

Abstracts

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Children's Health and the Environment. Program at the Commission for Environmental Cooperation of North America - Applying Science to Policy

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The Commission for Environmental Cooperation (CEC) of North America was established to monitor environmental impacts resulting from the North American Free Trade Agreement. The CEC Council, consisting of the three Federal Environment Ministers of Mexico, USA and Canada, announced an initiative to address health effects on children from environmental toxins and factors.

A symposium on Children's Health and the Environment in North America was held in Toronto, May 2000, where scientists, policy makers and children's advocates met to discuss the issues of the Effects of the Environment on Children's Health. This led to Council resolution 00-10 on Children's Health and the Environment which committed the three governments to work together to develop a Cooperative Agenda on Children's Health and the Environment in the three countries with a special emphasis on:

Asthma and respiratory disorders.

The toxic effects of lead and other chemical substances on children.

The resolution also called for the formation of an Expert Advisory Board on Children's Health and the Environment which was convened in October 2001.

The Trilateral Cooperative Agenda on Children's Health and the Environment subsequently developed as a blueprint for the projects that would be undertaken to better protect children from environmental threats.

The projects that have been initiated include:

Asthma Surveillance – to develop a framework for North American children, not only to collect data in comparable ways but to juxtapose this information on environmental monitoring data, e.g. air pollution. Assess the impact of diesel exhaust at congested border crossings, health of children.

Develop a special Taking Stock Report on Toxics and Children's Environmental Health. This is a report of industrial emissions on the North American continent and their effects on children's health.

Development of North American indicators of children's environmental health.

Develop common methodologies in North America for Risk Assessment with special consideration to the vulnerabilities of children.

Develop a report on identifying exposures of children to lead in consumer products in North America.

Develop a report on the economic impacts of children's environment related illnesses.

Health care professional training in North America. Identify gaps and barriers and develop methodologies for increasing knowledge base among health care providers in the areas of children's health and environment.

The Expert Advisory Board on Children's Health and the Environment has also played a role in other programs of the CEC e.g. the Sound Management of Chemicals Program. The purpose to address decisions that are made by identifying impacts that these decisions may have on children's health and developing a collective vision of improving the health of children by protecting them from environmental hazards.

This presentation will discuss how the EAB on Children's Health and the Environment have worked together with the three governments to effect progress in improving the health of children and the difficulties encountered with these issues.

Air pollution, Asthma and the UK Science-Policy Interface

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The political need to show action has driven policy-making on air pollution in the UK. Thus we have the declaration of a 'safe' threshold where no threshold exists (for PM10) and definition of a headline indicator that shows rural pollution as worse than urban air pollution. Denials that outdoor air pollution causes asthma in children, and that it affects more than a small fraction of "sensitive" people show that a non-precautionary approach has prevailed. Public health advice is slow to take on board the evidence that children indulging in outdoor physical activity in higher ozone pollution tend to develop asthma. The science-policy interface needs to overcome such institutional failure; scientists need to be detached from policy-making, scientific uncertainties should be included for open discussion and appraisal by stakeholder mechanisms. Capacity building among NGOs is needed. Stakeholder forums function poorly when technical capacity on the public side is needed, so there's preference for citizens' juries or panels to hear and debate evidence from all sides, including NGOs and independent scientists.

Children's Health Research Program: Perspectives of the Chemical Industry and the Long-Range Research Initiative

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The chemical industry has made visible and firm commitments to fulfil its obligation to understand the potential human health and environmental risks associated with its products and processes. This presentation will describe research that addresses the children's health component of the industry's Long-Range Research Initiative (LRI) program.

The primary goal of the LRI is to increase knowledge of the potential impacts that chemicals may have on the health of human and wildlife populations and the environment. Achieving this goal requires that the LRI improve the scientific foundation of the risk equation (hazard X exposure = risk). The chemical industry has committed to sponsor independent third-party research that will provide valuable information in assessing risks to health and environment from the impacts of chemicals.

Increasingly, the public and regulatory organizations are focusing their attention on understanding the susceptibility of developing organisms to chemical exposures and acting on that susceptibility. For humans, susceptibility to chemicals can be due to a host of factors that can be categorized broadly into two themes: (1) differences in biological sensitivity, and (2) differences in exposure. The average individual receiving the average exposure to chemicals is typically not at risk. Thus, understanding those factors that will put some populations at higher risk is important. Such understanding facilitates the identification of impacts in susceptible populations and therefore prevention of those impacts. At present, most assessment methodologies assume that all people exposed are very sensitive and they all receive a very high exposure. Such assumptions may be protective, but they do not lead to accurate risk assessments and cost-effective risk management strategies. The current emphasis of the LRI is on understanding the susceptibilities of children, but other factors such as advanced age, gender, or genetic make-up need to be considered as well.

The LRI program in susceptibility will be described and centers on factors that will influence the relationship between exposure and dose to target organ and the adequacy of default factors used in risk assessments to protect infants and children.

Reality with Several Understandings: The Outdoor Environment narrated by Children and interpreted by Professional Urban Planners.

Hanne Wilhelm, associate professor, dr.ing. Oslo School of Architecture

The Norwegian planning legislation strengthened in 1989 the position of children in society by implementing national guidelines. Today we can resume that the reform was only partly successful. Knowledge about children in the outdoor environment is extensive, but the exception proves the rule when children's interests are regarded the most important. The goal for study was therefore to go behind the public rhetoric and to establish a greater understanding for the mechanism in use by professionals. The aim of the study was to illuminate the parts of the traditional urban planners and architects practice that could be revised if children's narratives are to be accommodated.

The point of departure was a Norwegian study which formed part of the international study *Growing up in Cities*. It is based on the narratives of 38 children, 9 through 13 years old, from two neighborhoods and on interviews with eight architects, all from Trondheim. The discursive practices of the architects come forward in dialogs with the researcher around the children's photos. The urban planners and architects habitus guide them to divide spaces for children based on functions and fixed categories. Thus the structure of their knowledge contradicts, to a certain extent, the narratives about everyday life given by the children. The Norwegian concept of childhood is strongly related to the use of green spaces. But it does not imply children's great appreciation of all kinds of green and open spaces in the city. Traffic is also significant, but for architects it is related to problems to be solved, while for children it is assigned to the mastering of their environment. To accept reality with several interpretations by including children's views is one of the ways to secure current policies better.

Creating Healthy Environments for Children: Reflections on Children's Perceptions and the Challenges for Research and Policy

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Policy interpretation concerning Children Health and Environment is as much a social and political, as a scientific, process. Children's health and environments are affected by a myriad of social, cultural and political processes which tend to reflect the dominance of adult (and economic) values and interests and particular views and priorities with respect to children. Yet, despite most adults showing concern about children's health and well being, children tend to have little influence on the powerful forces that shape their lives. This raises critical questions about approaches to research, policy learning and implementation with respect to the health and well being of children and children's role in that process.

This paper will begin by setting out a wider 'whole systems' perspective on children, health and environments by raising critical issues, dilemmas, paradoxes and contradictions concerned with wider macro social processes which impinge on children's health and well being. The paper then draws on two pieces of research – the UNESCO supported 'Growing Up in Cities' project and 'Mind the Gap', (an innovative piece of work bringing professionals and young people together to create healthy futures for young people in a London Borough) – to highlight the value of involving children and young people as equal partners in research, policy learning and interpretation processes. The paper uses examples to highlight the importance of social rather than just physical environmental factors on children and young people's risk perceptions; but also how young people's perceptions and priorities (eg stress, pressure, relationships, conflict with adults, alienation and mental well being) rooted in their everyday lives, may be at odds with policy formulations. The paper concludes by making a case for a more participative, whole systems approach to research and decision making which has children at its heart and which engages with the wider systemic complexity which influences children's health and well being.

Children and Urban Space

Josine van den Bogaard, Municipal Health Service for Rotterdam area, The Netherlands

An important but often overlooked factor for a healthy development of children is the possibility to play in the urban environment. The right to play is one of the articles (nr 31) in the UN Convention on Children's Rights. However, children spend less time playing outside and less time without control of adults, because of perceived unsafety, busy agenda's, institutionalization of their lives.

Scientific studies into urban space and children's health are scarce en scattered, but suggest that the availability of space (m²) for outdoor play and the quality of the space affect the physical, mental and social health of the children. Some results:

- Areas with variation and natural elements stimulate motorical and cognitive skills and 'health as a whole'.
- Heavy traffic in the street gives rise to social isolation.
- Living in a disadvantaged neighborhood is associated with greater behavioral problems in late childhood (independent of SES).
- Asthmatic children spending more hours outdoors have less symptoms.
- Parents with children able to play safely outside the house have less conflicts (abuse!) with the children.

Factors of urban planning and design are not often taken into account when tackling health issues. For example obesity: a growing health problem among youth, one of the 3 priorities in the Prevention policy of the Dutch government. One of the key determinants when fighting obesity is the daily amount of physical activity. Environmental factors, like human scale neighborhood design and attractive pedestrian and cycle paths encourage physical activity of children (and adults). It seems hard to defeat the enslaving television and computer programmes, but most children prefer outdoor games, fresh air and meeting real friends above virtual ones. Yet the public health sector does not advocate these health needs to the urban planning sector. And urban planners themselves are not aware of these long term issues.

