the medicine and/or the doctor.

Reyes, H., Perez-Cuevas, R., Salmeron, J., Tome, P., Guiscafne, H., Gutierrez, G (1997) **Infant mortality due to acute respiratory infections: The influence of primary care processes.** *Health Policy Planning*, 12(3), 214-223.

A population-based case control study was conducted to ascertain whether the process of primary care can be a determinant of infant mortality due to Acute Respiratory Infection (ARI). Cases were 118 infants who died from ARI, individually matched with 118 infants who suffered an ARI episode and recovered. Information was gathered through interviewing mothers. Study variables were assembled into five subsets: children's characteristics; mothers' characteristics; access to medical services; process of primary care, and; sociodemographic variables. An index per subset was built to analyze the independent influence of each on ARI death risk. The index was constructed upon the weighted sum of the adjusted odds-ratios (OR) within each subset. Then, the values of each index were collapsed into high/low values with the 50 percentile as a cut-off value. Next, by means of a conditional logistic

regression procedure, an explanatory model of ARI mortality was obtained. The final multivariate model included the indexes that showed an independent effect: I) Process of care (OR 9.68, CI 95% 3.59-26.1): inadequate referral, attention provided by more than one physician and being attended by a private physician; II) children's characteristics (OR 7.22, CI 95% 2.35-22.2): perinatal history, lack of breast-feeding and incomplete immunization scheme; III) access to medical services (OR 5.27, CI 95% 2.02-13.7): geographic and economic barriers, lack of confidence in public health services, and; IV) mothers' characteristics (OR 4.03, CI 95% 1.18-13.8), mainly represented by untimely care seeking. We conclude that the management of the disease is a key determinant in which factors relating to the mother and the health services are strongly related. Our study reveals untimely care seeking, difficult access and inadequate disease treatment as important factors which deserve careful attention in the future. We also confirm the importance of biological determinants previously described. A main strategy to reduce infant mortality due to ARI should be to encourage training of primary care physicians, including private practitioners, focused on providing effective case management and emphasizing the education to mothers.

Ricciardolo, F. L. M., Di Maria, G. U., Mistretta, A., Saplenza, M. A., and Geppetti, P. **Correspondence: Nitric Oxide and responses to inhaled bradykinin in severe asthma.** *Lancet*, 351.

Ricciardolo and co-workers describe the response to inhaled bradykinin in ten patients with severe asthma. The patients had a forced expiratory volume of 65-75% and were on inhaled corticosteroids. The dose of inhaled corticosteroid was not stated, so whether they had severe as opposed to moderate asthma is uncertain. The ten patients had a greater response to inhaled bradykinin than individuals with mild asthma (who were not on treatment with inhaled steroids).

Roemer, W., Hoek, G., and Brunkeef, B. (1993) **Effects of Ambient Winter Air Pollution on Respiratory Health of Children with Chronic Respiratory Symptoms.** *American Review of Respiratory Diseases*, 147, 118-124.

The acute respiratory effects of ambient air pollution were studied in a panel of 73 children with chronic respiratory symptoms in the winter of 1990-1991. The participating children were selected from all children aged 6 to 12 yr in Wageningen and Bennekom, two small, nonindustrial towns in the east of the Netherlands. Peak flow was measured twice daily with MiniWright(R) meters. A diary was used to register the occurrence of acute respiratory symptoms and medication use by the children. Exposure to air pollution was characterized by the ambient concentrations of sulfur dioxide (SO<sub>2</sub>), Nitrogen dioxide (NO<sub>2</sub>), black smoke (BS), and particulate matter less than 10µm (PM<sub>10</sub>). Associations between air pollution concentrations and health outcomes were analyzed using time series analysis. During the study period an air pollution episode occurred, with moderately elevated concentrations of PM<sub>10</sub> and SO<sub>2</sub>. There were 6 days with 24 hr average PM<sub>10</sub>, BS, and SO<sub>2</sub> with both morning and evening PEF. There was a consistent positive association between PM<sub>10</sub>, BS, and SO<sub>2</sub> with the prevalence of wheeze and bronchodilator use. Overall, the observed associations suggest a mild to moderate response to these moderately elevated levels of air pollution in a group of potentially sensitive children.

Romeieu, I., Meniese, F., Ruiz, S., Sienna, J. J., Huerta, J., White, M. and Etzel, R. (1996) **Effects of Air Pollution on the Respiratory Health of Asthmatic Children Living in Mexico City.** *American J of Respiratory Critical Care Medicine*, 154, 300-307.

The relationship between air pollution and the exacerbation of childhood asthma was studied in a panel of 71 children (aged 5-7yrs) with mild asthma who resided in the northern part of Mexico City. During the follow-up, ambient measures of particulate matter less than 10µm (PM<sub>10</sub>, 24h average) and ozone (1h maximum) frequently exceeded the Mexican standards for these contaminants. The peak expiratory

flow rate (PEFR) was strongly associated with PM<sub>10</sub> levels and marginally with ozone levels. Respiratory symptoms (coughing, phlegm production, wheezing, and difficulty breathing) were associated with both PM<sub>10</sub> and ozone levels. An increase of 20 µg/m<sup>3</sup> of PM<sub>10</sub> was related to an 8% increase in lower respiratory illness (LRI) among children on the same day (95% confidence interval [CI] = 1.04-1.15), and an increase of 10 µg/m<sup>3</sup> in weekly mean particulate matter less than 2.5 µm (PM<sub>10-2.5</sub>) was related to a 21% increase in LRI (95% CI = 1.08-1.35). A 50 parts per billion (ppb) increase in ozone was associated with a 9% increase in LRI (CI = 1.03-1.15) on the same day. We concluded that children with mild asthma are affected by high ambient levels of particulate matter and ozone observed in the northern part of Mexico City.

Saatkamp, B. D., Masera, O., and Kammen, D. M. (1999) **Energy and health transitions in development science and planning: Fuel use, stove technology, and morbidity in Jarácuaro, México**, *Energy for Sustainable Development*, in press.

The 'energy ladder' relating improvements in socioeconomic status with transitions to more sophisticated stoves and to higher quality, less polluting, fuels is often invoked as a theoretical model for analyzing household energy management practices. We report here on an integrated study of the energy, health and economic implications of fuel switching in the small village of Jarácuaro, Michoacán State, México, that challenges the traditional energy ladder model. We monitored fuel and stove use, economic status, exposure to respirable suspended particulates (RSP) and trace gases (CO, CO<sub>2</sub>, NO<sub>x</sub>, SO<sub>2</sub>), and morbidity during both wet and dry seasons for a sample of 141 persons living in 21 homes. The families surveyed utilized simple 'three stone' fires, traditional enclosed or improved stoves, and gas ranges or a combination of these technologies. In Jarácuaro, people who cook regularly are twice as likely as non-cooks to exhibit acute respiratory infection (ARI) (relative risk = 2.0, 95% C.I. = 1.3 - 2.7). The use of improved stoves correlates with reductions in indoor concentrations of RSPs and CO, and decreases in: reported cases of ARI; eye infections; and intestinal disorders. These changes are consistent with the *technology component* of the energy ladder, relating improvements in stove and fuel type to emissions and then to respiratory ailments. This suggests an associated 'health ladder' for families adopting improved stoves or kitchen designs. The degree to which the overall energy ladder is a gross oversimplification that neglects the true energy strategies of many households, however, is reflected in Jarácuaro where the socioeconomic correlate breaks down: we find that more affluent families do not necessarily use cleaner fuel and stove combinations or invest in kitchens that are more healthy or energy efficient. Some of the most affluent households even exhibited the highest RSP and CO concentrations. These findings lead to a more eclectic model of fuel and stove adoption and use. that has implications for integrated health and development policies that highlight the need and the means for educational programs in conjunction with efforts to facilitate transitions to more efficient stoves and cleaner fuels.

Sahu, K., and Das, R. K. 1995) **Micronucleus assay in pulmonary alveolar macrophages, a simple model to detect genotoxicity of environmental agents entering through the inhalation route**. *Mutation Research - Mutation Research Letters*, 347(2), 61-65.

A simple and short-term micronucleus (MN) test in pulmonary alveolar macrophages (PAMs) of rats has been developed to assess potential genotoxic effects of gaseous environmental agents. The protocol has been tested in model experiments with indoor air pollutants like mosquito coil smoke (MCS) and mosquito mat vapour (MMV). Smears of pulmonary lavage fluid collected in hypotonic (0.56%) KCl solution were fixed in absolute methanol and stained in Giemsa (10%). Characteristically the large size of the PAMs facilitates easy scoring of MN. An interval of 32 h post exposure seems to be suitable for MN preparation. A comparison of the concentration-response data on CAs (at 24 h post exposure) and MN (at 32 h post exposure) clearly reveals the validity of the MN assay in PAMs.

Saini, N.K., Gaur, D. R., Saini, V., Lal, S. (1992) **Acute respiratory infections in children: a study of knowledge and practices of mothers in rural Haryana.** *J Commun Dis*, 24 (2), 75-77.

In the present study, data were collected on knowledge and practices of mothers in two villages of Block Beri of district Rohtak for devising a standard management plan. In all 304 mothers were interviewed. About 23 per cent mothers recognised pneumonia by fast breathing and 11.2 per cent recognised severe pneumonia by chest indrawing. Only 1.3 per cent mothers knew infective origin of ARI. Although most of them were convinced about continuation of breast feeding, 70 per cent of them were advising food restriction. Use of herbal tea in ARI was widely prevalent and so was the practice of putting warm mustard oil in ear for curing ear pain. Primary Health Centre was the most frequented place for treatment of ARI and mother-in-law was the most important person in taking management decisions for the child.

Sharma C. K. (1997) **Urban air quality of Kathmandu valley 'Kingdom of Nepal'.** *Atmos Env*, 31(17), 2877-2883.