Conclusions for the public health sector:

- Research programmes on children's health and the environment should incorporate studies into effects of urban design on the promotion + protection of health.
- Public health policy and interventions to improve child health must take urban planning into account.

Review on State of the Art in Children and Noise

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The objectives of this presentation are to review the current knowledge on the effects of noise on children's health and cognition, to identify the gaps in research and to highlight the policy implications for the protection of children from noise.

Noise, usually transport noise from aircraft and road traffic, has been associated with annoyance responses and reduction of quality of life in children. Effects on mental health have been mixed. Aircraft noise, and to a lesser extent road traffic noise have been linked with impairments in children's school performance, notably reading comprehension and episodic and working memory. Evidence from the Munich study suggests that these cognitive impairments improve if noise is removed. Small elevations of blood pressure in response to noise exposure have been found in some studies although the results are inconsistent. In keeping with psychophysiological arousal associated with noise, some studies have found elevated stress hormones in response to chronic aircraft noise exposure. Although children may be vulnerable to cognitive impairments from noise they are more resilient than adults in terms of sleep disturbance from noise. Areas of relaxation and quiet may help children, through a process of psychological restoration, recover from exposure to chronic environmental noise stressors. Prolonged exposure to loud music may also affect children's hearing with long-term consequences.

Although the effects of aircraft noise on children's cognitive performance are well established there is little evidence for the mechanisms that might explain these effects. Moreover, it is uncertain whether sound insulation in schools or educational strategies might be used to prevent or overcome these effects. Further research on mechanisms and interventions is needed.

Review on State of the art in Children and Neurodevelopmental toxicants

Janna G. Koppe, em. Professor of Neonatology, University of Amsterdam. Chairman foundation Ecobaby

Recent data seem to confirm for Europe the apparent increase of ADHD (Attention Deficit Hyperactivity Disorder), Autism and neuropsychological and neurobehavioural problems. According to American estimates the percentage of children born or developing neurodevelopmental disorders is 3-8 %. If this is applied for Europe than 2-8 million children are affected by these conditions, like in the USA.

Environmental factors can negatively influence neurodevelopment. To study these factors they are divided in three groups.

1. Voluntary exposure (alcohol, smoking, drugs)
2. Involuntary exposure (PCBs, Dioxins, Pesticides, Lead, Mercury, second-hand smoke, PAHs, Stress, Noise)
3. Therapeutic exposure (Anticonvulsants, Steroids, DES, radiation)

Depending on the stage of development an environmental stress factor can cause different abnormalities. A factor like the anticonvulsants can cause congenital malformations when applied in early pregnancy, later on in pregnancy brain function is negatively influenced resulting in a lower IQ, behavioural problems and an abnormal sexual brain development. These effects are mediated by induction of enzymes in the liver on a not appropriate moment leading to a decrease in hormone levels and vitamins. Background levels of dioxins and PCBs are more related to problems with myelination during the brain growth spurt around birth and it is still not clear if this is due to a lowering of the thyroid hormone level or to direct toxic effects on the oligodendrocytes. An example of a direct toxic effect on neurons during early development is chlorpyrifos.

That the stage of the development is important is also demonstrated by the fact that autism can be caused by thalidomide at the end of organogenesis (day 49) when brain structure is formed. Autism is diagnosed in 1:1000 children, but autism spectrum disorders is 1 in 200.

The incidence of ADHD is 2-4% and is related to smoking mothers, and that makes other oxidants like dioxins suspect. There is a genetic factor in this disease, but this alone cannot explain the number of these children that are now diagnosed as ADHD and successfully treated with ritalin.

Besides these outspoken neurodevelopmental disorders like autism and ADHD there can also be an overall lowering of a few points in IQ, as is seen at follow-up in relation to PCB-exposure in pregnancy in the Netherlands and the USA and Germany. From a public health point of view this is a disaster. The lowering in IQ was most related to prenatal exposure, and both breastfeeding and a good home environment seem to protect against these negative chemical influences and must be recommended. Levels of dioxins and PCBs are decreasing on the moment in Western Europe, but are still too high. Measures to lower levels in food are indicated.

Smoking and alcohol are wellknown neurodevelopmental toxicants and must be avoided in pregnancy and childhood, both active smoking and second-hand smoke.

About 1- 3% of pregnant women are heavy drinkers. But even the drinking of 3-6 units of alcohol in a week can have negative influences on the developing child.

Lead is a neurodevelopmental toxicant. Recent research reveals that there is not a safe level. All measures to protect children against this pollutant are indicated. Mercury is also a neurodevelopmental toxicant, but two famous studies one in the Seychelles islands in the Indian ocean and one in the Faroe islands in the Atlantic ocean are conflicting. No harm was found in the Seychelles population while there were neurodevelopmental abnormalities found in the Faroese population. Multiple exposure to other environmental stressors differing for these populations f.i. the PCB levels might explain this finding.

Of many other chemicals and heavy metals no data are available and of other neurotoxicants like Cadmium, Aluminium, Manganese, Arsenic, Monosodiumglutamate, Formaldehyde are not known to cause neurodevelopmental disorders in general in Europe, but may do so in specific situations and need further research.

In general intrauterine growth retardation and lower birthweight as is seen in relation to the pesticide chlorpyrifos and PAHs are strong indicators for environmental stressors.

More insight and research is needed in both the number of the different neurodevelopmental diseases in countries and their relation with environmental factors.

Indicators of Children's Health and the Environment — A Canadian Perspective

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This presentation will describe the Canadian perspective on accessing data on children's health and the environment indicators for a Commission for Environmental Cooperation (CEC) project. The CEC brought Canada, the United States (US) and Mexico along with partners including the Pan American Health Organization, the World Health Organization and the International Joint Commission together to identify appropriate indicators in December, 2002.

The CEC was established to build co-operation among the NAFTA partners, Canada, Mexico and the US in protecting shared environments, with a particular focus on the opportunities and challenges presented by continent-wide free trade. In 2002, the Ministers of the Environment for the three countries adopted the *Co-operative Agenda for Children's Health and the Environment in North America* at a CEC Council meeting to guide CEC activities in this area. One of the projects identified to support the Agenda was a report on indicators of children's health and the environment. Twelve indicators of children's health and the environment were identified at the meeting in December, 2002. The first report is scheduled to be published in September 2004. It was recognized that each country may not have data on all indicators for the first report. However, efforts would be made to populate as many indicators as possible with a goal to provide more data in second and subsequent reports.

The purpose of the report is to "provide decision-makers and the public with periodic, understandable information on the status of key parameters related to children's health and the environment in North America as a means of measuring and promoting change." The project also contributes to commitments made at the World Summit on Sustainable Development in Johannesburg, South Africa, and to the World Health Organization's initiative to promote the development of indicators of children's health and the environment worldwide. The presentation will identify the process to select appropriate indicators and describe the steps to finding Canadian data to populate the indicators.

National Environmental Health study of Swedish children

Marie Becker, The National Board of Health and Welfare, Sweden

In Sweden the environmental quality criteria will act as an important tool for guidance of the development of health protection. To assess children's environmental exposure and their overall health, information on different prevalences is necessary. The environmental health study will contribute with important information, the report will be published in January 2005.

Study design

42 000 parents of children in three age strata, 8 months, 4 years and 12 years, were invited to participate in this study. In Stockholm, children of 8 years were also recruited. Questionnaires, specially designed for each age strata, were constructed.

The questions address various aspects for example, indoor- and outdoor environment, health conditions, diseases, allergic conditions, and if perceived symptoms are related to specific environments or situations. Questions about noise, odours and food habits are also included in the study. Register data will also be used in the study.

Distribution of questionnaires

The questionnaires will be distributed evenly throughout the year 2003, due to significant variations in both climate and daylight hours in Sweden over the year.

Validation of the questionnaire

The questionnaires will be consecutively validated in 750 children (250 children from each age strata). The validation will include an interview and a medical examination, including lung function, blood pressure and atopic constitution.

Contributors

The Environmental Health report was initiated by The National Board of Health and Welfare and is a joint project with the Institute of Environmental Medicine, Karolinska Institutet, Stockholm, and the Department of Occupational and Environmental Health, Stockholm Center for Public Health, Stockholm County Council.

County participation

To enable region-specific analysis, counties were offered to increase the number of studied children in their regions by covering the costs for extra questionnaires. Ten out of twenty-one counties chose to extend the study in their respective regions.

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From Theory to Action: Pilot Application of the Global Initiative on Children Environmental Health Indicators in the Eastern Mediterranean Region of the World Health Organization

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Responding to several international calls for action to improve monitoring of children's environmental health, the Global Initiative on Children's Environmental Health (CEH) Indicators was launched at the World Summit on Sustainable Development in September 2002. This will contribute to achieving the objectives of the Healthy Environments for Children Alliance. The CEH indicators initiative will be implemented as a pilot in selected countries to refine assessment and reporting methodologies in addition to building national and regional capacities in monitoring the status of children's environmental health. The country pilots will feed into regional reports which in turn will contribute to a global report on the state of children's environmental health.

Several assessment and reporting options were identified for testing and refinement:

- Use of existing international data sources, e.g. World Health Survey (WHS)
- Complementary collection of new data through international surveys, e.g. Demographic and Health Surveys (DHS)
- Country-based provision of existing data into a common framework.
- Complementary collection of new data at the national level, e.g. Thai school survey

The Eastern Mediterranean Regional Office (EMRO) pilot started in Oman and Tunisia December 2003 for completion by March 2005. Other pilots in Iran, Yemen and Pakistan are in the planning stage. The main objectives:

- a) Assess the availability, accessibility, accuracy and reliability of information on CEH
- b) Assess and prioritize the environmental health risk factors affecting children within the home environment and its immediate surroundings.
- c) Refine CEH indicators in view of regional conditions and promote their use as a tool for decision making to improve environmental conditions for children
- d) Establish a monitoring system of EH risk factors affecting children in pilot countries
- e) Sensitize the policy makers and encourage action to improve management of the environmental risk factors affecting children's health.

EMRO pilot concentrates on assessment and reporting risk factors within the home environment and its surroundings including: household water security (quantity and quality); sanitation; personal and food hygiene; shelter and housing quality; indoor air quality; out door air quality; physical safety; and chemical safety. These priority issues were identified for action at the November 2002 consultation convened by the Task Force on EMRO Children Environmental Health Initiative.

The project implementation approach is designed to encourage action and increase awareness of children environmental health conditions in addition to reporting and prioritizing risk factors. The approach:

1. Prepare preliminary report with descriptive and numerical account of the status of children environmental health in the pilot countries
2. Present the preliminary report to national seminar.
3. Undertake a population-based assessment (i.e. household survey) of the EH risk factors affecting children.
4. Prepare report on the assessment including analysis of findings and trends. The report shall be accompanied with the database on the population based surveys and the survey methodology.
5. Generate the national report on the Status of Children Environment Health and present to a national seminar.

Pilot countries will generate a preliminary country report on the status of children's environmental health using the CEH indicators framework. The report will be largely draw on accessible existing information sources within the respective countries including:

- a) Health and nutrition surveys, demographic survey, housing and living conditions surveys.
- b) Routine health and environment surveillance information.

The preliminary country reports will provide descriptive and numerical accounts of the status of children environmental health conditions. In addition, the reports will assess the availability and coverage of information, in time and spatially, on each issue . Analysis of the accuracy, reliability and accessibility of information will also be provided and information gaps identified.

Household surveys will be conducted to assess and prioritize the risk factors affecting children within the home environment and its immediate surroundings. Both the exposure conditions and health effects will be assessed. Health effects include morbidity from childhood diarrhea, acute respiratory infections, and physical injuries.

The survey modules are developed not only to report the status of exposure and health effects but also to provide data for investigative analysis of the risk factors. For example:

- Household water security is a priority issue in EMRO countries and several countries are seeking WHO guidance on minimum water requirements for health in order to develop service provision targets and to protection of public health. Thus the water security, sanitation, and hygiene module investigates in details the sources of domestic water supply, sources of drinking water, volumes of water available and consumed at households, water handling and storage practices, household sanitation facilities, and household hygiene facilities. The outcome of this module will contribute to:
 - a) Identifying more reliable indicators for household water security than just the commonly used indicator on access to safe water supplies.
 - b) Contribute to the body of evidence that is being generated for supporting WHO guidance on minimum water requirements for health.
- The survey module on indoor air quality will investigate indoor tobacco smoking, use of kerosene as a heating fuel, and the effects of closed and air-conditioned household environments in the hot Arabian Gulf countries.

The WHO/EMRO expert consultation on minimum household water security requirements for health, December 2003, recommended that a minimum of 5000 under-five child population is needed to establish reasonable linkages between household water consumption and the incidence of diarrhea. Accordingly the Tunisian survey is intended to reach 5000 under-five children by visiting 12,000 households. The Omani survey will be conducted together with the World Health Survey in October 2004 investigating about 5000 households with an estimated 7500 under-five children population.

Making a Difference: Making Indicators that can improve Children's Environmental Health

David Briggs, Department of Epidemiology and Public Health, Imperial College London

Children throughout the world are the main victims of most environmental hazards – most especially in the developing world, where 75% or more of the environmental burden of disease falls on children, and some 80% of this on the very young. Except in rare, local situations, children have no voice in either identifying or resolving the risks that they face: they depend upon the perceptions, priorities and actions of adults to protect them. Patently, as the statistics on children's mortality and morbidity show, these remain inadequate. One way or another, adults need better, child-centred information to help them make the decisions and act to the benefit of children.

One means of obtaining this information is through the use of indicators. These are now an integral part of priority-setting and performance monitoring in almost every area of policy. As yet, however, there is little evidence that the indicators that have been developed – and there are tens of thousands of them in the area of environment and health alone – are either well-founded or effective. Simply producing more environmental health indicators may therefore not be the answer. What is needed is a change in the way in which we use indicators, and based on that a change in the attitudes of those concerned to information.

To achieve this, we need to re-examine the ways in which we devise and present indicators. At the local level, one thing is clear: wherever feasible, participation is the key. All stakeholders – not only policy-makers and scientists, but those who perpetrate the risk, those who communicate information about risks and above all those who are the victims of risk need to be involved. This rarely happens. More generally, there is a need to recognise indicators not as political devices (at worst comfort-blankets for politicians) that are merely intended to assuage the fears of the public, show them how well policy is working, or give simple sad- or smiley-face images of trends in the state of the world, but as challenges to our collective and individual conscience, and as tools that can be used to identify what is going wrong, why it's going wrong, and how to fix it. Indicators thus need to be more resonant: they need to give messages that cannot be ignored. They also need to be more insightful: they need to demonstrate and elucidate the complexities and many-to-many relationships that exist between environment and health. They need to act as a bridge between science and policy, between understanding and action.

This paper suggests ways in which this can be done in relation to indicators on children's health. In introducing a newly published report on children's environmental health indicators for WHO¹, it argues that the first need is to focus the indicators on the real issues that threaten children's lives. Globally, this means perinatal diseases, respiratory illness, diarrhoeal diseases, vector-borne diseases and accidents and injuries. If the indicators are to help develop preventive policies they also need to highlight the underlying causes of these problems, and give early warning of the risks and the effects of intervention. In terms of the more proximal risks this means focusing on the immediate settings in which exposures occur – especially the home environment. In terms of the more distal risks, this means recognising the institutional, political, economic and social forces that shape the wider (adult) world, and often condition people's perceptions and abilities to intervene. The indicators also need to provide a clear, balanced and sufficiently complete picture of all these factors – of the whole system of risk – in order to ensure that they do not merely create or maintain pre-existing biases, and enable the real interactions and interdependencies to be seen and acted upon. This means model-building. Equally, the indicators must be well founded, up-to-date and timely. This means that both the science and the data on which they are based must be active and sound, and linked into the indicator-building process. This demands research, survey and monitoring focused much more explicitly on children, and the environments in which they live.

¹ WHO 2003 *Making a difference: indicators to improve children's environmental health*. Geneva: WHO

Prenatal and Preconception Exposure to Carcinogens

Lorenzo Tomatis, International Society of Doctors for the Environment (ISDE)

The continuous progress and growing success of molecular biology and genetics have favored the studies on the pathogenesis of cancer and opened the way to a better understanding of the mechanisms underlying the carcinogenesis process. Nevertheless, it has also considerably decreased interest in the etiologic role of environmental agents. Humans are exposed throughout their life, and beginning prenatally, to the widespread presence in the air, water, soil and food of environmental carcinogens and to agents that may modulate risks of cancer as well as progression of the carcinogenesis process.

The first experimental evidence that fetal cells are susceptible to the carcinogenic action of chemicals was provided in 1940. In 1947 urethane was the first carcinogen for which was demonstrated a transplacental carcinogenic effect. Subsequently, numerous chemical carcinogens with different structure were shown to cross the placenta and interact with fetal cells in several species.

The first evidence in humans of a carcinogenic effect after prenatal exposure was reported in 1956: an increased risk of childhood leukemia was observed after exposure to radiation during pregnancy. In 1971 the occurrence of urogenital malformations and vaginal adenocarcinomas was reported to occur in young daughters of women treated with DES during pregnancy. There is little reason to ignore the possibility that exposure to other noxious agents could increase the risks for cancer. Chromosomal translocations characteristic of myeloid leukemia, probably caused by transplacental exposure to toxic chemicals (possibly pesticides) have been observed at birth in patients who later developed leukemia.

The results of several animal experiments showed an increased cancer risk in the progeny of parents exposed to a carcinogen before conception. The human evidence for a transgenerational carcinogenic effect is based on the results of several surveys of associations between occupational exposure of parents, mainly fathers, before conception and increased risks for childhood leukemia and other cancers. Particular attention was attracted by a report of an increased risk for leukemia among the progeny of fathers occupationally exposed to radiation. Increased rates of heritable germ cell lines mutations were found in populations exposed to radiation from the fallout of nuclear tests or following the Chernobyl accident.

Hans Jonas stated some years ago that people in every period of history have felt that a duty toward future generations. Recent progress in science and technology has extended our reach and has given us excessive power over our environment and over all living species on this planet. This would require considerable more wisdom and moderation as well as a greater sense of responsibility toward future generations than we have been able to express until now.