The oval shaped tectonic basin of Kathmandu valley, occupying about 656 sq.km is situated in the middle sector of Himalayan range. There are three districts in the valley, i.e. Kathmandu, Lalitpur and Bhaktapur. Out of the three, the most populated is Kathmandu city (the capital of Kingdom of Nepal) which has a population of 668,00 in an area of approximately 50 km<sup>2</sup>. The energy consumption of the city population is about 1/3 of the total import to Nepal of gasoline, diesel, kerosene, furnace oil and cooking gas. This has resulted heavy pollution of air in the city leading to bronchitis, and throat and chest diseases. Vehicles have increased several fold in recent months and there are 100,000 in number on the road and they have 900 km of road, out of which only 25% is metalled. Most of the two and three wheelers are polluting the air by emission of gases as well as dust particulate. SO<sub>2</sub> has been found to go as high as 202 (μg cm<sup>-3</sup>) and NO<sub>2</sub> to 126 (μg cm<sup>-3</sup>) particularly in winter months when a thick layer of fog covers the valley up to 10 am in the morning. All the gases are mixed within the limited air below the fog and the ground. This creates the problem. Furthermore, municipal waste of 500 m<sup>3</sup> a day and also liquid waste dumped directly into the Bagmati river at the rate of 500,000 l d<sup>-1</sup> makes the city ugly and filthy. Unless pollution of air, water and land are controlled in time, Nepal will lose much of its foreign exchange earnings from the tourist industry. It is found that tourist arrivals have considerably reduced in recent years and most of hotels occupancy is 50-60% in peak time. Nepal is trying to introduce a legal framework for pollution control but it will take time to become effective.

Sharma, S., Gulshan, R. S., Rohtagi, A., Chaudhary, A., Shankar, R., Singh J. B, Joshi, V. and Sapir, D. G. (1998) **Indoor Air Quality and Acute Lower Respiratory Infection in Indian Urban Slums.** *Environmental Health Perspectives*, 106(5), 291 - 297.

The present prospective study was conducted at two urban slums of Delhi, Kusumpur Pahari and Kathputly Colony, in the peak winter season from November 1994 through February 1995. We studied 642 infants to determine the incidence of acute lower respiratory infection (ALRI) and its relationship to indoor air pollution due to fuel used for cooking (wood or kerosene). In Kusumpur Pahari, there were 317 children (142 wood and 175 kerosene), including 64 controls and 78 cases of ALRI in the wood fuel group and 81 controls and 94 ALRI cases in the kerosene group ( $p > 0.05$ ). Out of 316 children in Kathputly Colony (174 wood and 142 kerosene), there were 33 and 45 ALRI cases in the wood and kerosene groups, respectively ( $p < 0.05$ ). Controls were children without ALRI and were used as controls in different groups. The demographic data and risk factors, namely nutritional and immunization status, were comparable in ALRI cases and controls in both study areas. Pneumonia was the most common ailment in all the groups. Bronchiolitis was reported in 22.5% of the wood group and 27.1% of the kerosene group in Kathputly Colony versus 13.7% in the wood group and 12.1% in the

kerosene group in Kusumpur Colony. Only one case of croup was reported from Kusumpur Pahari among wood users. The duration of illness was longer in the Kusumpur Pahari due to poor compliance, feeding, and child rearing habits. In conclusion, a higher incidence of ALRI was reported in kerosene users in Kathputly Colony, a high pollution area; however, the reasons for the differences observed need further elucidation. Key words: acute respiratory tract infection, ALRI, ARI, fuel, incidence, indoor air quality, infants, kerosene, urban slums, wood.

Shamebo, D., Sandstrom, A., Muhe, L., Freij, L., Krantz, I., and Lonnberg, G. (1993) **The Butajira project in Ethiopia - a nested case-referent study of under-5 mortality and its public health determinants**, *Bulletin of the World Health Organization*, 71(3-4), 389-396.

During one year of follow-up, 306 deaths of children under the age of 5 years were included in a concurrent case-referent study that was based on a population estimated at 28 780 in 1987. A total of 612 live referents, matched for age, sex and study area, were also selected from the study population through density sampling. Data were collected by lay reporters by verbal autopsy. For the study period the estimated cumulative under-five mortality rate was 293 and the infant (0-11 months old) mortality rate was 136 per 1000. Major probable causes of death were diarrhoeal disease or acute respiratory infections (ARI). The relative importance of parental and environmental characteristics was assessed using conditional multiple logistic regression analysis. Under-five mortality was associated with paternal illiteracy, maternal ethnicity, and not being in the committee of people's organizations. Parental factors affected the infants relatively more than they did the children, especially with regard to ARI mortality. This was also noted with "absence of window", a proxy measure for evaluating the type of housing. In terms of etiological fractions a greater number of under-five deaths could be ascribed to parental than environmental conditions, with relatively more infants being affected than children.

Shen, X.-B., Wang, G.-X., Huang Y.-Z., Xiang L.-S., Wang X.-H. (1996) **Analysis and estimates of attributable risk factors for lung cancer in Nanjing, China**. *Lung Cancer*, 14 (Supl. 1 S107-S112).

A case-control study was performed on 83 cases of primary pulmonary squamous cell carcinoma and 180 cases of primary pulmonary adenocarcinoma in Nanjing. Multivariate conditional logistic regression analysis showed five risk factors for pulmonary squamous carcinoma. These were: smoking, indoor air pollution due to cooking fumes, family tumor history, type of fuel used in the home, and use of coal stoves for heating in winter. The relative risks (RR) for these five risk factors were: 1.03 (95% CI, 1.00-1.06), 3.81 (95% CI, 1.06-13.73), 5.61 (95% CI, 1.23-15.79), 4.97 (95% CI, 0.8-30.88) and 3.72 (95% CI, 0.88-15.71), respectively. The respective population attributable risks (PAR) were: 68%, 52%, 28%, 55% and 36%. The four risk factors for pulmonary adenocarcinoma were smoking; cooking fumes, chronic bronchitis and family tumor history. The respective RRs were: 1.01 (95% CI, 1.00-1.03), 2.99 (95% CI, 1.68-5.34), 2.49 (95% CI, 1.68-5.34) and 4.77 (95% CI, 1.93-11.83). The respective PARs were: 20%, 47%, 18% and 18%. The combined PAR for the five risk factors for pulmonary squamous cell carcinoma was 94% and the combined PAR for the risk factors for pulmonary adenocarcinoma was 79%.

Shell-Duncan, B., and Wood, J. W. (1997) **The evaluation of delayed-type hypersensitivity responsiveness and nutritional status as predictors of gastro-intestinal and acute respiratory infection: A prospective field study among traditional nomadic Kenyan children**. *J of Tropical Pediatrics*, 43(1), 25-32.

A 10-month prospective study of children from a nomadic pastoralist community in northwest Kenya was conducted to examine the relationship between nutritional status, cell-mediated immunity (CMI), and morbidity due to gastroenteritis and acute respiratory infection (ARI). In children ages 6 months

to 10 years, nutritional status and cellular immunocompetence, determined by delayed-type hypersensitivity (DTH), were related to individual attack rates of diarrhoea and ARI over two 5-month observation periods, one each in the wet and dry season. While no association was found between premorbid nutritional status and gastroenteritis, DTH responsiveness was a significant predictor of diarrhoeal disease, with anergic children experiencing, on average, 20 percent higher attack rates than immunocompetent children. When examined separately, both nutritional status and DTH responsiveness were significant predictors of individual attack rates of ARI in the wet season. However, when the effects of nutritional and immunological status were simultaneously tested, only DTH responsiveness was significant. Anergic children experienced 34 percent excess ARI, compared to immunocompetent children. These results indicate that cellular immunocompetence is a sensitive predictor of gastrointestinal and respiratory infection, and that the effect of nutritional status on the occurrence of ARI may be mediated by cellular immune function.

Shy, C. M., Degnan, D., Fox, D. L., Mukerjee, S., Hazucha, M. J., Boehlecke, B. A. Rothenbacher, D., Briggs, P. M., Devlin, R. B., Wallace, D. D., Stevens, R. K., and Bromberg, P. A. (1995) **Do waste incinerators induce adverse respiratory effects? an air quality and epidemiological study of six communities.** *Environmental Health Perspectives*, 103, 714-724.

The purpose of the study presented here was to simultaneously measure air quality and respiratory function and symptoms in populations living in the neighborhood of waste incinerators and to estimate the contribution of incinerator emissions to the particulate air mass in these neighborhoods. We studied the residents of three communities having, respectively, a biomedical and a municipal incinerator, and a liquid hazardous waste-burning industrial furnace. We compared results with three matched-comparison communities. We did not detect differences in concentrations of particulate matter among any of the three pairs of study communities. Average fine particulate (PM<sub>2.5</sub>) concentrations measured for 35 days varied across study communities from 16 to 32 µg/m<sup>3</sup>. Within the same community, daily concentrations of fine particulates varied by as much as eightfold, from 10 to 80 µg/m<sup>3</sup>, and were nearly identical within each pair of communities. Direct measurements of air quality and estimates based on a chemical mass balance receptor model showed that incinerator emissions did not have a major or even a modest impact on routinely monitored air pollutants. A one-time baseline descriptive survey (n = 6,963) did not reveal consistent community differences in the prevalence of chronic or acute respiratory symptoms between incinerator and comparison communities, nor did we see a difference in baseline lung function tests or in the average peak expiratory flow rate measured over a period of 35 days. Based on this analysis of the first year of our study, we conclude that we have no evidence to reject the null hypothesis of no acute or chronic respiratory effects associated with residence in any of the three incinerator communities.

Sillis, M., White, P., and Caul, E. O. (1992) **The differentiation of Chlamydia species by antigen detection in sputum specimens from patients with community-acquired acute respiratory infections.** *The J of Infection*, 25 (Supp 1), 77.

An amplified enzyme immunoassay for detecting genus specific chlamydia antigen was evaluated prospectively on 286 respiratory specimens from 275 patients presenting community acquired pneumonia or persistent chest infection. 19 patients had evidence of recent chlamydial infection. Non-specific problems with a wide variety of other micro-organisms isolated from the sputa were not encountered. Attempts to differentiate between chlamydia psittaci, chlamydia pneumoniae, and chlamydia trachomatis were encouraging and results were substantiated. The study demonstrated that antigen detection techniques offer scope for routine laboratories to diagnose chlamydial respiratory infections rapidly and reliably and may enable differentiation to species level. Although immunofluorescence offers marginally greater sensitivity and specificity compared with ELISA, the latter

is less subjective and less demanding. 68% of these infections would have remained undiagnosed despite the general availability of ELISA tests.