Genetic and Somatic Effects in Children following Internal Exposure to Man-made Radioactive Substances

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I suggest that the major cause of the increase in childhood cancer which has occurred this century is exposure to internal anthropogenic radioactive isotopes. I review evidence that supports this claim and explain how the risk model of the International Commission on Radiological Protection (ICRP) is unsafe because it does not deal adequately with anisotropic exposures.

A brief review of evidence begins with the 1959-63 atmospheric weapons test exposures to Strontium-90 in milk which increased infant mortality, particularly from congenital heart developmental defects. I focus on the pivotal Darby *et al.* (1993) Nordic leukaemia fallout study. This spliced together data from different countries at the peak exposure point but continuous time series Danish data from 1943 to 1982 (Clemmensen) show a significant 30% increase in childhood leukaemia 0-4 over this period in line with England and Wales data examined by Bentham and Haynes (1995) and the data show an increase in infant leukaemia also.

Authoritative dismissal of causality in the cases of the nuclear site clusters (Sellafield, Aldermaston, Dounreay, La Hague, Kruemmel etc.) is based on the ICRP model. But children near nuclear sites were exposed to internal radiation following sea to land transfer or resuspension and inhalation. Mismatch between ICRP predictions and observation requires errors of 300 to 2000-fold and other explanations were sought. However reports of infant leukaemia in the *in utero* cohort after Chernobyl from five countries (Busby and Scott Cato 2000, Busby 2002) are of critical interest since the expected yield in the *in utero* cohort for Wales and Scotland based on well characterised exposures also demonstrates similar errors in the ICRP calculation but unlike the nuclear clusters, in this case radiation can be the only cause. If these errors are real then the increases in childhood (and also many adult) cancers over the century can be mainly attributed to anthropogenic radiation exposure.

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Childhood Cancer Burden in Europe

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Objectives

Even if rare, cancer represents one of the major causes of children's mortality. The improvement of treatments over the last three decades has produced impressive gains in survival, but late effects of therapies often impair survivor's health and quality of life. Ongoing surveillance is thus needed to evaluate health care needs in this increasing survivors population. In this context the prevalence measures support cancer burden assessment and interventions planning. The presentation will report the main results of the EuroPreval study, aimed at estimating prevalence in the European areas covered by population-based cancer registries.

Contents summary

An overview of incidence and survival in Europe for the major childhood cancers will be given, to better interpret prevalence patterns. Incidence rates for childhood cancers in Europe 1993-1997 ranged from 11 to 20 per 100,000. The higher levels were registered in Nordic countries and in Italy. Incidence rates are slightly increasing (about 1% yearly) everywhere.

All cancers survival at 5 years, was on average 73% in Europe (Eurocare-3 study) and a wide geographical variability was observed. Survival improved about 5% yearly everywhere over the period 1983-1994.

Overall prevalent proportion in European children was 71 per 100,000 in 1992, and about 60% of the patients were diagnosed within the last 5 years. Inter-countries differences were remarkable and reflect incidence and survival geographical patterns. US cancer registries data show that childhood cancer prevalence was progressively increasing by 2% yearly over the period 1990-2000. Since comparable survival improvements have been observed, we expect a similar trend also in Europe.

Conclusions

Childhood cancer survivor population has increased in the recent past and is expected to continue growing in the future. Specialised cancer units are needed for optimal care and for post-treatment follow-up of patients in this particular age span. It has been reported that about two thirds of childhood cancer patients experience at least one late effect of therapies. In one out of four cases this late effect is serious or also life threatening.

Environmental Risks for Children in Hospitals and Opportunities for Prevention

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Objectives of the research:

Reduce children's exposure to toxic chemicals in hospitals.

Content summary:

Hospitals expose children to toxic chemicals. Medical devices, building and furnishing materials, cleaning chemicals, and disinfectants are all potential sources of exposure to toxic chemicals. As we assess the potential for adversely affecting the health of children in hospitals through the unintentional exposure to toxic chemicals, it is important to acknowledge that children, infants, and even the unborn child, are exposed to toxic chemicals before entering the hospital. Children do not enter health care free of toxic chemicals.

Phthalates are an example of a class of chemicals that the unborn child, infant, and pre-pubertal child is exposed to both prior to and within the hospital. Phthalates, especially di-(2-ethylhexyl) phthalate (DEHP), are of concern because some of them have caused reproductive and development effects in animals. DEHP is of particular concern because it: a) is widely used in polyvinyl chloride (PVC) medical devices used to treat children; b) can leach from the medical device and expose the patient; and c) causes adverse effects to the male reproductive tract (in animal studies) at doses approaching the levels of exposure in certain medical procedures.

The United States (US) Food and Drug Administration (FDA) has identified medical procedures that may result in exposures above the agency's "tolerable intake" (TI) level. Exposures below the TI should not result in adverse effects. Procedures for neonates that may exceed the TI are: exchange transfusion, total parenteral nutrition (TPN) administration, enteral nutrition, extracorporeal membrane oxygenation (ECMO), and aggregate exposure from multiple medical devices.

Conclusions:

Doctors can reduce DEHP exposure in hospitals by using products that are not manufactured with DEHP. For many medical devices, DEHP-free alternatives that meet the performance needs of doctors are on the market.

Dioxins and Children's Health: Health Care's Responsibilities in Creating and Preventing Dioxins

Dr. Vyvyan Howard, University of Liverpool, UK, Magnus Hedenmark, Health Care Without Harm Europe

Objectives of the research:

Reduce the role of hospitals in creating dioxins

Content summary:

The discovery that medical waste incinerators were a leading source of dioxin emissions in Europe and North America came as a surprise in the late 1980s to hospitals. And to this day medical waste incinerators remain a significant source of dioxins. It is a sad irony that the health care sector, whose goal is "first do no harm," should be a leading source of dioxins. The developing fetus and children are especially vulnerable to exposure to dioxins. Dioxins are carcinogenic, reproductive and developmental toxicants, as well as endocrine disruptors.

For example, very low single fetal doses have permanently altered reproductive tract development and sexual behavior in animals. Dioxins are carcinogenic at very low doses (ng/kg in rodents). In rodents, prenatal exposure increases the risk of breast cancer in adulthood after exposure to another mammary carcinogen. And fetal and adult exposure to dioxins have caused changes in estrogen and testosterone levels and decreased thyroid hormone levels in newborn infants at ambient concentrations (findings based on animal studies).

Conclusions:

Hospitals contribute to the formation of dioxins by burning their waste and purchasing products made with polyvinyl chloride (PVC). PVC production is a known source of dioxin emissions and the presence of PVC in medical waste incinerators can contribute to dioxin formation. PVC is often the principal source of chlorine in medical waste incinerators, and chlorine is essential to the formation of dioxins. Hospitals can prevent dioxins by curbing their burning of waste and purchasing of PVC products.

Engaging Pediatricians in Children's Environmental Health: Successes in Latin America

Dr. Lilian Corra, Argentinean Society of Doctors for the Environment

Objectives of the research:

Learn how to engage pediatricians in children's environmental health.

Content summary:

In caring for children and interacting with parents pediatricians can play a unique role in addressing children's environmental health. Pediatricians are beginning to play a leading role in addressing the environmental hazards faced by children. Some are taking an environmental history of their patients to better understand their physical environment and potential environmental causes of illnesses. Some are working with governments and non-governmental organizations to understand the potential environmental origins of children's disorders and develop solutions to prevent environmentally-related conditions in children.

This paper will address how pediatricians can be engaged in children's environmental health. The forum was the 33rd Congress of the Argentinean Society of Pediatrics; held in October 2003 in Mar del Plata, Argentina. At the Congress the Argentinean Society of Doctors for the Environment, International Society of Doctors for the Environment, and the World Health Organization organized a series of events to educate and engage pediatricians in children's environmental health. The events included: a day-long workshop of internationally-recognized experts on children's health and the environment, a round table during the conference, and a meeting of the presidents of seven South American Pediatric Associations. The meeting of the presidents of the pediatric associations culminated with them signing a joint declaration on children's environmental health: the "Declaration of the Presidents of the Pediatric Societies of the Southern Cone on Children's Environmental Health." In the declaration the presidents of the pediatric societies agreed to do the following on children's health and the environment:

- educate and train their members
- investigate dominant problems
- advocate before their governments and national and international organizations
- assess the quality of children's environmental health in each of their countries
- promote actions for better knowledge and defense of the environments where children are born, grow-up, play, and learn

Conclusions:

A segment of pediatricians are open to engaging in and working on children's environmental health. However, to expand beyond the pediatricians' active in environmental health will require outreach, including workshops and gaining support from leaders in national associations.

Does Endocrine Dysfunction explain Neurobehavioral Adversity in Environmentally Exposed Children?

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The immature brain has received attention as a target for some chemicals, particularly for some metals and polyhalogenated aromatic hydrocarbons at elevated environmental levels of exposure. This is a significant issue, because dysfunctional brain development can result in longlasting or permanent neurobehavioral alterations later in life.

Endocrine disruption during early ontogenesis is a case in point. Hormones, as e.g. thyroid hormones or sex steroids, play an organizational role in brain development, and interference with their orchestrating the sequence of neurobiological events of brain maturation may give rise to neurodevelopmental disturbances. Thyroid hormones are one example. They regulate the proliferation, differentiation and migration of neurons, and severe hypothyroid conditions during brain development, if untreated, are known to result in cretinism. At the same time, however, some PCBs have experimentally been shown to give rise to hypothyroid dysfunction. It has, therefore been proposed that PCB-induced hypothyroid conditions might underly the PCB-related neurodevelopmental adversity observed in several studies worldwide. Such studies show negative associations between pre-/neonatal PCB-levels and developmental adversity. However, there is little information about mechanisms. The hypothyroid hypothesis, although biologically plausible and experimentally supported, has received little support in epidemiological studies, because reported associations between PCB-levels in children at birth and hypothyroid function are weak and inconsistent.

As for PCB-interactions with the sex steroid system during development and associated neurobehavioral outcome relevant experimental findings are available for both sexual and non-sexual endpoints. However, for example, behavioral feminization in male rats following developmental PCB-exposure has rarely been studied in human infants. A recent but still isolated example is feminized characteristics in boys with high pre-/neonatal PCB-exposure.

It may, thus, be concluded that the explanation of PCB-induced developmental neurotoxicity in terms of endocrine disruption, although biologically plausible, is not yet sufficiently consistent and coherent to pass conventional criteria of causal inference.

Endocrine Active Substances (EASs) – Potential Effects on Children’s Health?

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The OECD adopted the following working definition: An endocrine disrupting chemical is an exogenous substance that causes adverse health effects in an intact organism, or its progeny, secondary to changes in endocrine function.

Endocrine activity is a mechanism inducing functional changes that may or may not be adverse – there are many documented situations in which EASs cause changes without inducing ill effects.

Of the endpoints in children for which a potential association with exposure to EASs has been discussed, male reproductive tract abnormalities such as hypospadias and cryptorchidism, effects on testis function with affected sperm quality in adult life, and precocious puberty (for an overview see IPCS Global Assessment of EDCs, WHO, 2002) have received considerable attention.

Although hypothesized EAS exposure-effect relationships have been explored, much of the research to date has been compromised by methodological limitations. Geographical variations in incidence have been shown (e.g. for testicular cancer, low sperm counts), but the reasons for such differences remain unknown. The relevance of prospectively collected data, harmonised diagnostic criteria and registration with regard to these endpoints is emphasized, in particular if longitudinal analyses or geographical comparisons are intended to be performed. In order to obtain a realistic exposure assessment to EASs, exposures to and endocrine effects of natural, synthetic, and plant hormones need to be evaluated in conjunction with endocrine active chemicals. When the focus is on human data, e.g. from epidemiological studies, the multifactorial etiology of most diseases or disorders requires the appropriate consideration of other potential risk factors such as genetics, nutrition, lifestyle, socio-economic factors or infections.

To address the question raised in the title, large prospective cohort studies in children at multidisciplinary centres with standardised documentation of relevant health endpoints covering a range of exposures as wide as reasonably achievable are one of the most promising tools.

Water and Sanitation: The Implications for Children

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Although concerns related to toxics and pollutants have far higher visibility in the field of children's environmental health, poor provision of water and sanitation continues to be among the most globally significant environmental health risks for children. Thousands of children still die every day from preventable diseases related to inadequate provision; many more live with repeated diarrhea, worm infestations, skin infections and chronically challenged immune systems as a result of their unsanitary surroundings. The effects can be long term, and may include both physical and mental stunting. This paper reviews current knowledge on the disproportionate implications of poor water and sanitation for children's health and general development, considers the practical implications for children and their caregivers, and attempts to give some recognition to the true costs of the failure to respond to this ongoing emergency.

Implementing Safe and Effective Practices for Pesticide Use in Public Schools in the United States

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Pesticides have traditionally been relied upon for suppression of pests such as insects, mites, rodents, weeds and plant diseases and have routinely been applied in children's environments such as public school buildings and grounds. Exposure of children to pesticides has been determined to be health detrimental and should be avoided. However, presence of pests in schools also can be detrimental to children's safety, public properties as well as the learning process. Legislators of public schools in the United States are currently debating the standards and tolerances of pesticide use and children's protection. Recently, through the efforts of Purdue University, a successful integrated pest management (IPM) pilot program was developed and implemented in public schools throughout the state. This program was found to reduce strict reliance upon traditional chemical pesticides while improving pest control. Many progressive public schools have adopted this IPM system of managing pests. However, adoption requires directed implementation and demonstration in order to be effective. In addition, technical resources must support such an adoption if it is to be sustainable. The structure of this model implementation program will be presented.

Young Children's Exposure to Organophosphorus Pesticides in an Agricultural Area in Japan

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An investigation of young children's exposure to organophosphorus pesticide was conducted in an agricultural community during the summer of 2003, to evaluate their potential exposure to agricultural pesticides applied to fields near their living area. This study found that the application of pesticides polluted not only the outdoors, but also the indoor environment of young children and may possibly increase their exposure.

Organophosphorus pesticide is one of the main pesticides used for agricultural crops in Japan and the pesticides application using the remote controlled helicopter is increasing over recent years. In an area where residences and agricultural farm are mixed, there is concern the residents, especially the young children, suffer health hazards from the pesticides applied in neighborhood. Until now, most studies have not focused on the total living environment of young children.

In the surveyed community, trichlorfon was applied to the paddy field in July by the helicopter and fenitrothion was applied once in August. For 24 hours after the application, outdoor and indoor air was collected at four child daycare centers and about thirty residences where young children aged 0-6 years live. Other relevant information was collected by questionnaire. Trichlorfon was detected with the range of $3.6-227.1\text{ng/m}^3$ outdoors and $3.4-32.0\text{ ng/m}^3$ indoors, and fenitrothion was detected with the range of $7.8-625.2\text{ng/m}^3$ outdoors and $3.4-73.6\text{ ng/m}^3$ indoors. Dichlorvos, the potential degradation product of trichlorfon and higher in toxicity than the parent, was detected as well. The concentration of pesticides indoors showed a correlation with the outdoor concentration ($r=0.524$; $p<0.005$ for trichlorfon, $r=0.620$; $p<0.005$ for fenitrothion), indicating spreading of pesticides from the outside, inside.

Saving Children from Pesticide Exposure: Lessons from the Endosulfan Tragedy in India

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Objectives

Increasing exposure to pesticides in the living environment poses a threat to children in India. We review here this threat in view of the Endosulfan tragedy, keeping in mind the legal and constitutional provisions that exist to protect and safeguard the environment. The health problems among children in the villages surrounding the cashew plantations of Kasaragod, Kerala, reveal the effect of long term aerial spraying of endosulfan, a highly hazardous pesticide. A study of school children revealed higher prevalence of congenital malformations, changes in the reproductive system, learning disabilities and low IQ, suggestive of the toxic effects of endosulfan. Their blood samples also contained pesticide residues.

Summary

Following the expose', all that the state Govt. has done is impose a temporary ban on use of endosulfan. There has been no redressal system to ensure justice for the affected people. The Insecticide Act, 1968 has extensive rules regarding the manufacturing, licensing and sale of pesticides. Regulation of pesticide 'use' is narrowly confined to workers in direct contact during formulation, mixing and spraying. It does not specify any rules to protect or prevent communities from exposure as in Kasaragod. Other environment laws have no provisions regulating the use of pesticides.

Conclusions

The existing regulations are ill-equipped to implement any safety mechanisms for preventing exposure of children against toxic chemicals. Their susceptibilities are enhanced by- possible intranatal exposure, physical size, immature organs, metabolic rate, child behavior and lack of knowledge; confounded by poverty, malnutrition and infectious diseases. A better understanding of children's vulnerabilities and revamping of the existing regulations is necessary to ensure a safe living environment for our future children.

European Network on Children's Susceptibility and Exposure to Environmental Genotoxics

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The Concerted Action, Children Genotoxicity Network, explores gene-environment interactions during the foetal, neonatal and infancy developmental periods, concentrating on genotoxic exposures and environmental factors with focus on air pollution (traffic and tobacco). Six relevant research areas (work packages) have been chosen and these will be covered by 16 European research groups. The work packages are: 1) Literature study of (cyto) genetic data on children and protocol for establishment of a pooled database, 2) Mother Child cohorts/survey, 3) Placental exposure, 4) Impact of air pollution on pregnancy outcome and child development, 5) Risk assessment, 6) Ethics.

Since the kick-off meeting in February 2003, work has progressed and work-shops are planned for work packages 1, 2, 3, and 4. In work package 3, placental exposure, Copenhagen and Kuopio Universities are setting up placental perfusion systems which should yield results in the near future. In work package 6 (Ethics) state of the art in studies with focus on ethical issues in pre- and post-natal studies on children have been summarized. Special ethical issues arise from studies of environmental health contrary to clinical studies and clinical trials. These issues are related to incentives to participate, data protection, data storage and dissemination. Discussions of maturity age and assent/consent from children are also important. The network forms the basis for future projects within Europe, including new partners and with weight on exchange and mobility of young researchers. The network feeds information into the SCALE initiative by the commission. <http://brussels-conference.org/>
The network is described at website www.pubhealth.ku.dk/cgn

Comparison of DNA Sensitivity, Repair Efficiency, Apoptosis and Necrosis between Lymphocytes from Child and Adult Populations exposed to External Agents

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It is well known that in everyday life people get exposed to many genotoxic agents. Children are in a dynamic state of growth, and are therefore more susceptible to environmental threats than adults.