Simoes, E. A. F., Groothuis, J. R., and Welliver, R. C. (1996) **Respiratory syncytial virus-enriched globulin for the prevention of acute otitis media in high-risk children** *The J of Pediatrics*, 129(2), 214.

A masked multicenter trial used an immune globulin enriched with RSV-neutralizing antibodies (RSVIG) to prevent infection of the lower respiratory tract in 249 children. The records of 109 children in two centers were retrospectively analyzed. High-dose (750 mg/kg monthly) RSVIG recipients had significantly less AOM than did control children (mean episodes, 0.15 vs 0.78;  $p=0.003$ ) per season and fewer episodes of RSV-related AOM (0 vs 5;  $p=0.047$ ).

Some, E. S. (1992) **The pattern of morbidity and its effects on productivity of factory workers in Kenya.** *East African Medical J* 69(11), 622-626.

Abstract: A retrospective study was carried out from January to September 1990 in a factory that manufactures textiles in Eldoret, Kenya. Over the study period, 1400 factory workers had 303 episodes of illness resulting in a loss of 720 productive man-days. This is an incidence of 289 episodes of illness per 1000 workers per year. On average, each episode of illness resulted in 2.4 man-days loss. Of all the episodes of illness, 58.8% were attributable to infective and parasite diseases, 10.9% to respiratory system disorders and 21.7% to other conditions. Malaria constituted 53.1% of all episodes of illness, acute respiratory infection (ARI) 10.9%, physical injuries 5.6%, gastro-enteric illness 3.4% and other conditions 21.7%. For the productive man-days lost, 53.2% were attributable to malaria, 12.8% to ARI, 5.7% to physical injuries and 28.3% to other conditions. Abortions and worm infections resulted in loss of 7.0 man-days per episode of illness, diarrhoea, 3.2, myalgia 3.0, ARI 2.8, eye diseases 2.7 and the rest below the average of 2.4 days. Apart from the physical injuries, there were no other occupational illness in the textile factory workers. Episodes of illness that occur during the last and the first week of the month constitute 61.0% of all illnesses. Mondays had 24.4% of the episodes of illness, Sundays 7.9% with the other days of the week constituting an average 13.5%.

Smith, K. R. (1986) **Biomass Combustion and Indoor Air Pollution: The bright and dark sides of small is beautiful.** *Environ Management*, 10(1), 61 - 74.

About half the world's households cook and/or heat daily with biomass fuels. At small scale, biomass combustion releases significant amounts of particulates, carbon monoxide, and hydrocarbons, the latter with significant concentrations of polycyclic aromatic hydrocarbons. Preliminary measurements in kitchens of developing country villages have established airborne concentrations of these health-damaging pollutants that are orders of magnitude above urban levels or relevant standards. Particle size measurements and dose calculations lead to significant concerns about potential health hazards. The few epidemiological studies are consistent with such effects although more work is clearly needed. These findings may have significant implications for the planning of rural energy development in a number of countries. In particular, they may relate directly to the question of the optimum balance between centralized and decentralized systems.

Snider, G. L. (1989) **Chronic obstructive pulmonary disease: Risk factors, pathophysiology and pathogenesis.** *Ann Rev Med*, 40, 411 – 429.

Chronic obstructive pulmonary disease (COPD) is defined in this chapter, and the relation between its two major components, (a) chronic bronchitis and emphysema and (b) nonremitting asthma, is discussed. Intensity of tobacco smoking and age are the major risk factors for the development of



chronic airways obstruction. Environmental air pollution, childhood infections, and familial factors other than alpha-1 protease inhibitor deficiency appear to play only small roles. Emphysema is the major cause of severe airways obstruction; bronchiolitis is a contributing factor and likely is responsible for the minor reversible element of airways obstruction. The elastase-antielastase hypothesis, which is based mainly on indirect evidence, is the best explanation for the pathogenesis of emphysema. Extensive airspace enlargement with fibrosis is infrequently observed; this mechanism may play a role in the pathogenesis of the centrilobular emphysema of smokers.

Snow, R. W., Omumbo, J. A., Lowe, B., Molyneux, C. S., Obiero, J. O., Palmer, A., Weber, M. W., Pinder, M., Nahlen, B., Obonyo, C., Newbold, C., Gupta, S., and Marsh K. (1997) **Relation between severe malaria morbidity in children and level of Plasmodium falciparum transmission in Africa.** *Lancet*, 349(9066), 1650-1654.

Background. Malaria remains a major cause of mortality and morbidity in Africa. Many approaches to malaria control involve reducing the chances of infection but little is known of the relations between parasite exposure and the development of effective clinical immunity so the long-term effect of such approaches to control on the pattern and frequency of malaria cannot be predicted. Methods. We have prospectively recorded paediatric admissions with severe malaria over three to five years from five discrete communities in The Gambia and Kenya. Demographic analysis of the communities exposed to disease risk allowed the estimation of age-specific rates for severe malaria. Within each community the exposure to Plasmodium falciparum infection was determined through repeated parasitological and serological surveys among children and infants. We used acute respiratory-tract infections (ARI) as a comparison. Findings. 3556 malaria admissions were recorded for the five sites. Marked differences were observed in age, clinical spectrum and rates of severe malaria between the five sites. Paradoxically, the risks of severe disease in childhood were lowest among populations with the highest transmission intensities, and the highest disease risks were observed among populations exposed to low-to-moderate intensities of transmission. For severe malaria, for example, admission rates (per 1000 per year) for children up to their 10th birthday were estimated as 3.9, 25.8, 25.9, 16.7, and 18.0 in the five communities; the forces of infection estimated for those communities (new infections per infant per month) were 0.001, 0.034, 0.050, 0.093, and 0.176, respectively. Similar trends were noted for cerebral malaria and for severe malaria anaemia but not for ARI. Mean age of disease decreased with increasing transmission intensity. Interpretation. We propose that a critical determinant of life-time disease risk is the ability to develop clinical immunity early in life during a period when other protective mechanisms may operate. In highly endemic areas measures which reduce parasite transmission, and thus immunity, may lead to a change in both the clinical spectrum of severe disease and the overall burden of severe malaria morbidity.

Spengler, J., Koutrakis, P., Dockery, D., Raizenne, M., and Speizer, F. (1996) **Health effects of acid aerosols on North American children: Air pollution exposures.** *Environmental Health Perspectives*, 104(5), 492-499.

Air pollution measurements were conducted over a 1-year period in 24 North American communities participating in a respiratory health study. Ozone, particle strong acidity, sulfate, and mass (PM10 and PM2.1) were measured in all communities. In 20 of the communities, sulfur dioxide, ammonia, nitric acid, nitrous acid, and particulate nitrite were measured. The sampler was located centrally in the community whenever possible and samples were collected every other day. Concentrations of particle strong acidity, mass, sulfate, and ozone, were highly correlated both in the region of the country defined as a high-sulfur source area and in the downwind transport regions. These regions of the eastern United States and southern Canada experienced the greatest particle strong acidity, sulfate, and particle mass concentrations were highest in regions close to the high sulfur emission areas of the United States; that is, in the area immediately to the west of the Appalachian Plateau and west of the Allegheny Mountains

(western Pennsylvania, eastern Ohio, and West Virginia) up through southern Ontario. The frequency of particle strong acidity events decreased with transport distance from the region of highest sulfur emissions. Low particle strong acidity events were found at the western and midwestern sites of both the United States and Canada. Substantial concentrations of nitric acid were found in two of the California sites as well as many sites in the northeastern portion of the United States. Sites selected for the epidemiological study provided a range of annual mean particle strong acidity exposure from below the limit of detection to more than 50 nmol/m<sup>3</sup>.

Spiritus, E. M. (1994) **Diagnosis and Treatment of Acute Lower Respiratory Tract Infections** *Resident & Staff Physician*, 40(1), 28.

Stanek, E. J. III, Wafula, E. M., Onyango, F. E., and Musia, J. (1994) **Characteristics related to the incidence and prevalence of acute respiratory tract infection in young children in Kenya.** *Clin Infect Dis*, 18(4), 639-647.

Acute respiratory tract infection (ARI) in children is a prevalent condition that results in substantial morbidity and consumes large portions of health care resources in developing countries. We examined factors associated with the reported incidence and prevalence of ARI in a 3-year longitudinal study of 485 children <5 years of age in rural Kenya. A large number of environmental factors, household and family characteristics, and child-specific factors were examined with use of multivariable methods. Few variables that may play a role in the incidence and prevalence of ARI (e.g., household tobacco use and weight z-score) were found to be related to such rates. Several factors related to ARI incidence and prevalence (e.g., mother's age, number of children, and community) were found to be associated with only mild ARI episodes. Evidence is presented to support the hypothesis that these factors are related to differential reporting of mild ARI episodes. The impact of such differential reporting on health care utilization and health education is discussed.

Steinhoff, M. C., El Khalek, M. K. A., Khallaf, N., Hamza, H. S., El Ayadi A., Orabi, A., Fouad H., and Kamel, M. (1997) **Effectiveness of clinical guidelines for the presumptive treatment of streptococcal pharyngitis in Egyptian children.** *Lancet*, 350(9082), 918-921.

Background. Primary prevention of acute rheumatic fever requires antibiotic treatment of acute streptococcal pharyngitis. In developing countries, clinicians must rely on clinical guidelines for presumptive treatment of streptococcal pharyngitis since bacterial culture and rapid diagnostic tests are not feasible. We evaluated the WHO Acute Respiratory Infection guideline in a large urban paediatric clinic in Egypt. Methods. Children between 2 and 13 years of age who had a sore throat and pharyngeal erythema were enrolled in the study. Clinical, historical, and demographic information was recorded and a throat culture for group A (beta)-haemolytic streptococci was done. Sensitivity (% of true-positive throat cultures) and specificity (% of true-negative throat cultures) were calculated for each clinical feature. The effect of various guidelines on correct presumptive treatment for throat-culture status was calculated. Findings. Of 451 children with pharyngitis, 107 (24%) had group A (beta)-haemolytic streptococci on throat culture. A purulent exudate was seen in 22% (99/450) of these children and this sign was 31% sensitive and 81% specific for a positive culture. The WHO Acute Respiratory Infections (ARI) guidelines, which suggest treatment for pharyngeal exudate plus enlarged and tender cervical node, were 12% sensitive and 94% specific; 13/107 children with a positive throat culture would correctly receive antibiotics and 323/344 with a negative throat culture would, correctly, not, receive antibiotics. Based on our data we propose a modified guideline whereby exudate or large cervical nodes would indicate antibiotic treatment, and this guideline would be 84% sensitive and 40% specific; 90/107 children with a positive throat culture would correctly receive antibiotics and 138/344 with a negative throat culture would, correctly, not receive antibiotics. Interpretation. The WHO ARI clinical guideline has a high specificity but low sensitivity that limits the unnecessary use of antibiotics, but

does not treat 88% of children with a positive streptococcal throat culture who are at risk of acute rheumatic fever. A modified guideline may be more useful in this population. Prospective studies of treatment guidelines from many regions are needed to assess their use since the frequency of pharyngitis varies.

Stewart, M.K., Parker, B., Chakraborty, J., and Begum, H. (1994) **Acute respiratory infections (ARI) in rural Bangladesh: perceptions and practices.** *Med Anthropol*, 15 (4), 377-94.

Acute Respiratory Infections (ARI) are a major cause of death in children under five in rural Bangladesh. A popular strategy for lowering ARI mortality in such settings includes detecting and managing pneumonia in children at the community level. The success of programs using this approach requires a well-trained community-based cadre of health workers and the appropriate utilization of services provided. Determinants of health care seeking behavior are clearly of interest in this regard. A qualitative study was conducted in Matlab, Bangladesh to describe community perceptions of signs and symptoms of ARI, case management behavior, and constraints to service utilization. Mothers recognized pneumonia and thought it to be caused by "exposure to cold." They were able to identify labored breathing, chest retractions, lethargy, and inability to feed as signs of severe disease needing treatment outside the home. Nevertheless, similar illnesses were sometimes believed to be due to attack by evil influences. In these cases, spiritual healers were sought and allopathic treatment was avoided or delayed. The mothers' observance of purdah and "proper" behavior were reported to play a role in prevention of child death from disease. Implications of this belief and its impact on service utilization are discussed. Suggestions for program managers are made in addition to recommendations for further research.

Stick, S. M., Burton, P. R., Gurrin, L., Sly, P. D., and LeSouëf, P. N. (1996) **Effects of maternal smoking during pregnancy and a family history of asthma on respiratory function in newborn infants.** *Lancet*, 348(9034).

Infants of mothers who smoke have reduced respiratory function and are more likely to develop wheezing. Little evidence is available on the effect of in-utero cigarette-smoke exposure as opposed to postnatal exposure to environmental tobacco smoke. We used a previously validated non-invasive method to measure the time to peak tidal expiratory flow (tPTEF) as a proportion of expiratory time (tE) in newborn infants soon after birth to examine the effects of a family history of asthma and in-utero cigarette-smoke exposure on the infants' respiratory function. Data suitable for analysis were obtained from 461 infants. In multivariate regression analysis, lower values of tPTEF/tE were independently associated with respiratory rate ( $\beta$  coefficient per 10 breaths/min 0.018 [SE 0.005],  $p < 0.01$ ), age ( $\beta$  coefficient per 10 h -0.008 [0.003],  $p < 0.01$ ), maternal smoking during pregnancy (>10 cigarettes daily;  $\beta$  coefficient -0.049 [0.022],  $p < 0.05$ ), maternal hypertension during pregnancy (-0.037 [0.015],  $p < 0.02$ ), and a family history of asthma (-0.028 [0.014],  $p < 0.05$ ). In-utero smoke exposure, a family history of asthma, and maternal hypertension during pregnancy are associated with reduced respiratory function after birth. We speculate that these factors adversely affect lung development in utero. *Lancet* 1996; 348: 1060-64

Stoilova, I., Alagyosoan, D., Ivanova, E., Haydushka, I., and Milchev, A. (no date) **Epidemiologic study of acute respiratory infections in hospitalized children with diarrhoea** *Problems of Infectious and Parasitic Diseases*.

The acute respiratory infections, ARI, and diarrhea are some of the most common reasons for the mortality in children under 5 years. The rate of these disorders among children is high. The aim of this study is to establish the incidence of ARI in hospitalized children under 5 years with diarrhea - shigelosis, salmonelosis and enterocolitis and to find out the risk factors and groups causing their

simultaneous manifestation. The study included 142 children under the age of 5 years, hospitalized with diarrhea and ARI. These patients represented 42.65% of all 333 children with Diarrheic Syndrom, hospitalized during the period January - November 1995. In 35.43% of the patients enteroinfections were etiologically established. Most of the ARI were pneumonias - 17.61%, bronchitis - 47.89% and acute inflammation of the upper respiratory tract - 32.39%. 90.83% of the cases were children under the age of 2 and 67.60% were infants. 71.13% of the patients were gypsy. The common risk factors, the decreased immunity as a result of the hypotrophy in the risk groups and the predisposition to one of these disorders played the main role for the simultaneous manifestation of Diarrheic Syndrom and ARI.

Strachan, D. P and Cook, D. G. (1997) **Parental smoking and lower respiratory illness in infancy and early childhood.** *Thorax*, 52(10): 905-914.

A systematic quantitative review was conducted of evidence relating parental smoking to acute lower respiratory illness in the first three years of life. Methods - Fifty relevant publications were identified after consideration of 692 articles selected by electronic search of the Embase and Medline databases using keywords relevant to passive smoking in children. The search, completed in April 1997, identified 24 studies ascertaining illnesses in a community setting, including five surveys of schoolchildren with retrospective ascertainment of early chest illness, and 17 studies of admissions to hospital for lower respiratory illness in early life. Thirty eight studies were included in a quantitative overview using random effects modelling to derive pooled odds ratios. Results - The results of community and hospital studies are broadly consistent, with only one publication reporting a reduced risk among children of smokers. The pooled odds ratios were 1.57 (95% CI 1.42 to 1.74) for smoking by either parent and 1.72 (95% CI 1.55 to 1.91) for maternal smoking. There is a significantly increased risk of early chest illness associated with smoking by other household members in families where the mother does not smoke (1.29, 95% CI 1.16 to 1.44). The associations with parental smoking are robust to adjustment for confounding factors, and show evidence of a dose-response relationship in most studies in which this has been investigated. Conclusions - The relationship between parental smoking and acute lower respiratory illness in infancy is very likely to be causal. Although it is impossible to distinguish the independent contributions of prenatal and postnatal maternal smoking, the increased risk associated with smoking by other household members suggests that exposure to environmental tobacco smoke after birth is a cause of acute chest illness in young children.

M J A Tasche, J C van der Wouden, J H J M Uijen, B P Ponsioen, R M D Bernsen, L W A van Suijlekom-Smit, J C de Jongste. (1997) **Andomised placebo-controlled trial of inhaled sodium cromoglycate in 1-4-year-old children with moderate asthma** *Lancet*, 350: 1055-1059.

Background Inhalation therapy with sodium cromoglycate is recommended as the first-line prophylactic treatment for moderate asthma in children. The availability of spacer devices with face-masks has extended the applicability of metered-dose inhalers to younger children. We studied the feasibility and effects of this therapy compared with placebo in children aged 1-4 years. Methods 218 children aged 1-4 years with moderate asthma were recruited through 151 general practitioners between March, 1995, and March, 1996. They were randomly assigned sodium cromoglycate (10 mg three times daily) or placebo, given by inhaler with spacer device and face-mask for 5 months. 167 (77%) children completed the trial. 131 (78%) of these children used at least 80% of the recommended dose. Of the 51 children who stopped prematurely, 23 had difficulties with inhaled treatment. The mean proportion of symptom-free days for both groups was greater for the treatment period than for the baseline period (95% CI for mean difference 5.1 to 17.5 cromoglycate, 11.9 to 23.3 placebo). The study in a general practice setting shows that inhalation therapy with a spacer device and face-mask is feasible in a majority of children below the age of 4 years. However, long-term prophylactic therapy with inhaled sodium cromoglycate is not more effective than placebo in this age-group. *Lancet* 1997; 350: 1055-59.

Tattersfield, A.E. **Limitations of current treatment.** *Lancet* 1997; 350 (suppl II): 24-27

Asthma is common and cannot be cured, and there is no convincing evidence that it can be prevented except in an occupational setting. It can be treated, however, and good care and optimum drug treatment can convert asthma from a major handicap to a minor inconvenience. Management of asthma has improved enormously over the past 20 to 30 years due to advances in both drug development and in the way that drugs and care are delivered. While recognising the importance of all aspects of management I will focus here on pharmacological approaches to treatment. Modern pharmacological treatment of asthma dates from the turn of the century when adrenal extract was first used to treat asthma. Progress has been dominated by the progeny of two endogenous hormones, adrenaline and cortisol, to the extent that  $\beta$ -agonists and corticosteroids now account for almost 90% of all prescriptions for asthma in the UK. Pharmacological treatment for asthma relies heavily on  $\beta$ -agonists and corticosteroids. The development of both classes of drug combined with a general improvement in management means that most patients with mild or moderate asthma can now enjoy a relatively symptom-free life. Many patients continue to have considerable morbidity nevertheless and these patients require a new addition to current treatment. How might this happen? Further substantial improvements to existing drugs are unlikely and whether any antibodies or antagonists to single elements of the inflammatory cascade will produce drugs that are more effective than corticosteroids is uncertain. Further understanding of the genetic determinants of asthma may help, depending on how polygenic asthma turns out to be in the final analysis. Immunological approaches seem to be sensible though the ethical considerations involved in carrying out prospective intervention studies in babies are enormous. The last approach, trying to identify the environmental factors responsible for asthma, could well be the most cost-effective way of finding new developments for treatment--and the best chance of finding therapeutic approaches other than drug treatment.