The aim of our study, using the comet assay, was:

- 1) To determine the amount of endogenous DNA damage in human lymphocytes of child (1-5 years old) and adult (40-50 years old) populations.
- 2) To find the sensitivity of their lymphocytes to the exposure of increased concentrations of γ -irradiation and H_2O_2 .
- 3) To investigate the DNA repair efficiency of these two populations, and finally,
- 4) To measure apoptosis and necrosis in the same populations.

Our results indicate that:

- 1) The endogenous DNA damage is smaller in the child than the adult population.
- 2) There is a difference in the sensitivity of child and adult lymphocytes after been exposed to γ -irradiation or H_2O_2 .
- 3) The DNA repair was more efficient in the child than the adult population, and finally,
- 4) The amount of apoptotic cells appears to be less in the child than the adult population while the number of necrotic cells seems to be the same.

The “Cocktail of Pollutants Principle” could help the Explaining of Complex Health Effects over Large Exposed Populations

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Mixes of pollutants acting simultaneously over large exposed populations could produce complex health effects. Most of human populations are exposed to “cocktails” of energy and materials. The “Cocktail of Pollutants Principle” we propose is defined by eleven conditions: 1) When “n” materials and “n” energies acts simultaneously or step by step in the same area and over the same exposed person or population, we can consider such mix as a cocktail of pollutants. 2) Each cocktail of pollutants has its own chemical and energy processes according sources of energies, environment, losses by absorption etc., and can evolve into different chemical and energy cocktails. 3) More the cocktail has complexity, more diverse and unpredictable could be their health effects. 4) The mix of different pollutants' cocktails (the drinking water cocktail, the food cocktail, the drug cocktail, the cosmetic cocktail, the urban air cocktail, the indoor air cocktail and so on) could create specific and more complex cocktails of hazards. 5) Any cocktail of pollutants could change over time. 6) When a person is exposed to a cocktail of pollutants, a cocktail of organic responses could be expected. 7) When a person simultaneously receives “n” materials and “n” energies, and “n” doses from each of them, his organism could react according sensitivities to each of them and to the mix. 8) When “n” pollutants interact within the exposed person, effects could be synergic, additive, neutral or reduced. 9) When “n” pollutants acts over the same person at the same or different times, but below legal intake limits, and their effects are the same, e.g. endocrine disruption or immune depletion, additive effects could be expected. 10) Any new pollutant or new concentration of existing pollutant shall be considered in his relationship with existing cocktail of pollutants. 11) When studying exposed populations, it's important to consider those factors that increase sensitivity to pollutants' cocktails (e.g. undernourishment, higher intake of water, air and soil per unity of biomass, higher skin surface per weight or volume, higher metabolism, pregnancy).

Human effects of pollutants on health (H_p) is a function of “n” cocktails of pollutants ($Ck_1, Ck_2 \dots Ck_n$), each of them constituted by a mix of identified materials (m) and energies (e). Ck_1, Ck_2 and Ck_n constitute a mega-cocktail. Another variables, like metabolism of each exposed person or population, and remaining variables, are indicated as F, G Z. In symbols:

$$H_p = f(Ck_1, Ck_2, \dots Ck_n; F ; G \dots Z)$$

Food Allergies, Cross-Reactions and Agroalimentary Biotechnologies

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The type of food allergy more commonly seen in older children or adults is associated with sensitisation to inhaled allergens (especially pollens) that often cross react with other pollens or various vegetal foods (12).

The history of unexpected allergic cross reactions began in 1970 with a report describing coincident allergies to *Parietaria* and banana (17) followed by reports describing a frequent coupling of allergies to birch and apple (18), mugwort and celery (19), and latex-banana-avocado (20). Over recent years the list of syndromes involving cross-reactivity between pollens, fruits and vegetables has steadily lengthened.

The problem of cross reactivity among pollens-vegetals and fruits is growing and has now extended to encompass taxonomically distant plant derivatives. Therefore immunologists and specialists in allergy have devoted their most recent efforts to discovering “pan allergens”, defined as ubiquitous substances in the vegetal world that could underlie the ability of the various vegetals to elicit identical IgE in predisposed subjects (41-42-43).

These efforts provided a clear evidence that rather than being constitutively present in vegetals, these pan allergens are substances which have precise defence functions in the vegetal world and can be produced by innumerable vegetals when necessary. These “plant defense-related proteins” or “ stress-inducible plant proteins” or “pathogenesis-related proteins” (PRP), despite their enormous and emerging complexity have been classified into 14 groups: vegetals produce them in response to infection by pathogens (fungi, bacteria, and virus) or after plant injury or application of chemicals (42-44-45).

No wonder these substances have long been known to those botanists and scientists who strive to seek more efficient ways of producing vegetal foodstuffs. Intense research efforts are of course underway to exploit this field commercially (45-51). For example, research conducted several years ago showed that if a transgenic plant is induced to express high concentrations of “chitinases” or of “lipid transfer proteins”, two well known PRP , it will become far more resistant to pathogens (49-50). Chitinase-producing microorganisms may in future be disseminated in the soil to create a space into which nematodes and fungi cannot penetrate (52). Species of cereals, fruits and vegetables acclimatized to be cultivated in cold or glacial temperatures survive thanks to chitinase or LTP (53-54). A recent article entitled “Will genetically modified foods be allergenic?” states that only few genetically modified vegetals have already been introduced commercially. These few include staples such as potatoes, soybeans and maize (57). But within years dozens of new vegetals capable of “protecting themselves against infection and infestation” will come onto the market.

These few data should suffice to delineate a possible “conflict of interest” between the Food and Agriculture Industry, whose duty it is on a planetary level to use scientific knowledge to feed the largest number of people as efficiently as possible, and the Public Health Service, whose duty it is to ensure that commercially available foods are in general healthy, and in particular, non allergenic for the many people who are predisposed.

We deem it urgent that the two realms, Medical Science and Agricultural Biotechnology begin to communicate openly. As so often happens, they may well discover that an ethical and rational approach will identify the problems we need to worry about so that much damage can be avoided with modest expense.

Aircraft and Road Traffic Noise and Children's Cognition and Health: Exposure-effect Relationships from the RANCH Project

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The RANCH project set out to examine exposure-effect relationships between chronic aircraft noise, chronic road traffic noise and combinations of aircraft noise and road traffic noise and reading comprehension, episodic memory, working memory, prospective memory, sustained attention, annoyance and psychosocial distress. This cross-sectional epidemiological study was carried out with 9-10 year old children living around major airports in three European countries; Schiphol Amsterdam in the Netherlands, Barajas Madrid in Spain and London Heathrow in the United Kingdom.

Children were selected to take part in the study on the basis of school noise exposure. In each country precise predictions of aircraft and road traffic noise exposure were obtained from noise contour maps, modelling and on-site measurements. The same paper and pencil tests of cognition and health were completed in each country. Response rates for the study were high and a total of 2844 children from 89 schools around these airports took part in the study. Data on potential socio-economic confounding factors were collected in questionnaires completed by each child and the child's parent.

A linear exposure-effect association was found between chronic aircraft noise exposure and reading comprehension, episodic memory and working memory. This effect was maintained after full adjustment for socio-economic confounders. A 5dB increase in aircraft noise exposure was equivalent to a 2 month reading delay in the UK. There were no significant associations between road traffic noise and any of the cognitive or health outcomes, except for annoyance. There was a curvilinear exposure-effect relationship between aircraft noise exposure and noise annoyance and a linear exposure-effect relationship between road traffic noise exposure and noise annoyance.

The results of the RANCH project provide evidence that aircraft noise exposure may impair child development and education. The study did not examine the highest levels of road traffic noise exposure, so an effect of road traffic noise at high levels cannot be ruled out by this study. The paper will also discuss the relevance of the findings of the RANCH project for policies on noise and health for children across Europe.

Effects of Aircraft Noise and Road Traffic Noise on Annoyance, Sleep Quality and Perceived Health in Children; The RANCH Study

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One of the objectives of the 5th Framework project RANCH (Road traffic and aircraft noise exposure and children's cognition and health) is to provide knowledge on exposure-response relationships in children between chronic noise and respectively annoyance and health. Although some previous studies have addressed this issue the data derived from three large field surveys among schoolchildren enable us to study the exposure-response relations in more detail. This paper describes the prevalence of annoyance, sleep-complaints and self-rated health complaints in relation to different levels and sources of noise exposure expressed in $L_{Aeq,7-23hr}$ on the pooled data and in $L_{Aeq,24,7-23hr,23-7}$ on the Dutch data.

Data are derived from a children, parent and teacher questionnaire collected at the three centres (Madrid, London and Amsterdam). The samples comprise of children aged 9-11 years visiting primary schools around London Heathrow Airport (N=1182), Amsterdam Schiphol Airport (N=737) and Madrid Airport Barajas (N=920). As part of a paper-and-pencil test battery, the children completed a questionnaire on perceived health, sleep quality, coping with noise, annoyance and noise interference with activities. Additionally, the parents of the children completed a questionnaire on annoyance, social support, environmental attitudes, perceived health and behaviour of their child.