Teague, W. G. (1993) **Approach to Pneumonia in Infants, Children, and Adolescents: Agents, Diagnostic Strategies and Techniques, Treatments and Problems.** *Immunology and allergy clinics of North America*, 113 (1) 15.

As estimated two million children worldwide die each year from acute infections of the lower respiratory tract. Given this, it is imperative for the practitioner involved in the care of children to recognize the presence of these infections are to treat these young patients, appropriately. Included in this article are risk factors for infection, methods to select antibiotics according to age and the likelihood of specific pathogens, nosocomial and opportunistic infections, and invasive and noninvasive diagnostic methods.

**(1996) The challenge of asthma: Lancet conference 1997 (editorial).** *Lancet*, 348(9022).

The prevalence of asthma in children is increasing, and rising treatment costs and increasing morbidity add to the economic burden. Some comfort can be derived from mortality statistics, which show decreasing or static rates in those aged 5-40 since the late 1980s in most countries. Complacency about treatment, however, is unwarranted, as deaths in past decades associated with isoprenaline and fenoterol show, and as the limitations of existing treatments emphasise. Amid this gloom, are there reasons for optimism? At our 1997 conference, the fourth in our "challenge" series, we hope to identify and debate the issues, and to outline research and intervention goals, focusing particularly on prevention.

Why is asthma prevalence increasing? The degree to which a society is developed seems to be important, but what is detrimental about development remains unclear. Urbanisation might be a factor, but rural communities are not exempt. Although pollution seems an obvious candidate, for outdoor pollution at least the evidence points to a minor role in aggravating existing asthma, not to pollution as a direct cause of new asthma. Could indoor pollution be responsible? Can we be confident that reducing indoor allergens such as house-dust mite and pet dander will diminish asthma prevalence? We know that atopy remains the most important risk factor for asthma but not whether the increase in atopy

prevalence explains the increase in asthma. The evidence on respiratory infections is conflicting--some studies suggest a protective role of viral infection in early childhood, whereas others indicate a link with asthma exacerbations. It is tempting to speculate that dietary factors are relevant, yet proof of diet as a cause of asthma remains elusive. What about factors before birth? Maternal age, smoking in pregnancy, and allergen exposure during pregnancy and in the early months of life may all be influential. No single factor is likely to be responsible for the increase in asthma and the contribution of each needs urgent clarification before prevention can become a reality. How do environmental factors lead to the bronchial constriction, inflammation, and hyper-reactivity that characterise asthma? An augmented T-helper 2 cell response may regulate bronchial hyperresponsiveness and inflammation, but how this ties in with environmental triggers is unclear. Immunology has also influenced treatment, with new emphasis on early anti-inflammatory management to prevent airway remodelling, and immune suppression and modulation gaining support. However, there are many gaps in our knowledge of mechanisms. Genetic susceptibility is important, and understanding the relative contributions of genetic and environmental factors could aid the development of prevention strategies. Identifying those at high risk of asthma might then be feasible, as might manipulation of the relevant triggers. Results of allergen manipulation studies are encouraging, and suggest that wheezing in some groups can be reduced. Whether prevention, at a population or individual level, is a realistic goal will be for conference delegates to decide.

**The future of asthma (editorial)** *Lancet*, Volume 350, Number 9085, 18 October 1997

Choose one of the following. Asthma is a paediatric disease; an infectious disease; a developmental disease; an immunological disease; a genetic disease; or an environmental disease. At The Lancet's fourth international conference--The Challenge of Asthma, ably led by Anne Tattersfield from the University of Nottingham, UK, and supported by our latest supplement--2 days of conversation and debate produced one, perhaps the only, agreed conclusion. There is a compelling reason to develop new multidisciplinary lines of research. The prevalence of wheeze is increasing at the alarming rate of 5% per year. True, this global estimate hides massive variation.. Most investigators accept that genes predispose to asthma. But which genes and how remain contentious matters. Is asthma preventable? "It should be", according to John Britton, also from Nottingham. Yet asthma becomes more common even in marginally more prosperous towns. Researchers have yet to discover what part social and psychosocial factors have to play in the aetiology of asthma. But, for sure, the rate-limiting step in asthma will not be found in the genome. Community air pollution--ozone, sulphuric acid, and fine particles--can produce acute adverse effects on airways leading to increased hospital admissions. Whether pollution can cause asthma remains unproven. Dietary ingredients may also be important. Particular attention is currently being paid to the potential protective effects of antioxidants, such as vitamins C and E and selenium. Vitamin C intake, for example, is correlated with measures of lung function (see page 1149). And smoking should continue to be a focus for public-health strategies against asthma. John Britton suggested that as much as 15% of asthma could be eliminated if smoking was instantly extinguished. Asthma causes much disability through days lost at school and at work, and in premature death. Still, we are prone to think of asthma as an illness of minor importance, with symptoms that are amenable to easy treatment. This complacent view will not do. Asthma is preventable and funding of research ought to be judged by its potential impact on prevention.

Tokiwa, H., Nakagawa, R., and Horikawa, K. (1985) **Mutagenic/carcinogenic agents in indoor pollutants; the dinitropyrenes generated by kerosene heaters and fuel gas and liquefied petroleum gas burners.** *Mutat Res*, 157(1), 39-47.

Incomplete combustion of kerosene heater, and fuel gas and liquefied petroleum gas-burner emissions produces indoor pollutants that may be carcinogenic. The incomplete-combustion products from each type of appliance were therefore collected by adsorption on about 3 g of XAD-2 resin, and were extracted with benzene-methanol as a solvent for determination and

identification of mutagens in the Salmonella-microsome test system. Benzene-methanol extracts of the particulates generated by a heater and two burners showed extreme mutagenicity for strains TA97 and TA98 without S9 mix. Based on the results of analysis, a combination of high performance liquid chromatography (h.p.l.c.) and gas chromatography (GC), about 40-80% of the direct-acting mutagenicity in each crude extract showed the same h.p.l.c. and GC retention times as dinitropyrenes (1,3-, 1,6- and 1,8-isomers), and 1-nitropyrene. Moreover, other nitroarenes, 2-nitrofluorene, 1,5- and 1,8-dinitronaphthalene, and 4,4'-dinitrobiphenyl, were detectable in almost all samples, but their contribution to the mutagenicity of each extract was very low. Kerosene heaters were found to generate small amounts (0.2 ng/h) of dinitropyrenes, which are potential mutagens/carcinogens, only after 1 h of operation.

Tokiwa, H., Nakagawa, R., Horikawa, K., and Ohkubo, A. (1987) **The nature of the mutagenicity and carcinogenicity of nitrated, aromatic compounds in the environment.** *Environ Health Perspect*, 73, 191-199.

Gaseous substances such as nitrogen dioxide (NO<sub>2</sub>) and sulfur dioxide (SO<sub>2</sub>) stimulate the process of nitration of polycyclic aromatic hydrocarbons, and the transformation products display a broad spectrum of mutagenicity, genotoxicity, and carcinogenicity. Bacterial mutation by nitroarenes is specific. Tetracyclic nitroarenes are thought to be the most mutagenic compounds in the Salmonella test system, and some are carcinogenic in rats and mice. Furthermore, it was found that the mutational nitroarenes produced mostly DNA damage, which is subject to recombination repair in the rec assay system using *Bacillus subtilis*. Nitroarenes in the environment seem to be ubiquitous; the majority of the compounds are emitted directly from diesel emissions, kerosene heaters, and gas and liquefied-gas burners or heaters. In nitroarenes induced during incomplete combustion, nitropyrene and nitrofluoranthene derivatives are the most important mutagens/carcinogens for determining the chronic toxicity of nitroarenes overall.

Troncy, E., Collet, J., Shapiro, S., Guimond, J., Blair, L., Charbonneau, M., and Blaise, G. (1997) **Should we treat acute respiratory distress syndrome with inhaled nitric oxide?** *Lancet*, 350, 111-112.

No study has been appropriately designed to address the clinical outcome of ARDS patients treated with inhaled nitric oxide (NO). This pilot randomised controlled clinical trial of ARDS patients was implemented to study the efficacy of inhaled NO on lung function; the impact of inhaled NO on morbidity and mortality; and the feasibility of conducting a large multicentre trial. Comparison of follow-up effects (until day 10) in control and experimental (inhaled NO) groups on hypoxia score and venous admixture. 30 established ARDS (with lung injury score 4-5) patients were randomly allocated to usual care or usual care plus inhaled NO. All therapeutic interventions were standardised. Lung function was assessed by hypoxia score (PaO<sub>2</sub>/FiO<sub>2</sub>), dead space ventilation, lung compliance, and venous admixture. The optimal dose of NO was determined daily between 0.5 and 40 parts-per-million (ppm). The trial shows that inhaled NO in this population may improve initial gas exchange but does not affect mortality, and questions whether the etiology of ARDS is important for prognosis. After the initial improvement, the maintenance of lung indices to the same level suggests that NO was not more efficient, nor deleterious. However, the potential toxicity of inhaled NO at therapeutic concentrations should be the focus of future studies. Further studies should concentrate on preventive or early treatment (when the condition is more likely to be reversible) and on the use of inhaled NO in selected populations such as patients with ARDS induced by direct lung injury or those responsive to the therapy whatever the etiology. These populations should benefit the most from the use of NO with a possible effect not only on gas exchange but also on mortality.

Tupasi, T. E., Velmonte, M. A., Sanvictores, M. E. G., Abraham, L., De Leon, L. E., Tan, S. A., Miguel, C. A., and Saniel, M. C. (1988) **Determinants of morbidity and mortality due to acute respiratory infections: Implications for intervention** *J Infect Dis*, 157(4), 615-623.

Acute respiratory infections (ARI) were monitored every two weeks in an urban community in Metro Manila, Philippines, to determine the incidence and risk factors for ARI morbidity. Hospitalized children with acute lower-respiratory-tract infection (ALRI) were studied to determine case-fatality rates (CFR) and predictors for mortality. Incidence rates were highest in infants, 3.2-4.0 per person, followed by children one to four years of age, with corresponding rates of 3.0-3.4 per person. The risk factors for ARI morbidity were low socioeconomic status and age less than one year. A CFR of 5% in children with ALRI was observed. Malnutrition and a positive culture of blood were significantly risk factors for mortality. These identified risk factors underscore the value of primary health care interventions, such as the standard ARI case management, immunization, health education, promotion of breast-feeding, and vitamin A supplementation, as strategies for reducing ARI mortality in developing countries.

Uduman S. A., Ijaz, M. K., Kochiyil, J., Mathew, T., and Hossam, M. K. (1996) **Respiratory syncytial virus infection among hospitalized young children with acute lower respiratory illnesses in Al Ain, United Arab Emirates.** *J Communicable Diseases*, 28 (4), 245-252.

To establish the frequency and clinical pattern of Respiratory Syncytial virus (RSV) infection in the region, children under 3 years of age admitted for acute lower respiratory illness during two winter seasons of the years 1993-94 and 1994-95 were studied prospectively. Seventy two cases were diagnosed to have RSV infection among the 252 studied, representing 28.57% of these patients. The overall infection rate was 32.1% and 36.5% respectively for the two studied winter seasons. Among these children, 90% were under 12 months of age. A clinical diagnosis of sepsis and respiratory distress was entertained in five RSV positive cases and they were 1 month of age. The clinical pattern of RSV infection included bronchiolitis in 58.3% of cases, bronchopneumonia (19.4%) and pneumonia (11.1%). RSV activity was detected throughout the year with predominance during cooler months with an associated relative humidity (RH) between 50-60%. These results indicate that RSV plays a significant etiologic role among ALRI in hospitalized infants and young children in the Oasis region of the UAE. Factors such as RH, environmental temperature and lifestyle probably play an additional role in our region for the maintenance and dissemination of infection around the year.

Ulmer, W. T. (1990) **Bronchopulmonary diseases and the environment - A generation problem. Environment and pneumology: Damage recognition - Damage containment.** *Pneumologie*, 44(7), 871-874.

The bronchopulmonary system is at particular risk from environmental pollution. At the same time, numerous natural and personal confounding variables are also effective, and investigations need to give them careful consideration. In particular such diseases as pulmonary emphysema, bronchitis, obstructive airways diseases and carcinoma of the lung may be due to environmental factors. Highly reliable methods of detecting such diseases are presented. The use of these methods by specially trained staff with the requisite skills and knowledge, is a precondition for reliable results. Numerous uncertainties associated with these requirements led to a certain unreliability of the results obtained in earlier studies. Provided that the above requirements are met, the present state of the technological art makes it possible to identify even more subtle damage that can be caused by environmental factors.

Valcke, Y., and Van Der Straeten, M. (1992) **Changes in Lymphocyte Subpopulations in Patients Treated with Cefodizime for Acute Lower Respiratory Tract Infections.** *Infection*, 20 (Suppl), S58.



The influence of cefodizime (CDZ) on CD4 and CD8 lymphocytes was investigated in patients with ALRI and underlying respiratory diseases. Ten men and one woman were treated with CDZ for ten days. No adverse events were reported. Nine patients were clinically cured. Two required further antibiotic therapy. Leucocyte counts decreased significantly during treatment. Lymphocyte counts and CD4 cells both increased significantly in absolute and relative numbers. This resulted in an increase in CD4/CD8 ratio. These effects of CDZ may be of benefit for immunocompromised patients with bacterial infections.

Van Ginneken, J. K., Lob-Levyt, J., and Gove, S. (1996) **Potential interventions for preventing pneumonia among young children in developing countries: Promoting maternal education.** *Tropical Medicine and International Health*, 1(3), 283-294.

The views of various disciplines on the role of education in improving the health and survival of young children in developing countries are discussed, as well as the factors and processes explaining this impact of education and the influence which education could have on risk factors especially relevant to acute respiratory infections (ARI) and pneumonia. This is by reviews of the available evidence on the impact of maternal education on mortality and morbidity. Since there are hardly any data dealing with the impact of education on pneumonia mortality, we focus on post-neonatal mortality, assuming that it is a suitable proxy for pneumonia mortality. Evidence is summarized on several processes or mechanisms which could explain why there is such an impact of education on ARI mortality (and morbidity) in children below 5. An attempt is made to quantify the reduction in pneumonia mortality which has occurred during the past 10-15 years as a result of improvement in women's education. This will also give an indication of the magnitude of the potential benefits of education for health and survival in the years ahead. Throughout this report we define maternal education as the regular schooling received by women during their youth. Some may have followed additional adult education classes before they became mothers.

van Vliet, P., *et al.* (1997) **Motor vehicle exhaust and chronic respiratory symptoms in children living near freeways.** *Environ Res*, 74 (2), 122-132,

To examine whether motor vehicle exhaust from freeways has an effect on respiratory health of children, a cross-sectional study was conducted. Children attending schools situated less than 1000 m from major freeways in the Province of South Holland were asked to participate. The selected freeways carry between 80,000 and 150,000 vehicles per day. Separate counts for truck traffic indicated a range from 8000 to 17,500 trucks per day. At a total of 13 schools, 1498 children were asked to participate. From these children, 1068 usable questionnaires were obtained. Chronic respiratory symptoms reported in the questionnaire were analyzed with logistic regression. Distance from the freeway and (truck) traffic intensity were used as exposure variables. Cough, wheeze, runny nose, and doctor-diagnosed asthma were significantly more often reported for children living within 100 m from the freeway. Truck traffic intensity and the concentration of black smoke measured in schools were found to be significantly associated with chronic respiratory symptoms. These relationships were more pronounced in girls than in boys.

Vedal, S. (1995) **Outdoor air pollution and obstructive airways disease.** *European Respir Review*, 5(31), 323-326.

Data from controlled human exposure studies and observational population studies provide compelling evidence that ambient levels of several pollutants present in our air today can aggravate asthma, sometimes seriously. Similarly, observational population studies have provided good evidence that chronic obstructive pulmonary disease (COPD) can also be seriously aggravated by today's ambient levels of air pollution. Given the extensive data that have been collected, it seems reasonable to maintain

that air pollution can play a role in causing chronic bronchitis. However, no convincing data are available to support the notion that air pollution can cause asthma or emphysema. Original designs for population studies of asthma and COPD will be needed to better address the role of air pollution in causing obstructive airways diseases.

Vedal, S., Schenker, M.B., Samet, J.M., and Speizer, F.E. **Risk Factors for Childhood Respiratory Disease.** *Am Rev Respir Dis* 1984; 130:187-192.

Four thousand elementary-school-age children from a rural area of western Pennsylvania participated in a cross-sectional survey that consisted of a standardized respiratory questionnaire complete by their parents and spirometric testing at school. Spirographic tracings were digitized to obtain the FVC, FEV<sub>0.75</sub>, FEF<sub>25-75</sub>, Vmax<sub>75</sub>, and Vmax<sub>90</sub>, which were standardized for height, age, and sex for the subsequent analyses. Independent associations of potential risk factors with the standardized pulmonary fun

von der Hardt, H. (1985) **Air pollution and bronchopulmonary disease in children** *Monatsschr Kinderheilkd*, 133(1), 2-5.

In recent years air pollution was linked to the croup-syndrome and sudden infant death syndrome (SIDS). There is no doubt, that the incidence of bronchopulmonary disorders in infancy and childhood is higher than usual in more polluted areas. That has been proven especially for recurrent bronchitis and asthma syndrome. It may be possible, that there is a higher frequency of pseudo-croup in extremely polluted areas. However, there is no certain link between air pollution and SIDS. Indoor pollution, or pollution of the micro-environment, is as important as outdoor pollution regarding bronchopulmonary disease in infants and children. Smoking parents are the most important contribution to indoor pollution. Pediatricians should not only discuss airborne pollution but equally the importance of indoor environmental as having a negative influence on the respiratory system as well.

Wafula, E. M., Ouyango, F. E., Mirra, W. M., Macharia, W. M., Wamola, I., Ndiuya-Achola J. O., Agwanda, R., Waigwa, R. N., Musia, J. (1990) **Epidemiology of acute respiratory tract infections among young children in Kenya.** *Rev Infectious Diseases*, (12 Supplement 8), S1035 – S1041.

The epidemiology of acute respiratory tract infection (ARI) was investigated in a rural community 80 km north of Nairobi, Kenya. This research was conducted prospectively on 250 families with 470 children <5 years of age who were contacted every 8 days during the 3-year study. The yearly incidence of respiratory tract infections decreased from 5.2 to 3.4 during the study; <5% of these infections involved the lower respiratory tract. The incidence was inversely related to age, and the illnesses were generally mild and brief in length. Fifteen children died during the study period. The precise causes of death are unknown, but respiratory infections possibly played a role in most cases. This study emphasizes the importance of determining the risk factors responsible for unusually severe morbidity and high mortality in children with ARI in developing countries.

Wald, E. R. (1994) **Microbiology of Acute and Chronic Sinusitis.** *Immunology and allergy clinics of North America*, 14 (1), 31.

The microbiology of paranasal sinus infections can be anticipated according to the patient's age, clinical presentation, and immunocompetency. In acute sinus disease, viral upper respiratory infections frequently precede bacterial superinfection by *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Moraxella catarrhalis*. Staphylococci and respiratory anaerobes are common in chronic sinus infection, which also may be caused by the exacerbation of infection with the bacterial species that causes acute disease. Enterobacteriaceae may be found in patients with nosocomial sinusitis caused by prolonged

nasogastric and nasotracheal intubation. Finally, fungi may cause chronic disease in immunocompetent hosts or acute infection in immunocompromised patients.