Results confirm that there is a relatively strong association between noise exposure (both road and air) and annoyance, which is comparable to that of the parents, also after adjustment for confounding. These findings are consistent with earlier findings (see e.g. Lercher). The association of noise with sleep-complaint and perceived health is much weaker and might be mediated by annoyance.

Key-words: annoyance, sleep-quality, perceived health, air and road traffic noise, children

Science, Policy, and a New Children's Environmental Health Strategy

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Establishing reliable correlations between chemical contaminants in the environment and children's health outcomes is challenging. High-quality and reliable environmental monitoring data suitable for quantifying exposures are few, so understanding children's (or adults') exposures to chemicals is limited. The indicators of children's health that are available generally involve trends in hospitalization, specific diseases, and causes of death, but links between those outcomes and specific contaminant are rare. Furthermore, the "environment" includes many more complexities than just chemical contaminants, such as physical safety, nutrition, socioeconomic factors, infectious agents, naturally occurring substances, ultraviolet radiation, tobacco smoke, and natural disasters. Different scientists and politicians have made assertions about the extent to which environment plays a role in public health, but because the relationship between environment, other factors, and health is so complex and the definition of "environment" so variable and confusing, such assertions generally are not verifiable. A systematic approach to collecting vital statistics is needed that emphasizes the multifactorial nature of disease etiology. A consistent, integratable set of regional data bases comprising information on trends in children's morbidity and mortality, biological and environmental monitoring results, nutrition, socioeconomic status, health care, and other relevant indicators of children's health would be an important first step towards identifying problems and setting priorities. Improved data would provide extremely useful information for refining hypotheses for investigation, setting priorities for intervention, and evaluating the effectiveness of interventions; they will not establish cause-and-effect relationships connecting environmental contaminants and children's health problems, however. This paper attempts to identify what is known and what is not known about trends in children's environmental health in Europe, about contributors to those trends, and about trends in environmental contaminant levels, and recommends actions that would help provide a solid scientific basis for future children's environmental health policy and children's health protection.

Review of Current Situation with Defense of Children's Rights to Healthy Environment in Russia

Alla Dudnikova, legal group of the Euro-Asian chapter of International Network on Children's Health, Environment and Safety (INCHES), Russia

Objectives of the research

The analysis of potentiality of legal assistance of children's right to a healthy environment in Russian conditions.

Brief summary of the content

Special children's environmental vulnerability is not considered in Russian legislation. Defence of children's right to healthy environment is very difficult.

There is a gap between scientific achievements and using their results in making of legal decisions.

Legal Defence: Courts require conducting very expensive expertise to prove that even evident pollutants caused problems with someone's health. It is necessary to carry out it for each child. It is insuperable obstacle for the most of Russian people. So we need to find easier ways for proving cause-and-effect relation.

EIA: According to Russian legislation, now under EIA (Environmental Impact Assessment) project customer is not obliged to conduct assessment of effects from planned activities on children's and fetus health. Nevertheless this mechanism can be effective if we have conscientious experts. It is necessary to include the issue of special children's environmental vulnerability in the EIA.

General neglect to the legislation leads to special difficulty in using of legal instruments in Russia. And it reduces efficiency of legal assistance.

In Russia there is no governmental system of legal assistance of children's right to healthy environment. Not numerous precedents were made by NGOs including members of our Network.

The precedents:

Cheliabinsk – the bone atrophy (radiation)

Lipetsk – the chronic obstruction lung disease, tuberculosis (the ferrous metallurgy)

Nadvoici – the fluorosis (aluminum plant), etc.

Conclusions

It is necessary to develop a legal assistance of children's right to healthy environment in two ways contemporarily: the rule-making and the law enforcement with constant monitoring of the results for perfection of the processes. The legal group of the Network was founded for realisation of these tasks.

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Taking Action to Promote Children's Health and Environmental Safety

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There have been many attempts to put across the message that "children are not little adults" However, the phrase would become more meaningful only if it children's environmental health issues are placed at the forefront of public health policies that take into account their unique vulnerabilities on the background of their genetic susceptibilities. In the developing world or countries with very low gross national income (GNI) it is very difficult to create a separate program for children's environmental health even if we see an inverse relationship between GNP and the mortality rate of children under five. We learned that with very limited human, financial and technical resources building a separate infrastructure is not the answer in promoting healthy environmental for children. Thus, the objective of this presentation is to highlight experiences at the national level and relate this to existing recent international programs to promote chemical safety in children embodied in the decision documents of the Intergovernmental Forum for Chemical Safety (IFCS) and the efforts of the World Health Organization through the International Program on Chemical Safety and the Healthy Environment's for Children's Alliance. At the country level we would like to provide a CEH status report including a presentation of a curriculum for teaching pediatric environmental health integrated into the pediatric medical curriculum. We learned over time that integrating CEH to existing children health and protection programs would still be the most reasonable strategy at present to make it work. Highlights of some of the studies done in the Philippines on children and chemicals will be mentioned in this presentation. Beyond the country level, this talk will provide some insights regarding attempts for regional collaboration between organizations such as the networking being done through the Asia Pacific Association of Medical Toxicology by sharing resources between the Philippine Society of Clinical and Occupational Toxicology and the Malaysian National Poison Control Centre. There have been steps taken to conduct training and develop training materials. Thus, we can see that developing countries stand a better chance to move policy for children's environmental health by networking and collaborating at the local, national, regional and global levels so that the gaps can be narrowed and capacity building can be promoted.

The Impact of Insulating Homes on the Respiratory and General Health of Children

Howden- Chapman P.L, McDonald, S. C. and the He Kainga Oranga Research Group¹

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Objective of Research

To establish the relationship between cold damp houses and poor health among children with existing respiratory problems.

Poor housing conditions have long been identified as a source of ill health. Access to housing is an important socioeconomic determinant of health. Housing has also been identified as a key environmental determinant of health. However there is a lack of credible relevant research into these effects.

New Zealand housing is largely built of wood and surveys have shown considerable deferred maintenance. Most houses were built before the building code required insulation which results in indoor temperatures well below international averages and the WHO recommendation level of 18°C.

This study, using a randomised controlled design, compared the health of children and their families living in houses before and after the dwellings were insulated. It enrolled 1400 households living in seven communities across New Zealand. It sought to highlight possible causal pathway from increased temperatures and possibly reduced mould with improved health of the children living in the houses. The children living in newly insulated homes reported an increase in general health and a reduction in days off school. These self-report measures were compared to GP and hospitalisation records.

This research seeks to provide credible and relevant data on a household environmental factor readily amenable to intervention to inform policy development and action.

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Exposure of the Lower Airway to Biomass Particles in Ethiopian Women and Children

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Aim

To determine, whether carbon loading of alveolar macrophages (AM) can be used to as a marker of individual exposure to inhalation of biomass particles in women and children in Gondar, Ethiopia.

Approximately 50% of the world's population uses biomass fuels for cooking and heating. These fuels generate very high concentrations of potentially harmful pollutants. Of these, inhalable carbonaceous particulates (particulate matter (PM) <10 microns: PM₁₀) are the most biologically plausible mediators of the health effects of biomass burning. The most significant health effects are increased mortality from acute lower respiratory tract infections in children 0-5 years of age, and, in adults, chronic bronchitis. No study to date has validated indirect assessment, with *individual* exposure of the lower airway to biomass PM₁₀. Recently, we have developed a way of assessing individual exposure carbonaceous PM, utilising the capacity of lower airway alveolar macrophages (AM) to phagocytose and retain carbon, and the ability of individuals to cough them up after inhalation of hypertonic saline.

In this study, we utilised the phagocytic capacity of alveolar macrophages (AM) for inhaled particles to determine individual exposure to biomass carbon. AM were obtained using induced sputum from mothers (n=10) and their children (n=10) living in Gondar, Ethiopia, who were regularly exposed to biomass smoke. The mean area of cytoplasmic carbon per AM (μm^2) was determined by image analysis of 50 AM per individual. Carbon loading of AM in Ethiopia was compared with loading in non-biomass exposed adults (n=10) and unrelated children (n=10) living in a medium-sized UK city. Ethiopian women had higher mean cytoplasmic carbon compared with their own children (14.3 vs 5.8 μm^2 , p <0.01), and compared with UK adults (14.3 vs 1.8 μm^2 , p<0.001). Cytoplasmic carbon in Ethiopian children was elevated compared with UK children (5.8 vs 1.1 μm^2 , p<0.001).

We conclude that analysis of AM cytoplasmic carbon is a practical method for assessing individual exposure to biomass-particles in the developing world. Our data suggest that outdoor cooking partly protects older children from the highest levels of exposure.

Particulate Matter Air Pollution. Does Composition Count?