Wallmo, K. and Jacobson, S. K. (1998) **A Social and Environmental Evaluation of Fuel-Efficient Cook-Stoves and Conservation in Uganda.** *Environmental Conservation*, **25(2)**, 99 - 108.

A significant factor contributing to deforestation is the expanding human populations' increasing demands on forests and forest products. In many areas, rural households rely solely on fuelwood collected from the forest for their domestic energy supply. Fuel-saving stoves, or improved cook-stoves, have been introduced to reduce fuelwood consumption and thus alleviate deforestation, but there is frequently little or no formal monitoring and evaluation of programmes; their success as both a development and a resource-conservation tool is therefore undetermined. A programme was implemented in communities surrounding two national parks in

Western Uganda to compare domestic fuelwood consumption of an improve cook-stove and the traditional cooking fire, and assess the attitudes of stove users and non-users towards the improved stove and resource conservation. A kitchen performance test conducted in 100 households in Kiziba, Kahangi and Matayisa/Bundinyama parishes showed that fuelwood consumption did not differ significantly between improved and traditional stoves under actual field conditions. Household surveys showed that respondents in all three parishes had positive perceptions of the improved cook-stove. Perceived advantages of the improved stove included the ability to cook more than one item at once, fuelwood savings, quick cooking, and smoke/accident reduction. Many problems cited with the stove were technical, such as chimney malfunctions and pot-holes being too large or small to accommodate cooking pots. Cost of the stove was the primary reason for non-adoption. Improved-stove users were more concerned with forest conservation than were non-users. The need for monitoring and evaluation of improved-stove programmes is strongly indicated if they are to continue to be implemented as tools for resource conservation.

Wesley, A. G. and Loening, W. E. K. (1996) **Assessment and 2-year follow-up of some factors associated with severity of respiratory infections in early childhood.** *J of South African Medicine*, **86(4)**, 365-368.

Objective. To assess the effect of some factors on the severity of acute respiratory infection (ARI) in children. Design. In a case control study children with pneumonia were matched with controls who had upper respiratory infection. They were compared in respect of nutrition, household crowding and smoke pollution, and the presence of current viral respiratory infection. Both cohorts were followed up for 18-24 months to determine if there was a difference in subsequent respiratory sequelae. Setting. Primary health care-based cohorts of peri-urban township children. Participants. Forty-eight children < 3 years of age with pneumonia (index cases) were matched by age and presentation time with controls who suffered only from upper respiratory infection. All came from underprivileged communities. Index cases were selected as they presented and the study was conducted between February 1988 and June 1991. Main outcome measure. Any difference between index cases and controls in respect of the four factors listed under 'Design'. Follow-up home visits determined whether subsequent sequelae of the two grades of ARI were different. Results. The presence of current viral infection at entry to the study was evident in 21 of those with pneumonia and 12 controls (difference between groups = 19.15%, 95% confidence intervals 0.25-38.05, P = 0.052). Overcrowding in the home was comparable. Index homes were occupied by a mean of 3.57 (SD 1.54) children and 5.26 (SD 4.84) adults, control homes by 3.51 (SD 1.80) children and 4.36 (SD 2.02) adults. Occupancy of the room in which the child slept was also not significantly different: index group mean 4.23 (SD 1.55) and controls 4.02 (SD 1.38) (mean difference 0.21, 95% CI 0.378-0.798, P = 0.485). Correlation of bedroom crowding with young age (< 1 year) or weight-for-age centiles was not significant in either cohort (r < 0.3 in all). The

prevalence of viral infection was not increased by degree of crowding in either group ( $P = 0.636$ ). Domestic smoke pollution was similar: cigarettesmoking occurred in 75% of index homes and 69% of control homes. Wood or coal fires were used in 19% of index and 14% of control homes. The nutritional status of both groups proved to be similar. Fifteen per cent of index children and 12% of controls had weight-forage centiles  $\leq$  10th centile (difference = 3.26%, 95% CI - 10.72 - 17.24,  $P = 0.649$ ). Two-year home follow-up visits were completed in 75% of the index and 69% of the control group. The balance were followed up for 18 months. There was no difference between index and control children in the recurrence of respiratory symptoms ( $P = 0.664$ ) or need to visit a health facility ( $P = 0.302$ ). Conclusions. Factors shown elsewhere to contribute to the acquisition or severity of ARI could not be demonstrated as important in this study. The children with pneumonia and their matched controls with upper respiratory infections came from equally overcrowded and smoke-filled homes, had comparable nutritional status which was not markedly poor, and had an equal incidence of current viral infection. Subsequent ill-health was not found to be greater in the pneumonia group.

Willumsen, J. F., Simmank, K., Filteau, S. M., Wagstaff, L. A., and Tomkins, A. W. (1997) **Toxic damage to the respiratory epithelium induces acute phases changes in vitamin A metabolism without depleting retinol stores of South African children.** *J of Nutrition* 127(7): 1339-1343.

Whereas there is much information concerning the effects of vitamin A status on response to infectious challenge, the effects of infection or trauma on vitamin A metabolism and status are less well documented. These relationships need to be understood to optimize clinical and public health programs to improve vitamin A status and health of children in less-developed countries. We measured acute changes in retinol and retinol-binding protein in 57 young South African children hospitalized following respiratory epithelial damage resulting from accidental ingestion of kerosene. In addition, vitamin A status, as measured by the modified relative dose response test, of these children 3 mo later was compared with that of neighborhood control children to determine whether their illness had depleted retinol stores. Plasma retinol was already significantly below control levels when children were admitted (geometric mean (95% CI): 0.57- $\mu$ -mol/L (0.48-0.67) compared with 1.15  $\mu$ -mol/L (1.021.30) for controls) and decreased further the following morning (0.38  $\mu$ -mol/L (0.31-0.46)). Significant differences in retinol-binding protein were not detected until the next morning (5.99 mg/L (4.70-7.63) compared with 14.0 mg/L (11.8-16.6) for controls) and were not as large as the relative differences in retinol. This dissociation between changes in retinol and its binding protein suggests that there may be increased retinol uptake by certain tissues during the acute phase response. The proportion of case children (37/46, 80%) with inadequate liver retinol stores 3 mo after the illness was slightly, but not significantly ( $\chi^2 = 2.16$ ,  $P = 0.14$ ), greater than the proportion of control children (28/42, 67%). Acute respiratory illness therefore did not further deplete retinol stores in this population in which stores were already frequently inadequate.

Wilson, W. E.; Suh, H. H. (no date) **Fine particles and coarse particles: Concentration relationships relevant to epidemiologic studies.** U.S. Environmental Protection Agency, Research Triangle Park, NC, USA.

Fine particles and coarse particles are defined in terms of the modal structure of particle size distributions typically observed in the atmosphere. Differences between the various modes are discussed. The fractions of fine and coarse particles collected in specific size ranges, such as total suspended particulate matter (TSP),  $PM_{10}$ ,  $PM_{2.5}$ , and  $PM_{10-2.5}$ , are shown. Correlations of 24-h concentrations of  $PM_{2.5}$ ,  $PM_{10}$ , and  $PM_{10-2.5}$  at the same site show that, in Philadelphia and St. Louis,  $PM_{2.5}$  is highly correlated with  $PM_{10}$  but poorly correlated with  $PM_{10-2.5}$ . Among sites distributed across these urban areas, the site-to-site correlations of 24-h PM concentrations are high for  $PM_{2.5}$  but not for  $PM_{10-2.5}$ . This indicates that a PM measurement at a central monitor can serve as a better indicator of the community-wide concentration of fine particles than of coarse particles. The fraction of ambient

outdoor particles found suspended indoors is greater for fine particles than for coarse particles because of the difference in indoor lifetimes. Consideration of these relationships leads to the hypothesis that the statistical associations found between daily PM indicators and health outcomes may be the result of variations in the fine particle component of the atmospheric aerosol, not of variations in the coarse component. As a result, epidemiologic studies using PM<sub>10</sub> or TSP may provide more useful information on the acute health effects of fine particles than coarse particles. Fine and coarse particles are separate classes of pollutants and should be measured separately in research and epidemiologic studies. PM<sub>10-2.5</sub> and PM<sub>10-2.5</sub> are indicators or surrogates, but not measurements, of fine and coarse particles.

Woodring, J. L., Duffy, T. L. Davis, J. T., and Bechtold, R. R. (1985) **Measurements of combustion product emission factors of unvented kerosene heaters.** *Am Ind Hyg Assoc J.* 46 (7), 350-6.

Emissions of combustion products from unvented kerosene heaters were measured in an exhaust system used to ventilate the units. Measurements of carbon monoxide, nitrogen dioxide, sulfur dioxide, formaldehyde and particulates are reported and compared with the results of several other studies. Dilution ventilation requirements to maintain occupational and air quality standards are presented.

Yang C.-Y.; Wang J.-D.; Cha C.-C.; Chen P.-C.; Huang J.-S.; Cheng M.-F. (1997) **Respiratory and irritant health effects of a population living in a petrochemical-polluted area in Taiwan.** *Environmental Research*, 74(2), 145-149.

Reported herewith are the results from an ongoing study of outdoor air pollution and the health of persons living in the communities in close proximity to petrochemical industrial complexes. To determine if there is an excess of adverse health outcomes in the population exposed to petrochemical industrial emissions, a health survey was under-taken in 1996 in this area and in one reference area which has no local industrial emissions. The subjects were 436 adults (30-64 years of age) living in the Sanwei area (exposed area) and 488 in Taicei (reference area). For several indicators of respiratory health, including cough, wheezing, and chronic bronchitis, the prevalence rates were not significantly different between the study and the control populations. Acute irritative symptoms (eye irritation, nausea, throat irritation, and chemical odor perception) were significantly more common in the exposed area, particularly perception of chemical odors (84.6% vs 2.1%). It is concluded that exposure to petrochemical air emissions may be associated with increased rates of acute irritative symptoms. Future studies are needed to identify the potential role of petrochemical industrial emissions (particularly volatile organic compounds) in the genesis of acute irritative symptoms in a nearby petrochemical industrial area.

Young S.; O'Keeffe P.T.; Arnott J.; Landau L.I. **Lung function, airway responsiveness, and respiratory symptoms before and after bronchiolitis.** *Archives of Disease in Childhood* 72(1): 16-24 1995

**Abstract:** Acute viral respiratory illness during infancy has been implicated as a precursor for subsequent lower respiratory morbidity in childhood. A prospective, longitudinal study of respiratory function, airway responsiveness, and lower respiratory illness during early childhood was performed in a cohort of 253 healthy infants to characterize those who experienced bronchiolitis. Seventeen infants (7% of the cohort), were given a diagnosis of bronchiolitis during the first two years of life with two (1%) requiring hospital admission. Seventy one per cent of those infants with bronchiolitis had a family history of atopy, 53% of asthma, and 29% had a mother who smoked cigarettes. These family history characteristics in this group with bronchiolitis were not different from the rest of the cohort. There were also no differences in the number of older siblings, the number breast fed, the duration of breast feeding, or socioeconomic status of the families between those that did and did not get bronchiolitis. Respiratory

function was assessed at 1, 6, and 12 months of age. Maximum flow at functional residual capacity (ovrhdot V-maxFRC) was measured using the rapid thoracic compression technique. Resistance (Rrs) and size corrected compliance (Crs/kg) were obtained from a single brief occlusion at end inspiration. Airway responsiveness was assessed by histamine inhalation challenge and the provocation concentration of histamine resulting in a 40% fall on ovrdot V-maxFRC from baseline (PC-40) was determined. Respiratory measurements were ranked into terciles to assess the distribution of infants who developed bronchiolitis through the cohort. At the age of 5 weeks, a significant trend was observed for infants who subsequently developed bronchiolitis during the first year of life to have baseline ovrdot V-maxFRC values in the lowest tercile (odds ratio 3.16, 95% confidence interval 0.87 to 11.6). Rrs, Crs/kg, and PC-40 were not different at any age between the bronchiolitics and the cohort. Cough and wheeze were noted to be frequent before the episode of bronchiolitis. This study has demonstrated that infants who develop bronchiolitis have evidence of pre-existing reduced respiratory function and lower respiratory symptoms. It is proposed that bronchiolitis, although potentially contributory, is not usually causative of subsequent lower respiratory morbidity.

Zejda, J. E., Skiba, M., and Mensik, I (1996) **Lung Function in Children of Upper Silesian Industrial Zone, Poland: Results of the cross-sectional study in two towns of different ambient air pollution levels.** *Central European J. of Public Health*, 4, 252-254.

In two groups of children aged 7-9 years residing in two towns in the most industrial region of Poland, Chrozow (C-"higher air pollution") and Mikolow (M- "lower air pollution"), lung function testing was performed in a cross-sectional manner in order to examine if the spirometric indices in children depend on the ambient air pollution levels as assessed by area measurements. The between-town difference in ambient air quality was statistically significant with respect to particulate and gaseous pollutants (SO<sub>2</sub> and NO<sub>2</sub>). IN Chrozow 855 and in Mikolow 356 children were studied. Both groups (C and M) were similar in terms of sex, age, height, and weight. N boys, the group mean values of lung function indices (in % of predicted values) were for FVC: C-98.1, M-98.0; FEV<sub>1</sub>: C-109.5, M-107.8; PEF: C-84.3, M-80 (p,0.05); MEF<sub>50</sub>: C-105.5, M-100.4 (p 0.05); MEF<sub>25</sub>: C-100.5, M-93.7 (p 0.05). In girls, the respective values were for FVC: C-100.4, M-100.3; FEV<sub>1</sub>: C-107.5, M-107.1; PEF: C-78.4, M-77.6; MEF<sub>50</sub>: C-103.5, M-104.2; MEF<sub>25</sub>: C-97.6, M-99.9. Stratification for the presence of respiratory symptoms or exposure to environmental tobacco smoke did not change the between-town differences in boys' lung function. These findings were confirmed by the results of multivariate analyses. The study did not provide evidence that children living in Chrozow had poorer lung function compared with children living in Mikolow. The results highlight problems regarding a cross-sectional approach to the investigation into the effect of ambient air pollution on lung function, such as the study design, the validity of exposure assessment by means of stationary monitoring, the subjects' age and sensitivity of the evaluation of lung function.

Zhang, J. and Smith, K.R. (1996) **Hydrocarbon emissions and health risks from cookstoves in developing countries.** *J Expo Anal Environ Epidemiol*, 6 (2).

The nonmethane hydrocarbon emissions from several types of cookstoves commonly used in developing countries were measured in a pilot study conducted in Manila, the Philippines. Four types of fuel, i.e., wood, charcoal, kerosene, and liquefied petroleum gas (LPG), were tested. Because kerosene was burned in three different types of stoves, there were six fuel/stove combinations tested. Fifty-nine nonmethane hydrocarbons were identified frequently in emissions of these cookstoves, with emission ratios to CO<sub>2</sub> up to 5.3 x 10<sup>-3</sup>. The emissions were quantitated with emission factors on both a mass basis (emissions/kg fuel) and a task basis (emissions/cooking task). On a task basis, combustion of biomass fuels (wood and charcoal) generally produced higher emission factors than combustion of fossil fuels (kerosene and LPG). One type of kerosene stove (wick stove), however, still generated the greatest emissions of some individual and classes of

hydrocarbons, indicating that emissions were dependent on not only fuel types but also combustion devices. Some hydrocarbons, e.g., benzene, 1,3-butadiene, styrene, and xylenes, were of concern because of their carcinogenic properties. The lifetime risk from exposures to these compounds emitted from cookstoves was tentatively estimated by using a simple exposure model and published cancer potencies.

Zheng, W., Blot, W.J., Shu, X.O.,; Diamond, E.L., Gao, Y.T., Ji, B.T., and Fraumeni, J.F. Jr. **Risk factors for oral and pharyngeal cancer in Shanghai, with emphasis on diet.** *Epidemiol Biomarkers Prev (UNITED STATES) Sep-Oct 1992, 1 (6) p441-8.*

A population-based case-control study of oral and pharyngeal cancer was conducted in Shanghai, China, from 1988 to 1990, in which 204 (115 male, 89 female) incident cases and 41 (269 male, 145 female) controls were interviewed. Cigarette smoking and alcohol consumption, as well as occupational exposures to asbestos and to petroleum products and the use of kerosene stoves in cooking, were associated with increased risk of oral and pharyngeal cancer. In addition, more cases than controls reported having chronic oral diseases and false teeth. Dietary intakes of 42 major foods and selected salt-preserved or deep-fried foods during the past 10 years, ignoring any recent changes, were measured by a structured quantitative food questionnaire. After adjusting for known etiological factors, risks decreased with increasing intake of fruits, particularly oranges and tangerines, and some vegetables, including dark yellow vegetables and Chinese white radish. Men in the highest tertile of intake of these fruits and vegetables had about 30-50% the risk of those in the lowest tertile, with a less pronounced effect among women. A new finding was an excess risk associated with high consumption of salt-preserved meat and fish. The findings from this study provide further evidence that dietary factors play an important role in the development of oral and pharyngeal cancer.

Zaman K., Baqui A. H., Yunus, M. D., Sack R. B., Bateman O. M., Chowdhury, H. R., and Black R. E. (1997) **Acute respiratory infections in children: A community-based longitudinal study in rural Bangladesh.** *J of Tropical Pediatrics, 43(3), 133-137.*

A community-based longitudinal study conducted in Matlab, a rural area in Bangladesh, investigated acute respiratory infections (ARI) among children. A cohort of 696 children under 5 years of age was followed for 1 year yielding 183,865 child-days of observation, Trained field workers visited the study children every fourth day. Data on symptoms suggesting ARI, such as fever, cough, and nasal discharge, were collected for the preceding 3 days by recall. To determine the type and severity of ARI, the field workers conducted physical examinations (temperature, rate of respiration, and chest indrawing) of children reporting cough and/or fever. The overall incidence of ARI, was 5.5 episodes per child-year observed; the prevalence was 35.4 per hundred days observed. Most of the episodes (96 per cent) were upper respiratory infections (URI). The incidence of acute lower respiratory infections (ALRI) was 0.23 per child per year. The incidence of URI was highest in 18-23-month-old children, followed by infants 6-11 months old. The highest incidence of ALRI was observed in 0-5-month-old infants followed by 12-17-month-old children. Among 559 children who were followed for 6 months or longer, about 9 per cent did not suffer any URI episode and about 16 per cent suffered one or more ALRI episodes. About 46 per cent of URI and 65 per cent of ALRI episodes lasted 15 days or more. The incidence rates of URI were higher during the monsoon and pre-winter periods, and that of ALRI at the end of the monsoon and during the pre-winter periods. Sociodemographic variables were not associated with the incidence of URI or ALRI. The study documents ARI to be a major cause of morbidity among rural Bangladeshi children.

Zapasnik-Kobierska M. H. (1979) **Paediatric aspects of sinubronchial syndrome** *Otolaryngol Pol, 33 (Suppl), 27-32.*

The author discusses the causes leading to the development of sinubronchial syndrome in children, especially the immaturity of the respiratory system evidenced by morphological investigations, and a poorly developed immune system, particularly the local immunity of the mucosa. Attention is called to the importance of mother's milk in the resistance of the newborn and infant, and also to the genetic features of the individual immune response. The course of viral and bacterial infections of the respiratory tract is influenced essentially by numerous exogenous factors, among them atmospheric pollution and home environment. In a clinical material comprising 212 children with chronic bronchitis follow-up investigations were carried out in 92 children aged from 3 to 14 years. In 42 children sinubronchial syndrome was diagnosed. In 27 children the first nasopharyngeal infection developed in infancy. A separate problem was children with atopic asthma and recurrent obturative bronchitis. In about one-fourth of these patients clinical and radiological signs of sinusitis were found. In summary, it must be stated that co-operation of laryngologists and paediatricians is essential for the diagnosis of sinubronchial syndrome.