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Daily exposure to air pollution in urban zones is associated with an increase in morbidity and mortality, mainly affecting susceptible populations such as children. The increase in health risk is mainly associated with particulate matter (PM) and occurs even when ambient PM concentrations are below established air quality standards. Epidemiological associations have been done using current air quality standards which only comprise particle size and concentration, yet these studies do not address the issue of particle composition. Epidemiological findings from several cities around the world indicate that the greatest health risks correlate with smaller particles (PM_{2.5}), which have the ability to reach the distal regions of the lung following inhalation. However, the existence of some variation in the biological effects of PM from different cities has brought attention to the possible role of the various organic and inorganic components in the PM mixture in mediating adverse health effects. In particular, components such as transition metals, polycyclic aromatic hydrocarbons, and bacterial components (e.g., endotoxin) are known to be associated with PM. We have observed that the cytotoxic and proinflammatory *in vitro* effects of Mexico City PM are largely determined by variations in metal and endotoxin content related to differential sources in various parts of the City. We also found major differences in PM₁₀ and PM_{2.5}. PM_{2.5} induced cytotoxicity through an endotoxin-independent mechanism that is likely mediated by transition metals. In contrast, PM₁₀ with relatively high levels of endotoxin induced proinflammatory cytokine release via an endotoxin-dependent mechanism. These kinds of studies, besides providing biological plausibility for epidemiological studies, strongly suggest that PM size and composition are important variables that determine its toxicity. Additional recent studies support this observation and bring the challenge of reviewing the current standards based solely on PM physical characteristics. Although more research is needed to incorporate PM composition into health effects on children, an opportunity for reviewing policy issues in the topic are arising.

Policy driven actions to reduce childhood injuries in Europe

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Objective

To describe the magnitude of childhood injury in Europe and best practice policy actions taken to reduce the burden of injury.

Summary

Injury is the leading cause of death and disability for children in Europe. In the European Union, children die of injury at a rate 2 times that of a cancer and 8 times that of a respiratory related illness. With the expansion of the European Union, injury rates will multiply exponentially as poverty and injury have a strong correlation.

The most effective ways to reduce injuries is a combined approach of education, engineering and enforcement best practice strategies. Of these strategies enforcement of policy driven actions have the greatest impact to reduce the injury death toll. Such proven measures and cases to be presented include child safety seats, seat belts, speed limit reductions, bicycle helmets, child resistant packaging, smoke detectors, pool fencing, playground standards and others to demonstrate the power of using evidenced based measures linked to policy to reduce child injuries in various countries.

Coordinated actions need to be undertaken to motivate authorities to adopt these proven best practices in countries. Standardised tools and indicators to assess child injury nationally are currently under development in Europe. From this assessment countries will draft national action plans enabling countries to set benchmarks and targets for future injury reduction goals.

Conclusion

Childhood injuries can be reduced by adopting proven best practices that are supported by policy driven actions.

Indoor Air Pollution in Schools

Edith M.A.L. Rameckers, Mariadelaide Franchi, EFA, The Netherlands

More than 1 of every 4 children in Europe has asthma or allergy. These diseases are the major causes of days lost from school and their socio economic costs are very high. Studies have shown that exposure to indoor air pollutants is very important in terms of potential negative effects particularly in these children.

Children spend one-third of their normal day in school and they cannot choose the school environment. It is crucial that people working in school environments are aware of the problem of indoor air pollution.

Poor indoor air quality (IAQ) in schools interferes with learning activities and can cause discomfort, irritation and various short- and long-term health problems in students, teachers and staff.

The project "Indoor Air Pollution in Schools" funded by the European Commission, (DG Sanco, 1999) was undertaken in this context.

The project gives an overview over the facts, the effect of remedial measures and the laws and guidelines aimed at improving IAQ in schools in the different European countries.

EFA considers that the EU, national authorities, scientific societies and all organisations directly or indirectly implicated in this topic can play an important role in producing and implementing a multidisciplinary European programme on IAQ that focuses particular attention on schools. This programme integrated within the framework of the Health Community Programme, should result in development of European standards for good indoor school environment and should have an impact in terms of public health.

Recommendations for a European Programme were included in the final report.

The influences of this project on a Clean indoor air programme for Schools in Rome will be discussed.

Children And Indoor Air Pollution

Dr. H. Paramesh, Ms. Elizabeth Cherian, Lakeside Medical Center And Hospital, Lakeside Education Trust and H. P. Foundation, Bangalore, India

Introduction

Indoor air pollution is the major cause for respiratory morbidity and mortality. 84% of women and children are exposed to indoor smoke and 28% of all deaths are related to indoor air pollution in India.

Objective

Hence we aimed to find out the magnitude of the respiratory ailments in children of urban and rural areas and various indoor pollutants existent in our areas as triggers.

Summary of our studies

1. Point prevalence of respiratory infections in rural children under 5 years living in huts.

No	Fuel for cooking	Single Room	Double Room
612	Farm waste Dung Cakes	67.4%	32.56%

2 (a). Prevalence of asthma in urban and rural children of 6-15 years

Urban		Rural	
No	Percentage	No	Percentage
5570	16.63	995	5.7

(b). Prevalence of asthma in relation to location of school and socio-economic status

Location of school	No	Percentage
Low traffic regions	565	11.15
High traffic	3722	19.34
High traffic + low socio-economic society, poor indoor quality	273	31.14

3. High prevalence of asthma in rural girls than boys living in huts

Cooking Fuel	Age (yrs)	Total No	Percentage	Boys	Girls
Farm waste Dung cake	6-15	119	8.4%	2.52% Help in the farm	5.8% Help in the kitchen

4. Indoor air pollutants triggering asthma in our area.

Aero-biologicals	Irritants
Dust materials – 4000 / G of dust	Cigarette smoke 6% (1994) to 7.5% (1998)
Cockroaches – 25%	Mosquito coil burning – 5%
Fungi/pollens – 7.5%	Cooking fuels
Pets – 5.0%	Formaldehyde
Bacteria / virus	Cleaning agents / aerosols
	Asbestos
	Radon

Conclusion

It is quite evident from the above epidemiological studies that the respiratory infections and asthma is high in the places where indoor air quality is poor due to over crowding, poor ventilated houses and where cooking fuel is farm waste or dung cakes which has high carbon-monoxide, poly-organic materials, poly-organic hydrocarbon and formaldehyde. Control measures are essential to improve indoor air quality to reduce respiratory morbidity and mortality in children.

Prenatal and Postnatal Environmental Tobacco Smoke Exposure and Children's Health

Wojciech Hanke, Nofer Institute of Occupational Medicine, Lodz, Poland

Environmental tobacco smoke (ETS) is the term used to refer to a mixture of sidestream smoke and exhaled mainstream smoke that pollutes air in locations where tobacco is being smoked. The health effects in children, resulting both from prenatal and postnatal exposure to ETS, have been regarded as one of the most important public health issues.

In case of prenatal exposure to ETS, the evidence is most convincing for the decrease in mean birthweight. The results of epidemiological studies suggest also that high-level exposure to ETS may increase the risk of preterm birth, sudden infant death syndrome (SIDS) and child allergy.

Exposure to ETS has been reported to increase both the incidence of SIDS and the prevalence of asthma in school-age children, and also to trigger acute exacerbation of asthma. The mechanism by which childhood exposure to ETS exerts its effects is unknown, but may include effects on the IgE immune system, which can be elicited in utero and postnatally.

Epidemiological studies provide strong evidence that children who are exposed to ETS in their home environment are at a higher risk of having acute lower respiratory tract illnesses than are the unexposed children. A dose-response relationship has been reported between the of exposure and the risk of acute respiratory illnesses. The most susceptible seem to be the infants aged up to 3 months. The evidence for an effect of ETS is less persuasive for school-age children, which can be due to a decrease in illness frequency, the physiological development of the respiratory tract or the immune system with age or a decreased contact between mother and child with age.

Exposure to the compounds present in tobacco smoke may affect the fetal and neonatal lung and alter lung structure, much like these same compounds do in smoking adults. A relationship between ETS exposure and reduction in airflow parameters of the lung function in children was confirmed in several studies. Young children exposed to ETS had decreased forced expiratory volume in 1 s (FEV₁), FEV₁/forced vital capacity (FVC), maximal midexpiratory flow rate (FEF₂₅₋₇₅) and increased airway reactivity.

In infants and young children, the ETS exposure brings about an increased prevalence of respiratory symptoms including cough, wheezing, and sputum production. . The odds ratios generally range between 1.2 and 2.4. Several studies have also found that the effect of ETS on the respiratory symptoms is independent of maternal smoking during pregnancy and cannot be attributed exclusively to intrauterine exposure to tobacco products.

Available data provide good evidence demonstrating a significant increase in the prevalence of middle ear effusion in children exposed to ETS. Several studies in which no significant association was found between ETS exposure and middle ear effusion were not specifically designed to test this relationship. Postnatal ETS exposure is also associated with an enhanced risk of developing cancer in childhood. The most frequently reported cases include brain tumours, leukemia and lymphoma.

Prenatal maternal and postnatal child ETS exposure can cause neurobehavioral and neurodevelopmental deficits including hyperactivity, decreased attention span, reduced general intellectual ability, impaired skills in language and auditory tasks, and academic achievement.

Taking into account the current evidence on the harmful effects of ETS exposure on children's health, effective interventions aimed at eliminating ETS should be considered a priority task in future public health policies.

Endotoxin: a Link between the Indoor Environment and Early Childhood Wheezing

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The prevalence of asthma and atopic diseases are increasing throughout the world, particularly in developed countries. Many hypotheses have been proposed to explain this increase, including the hygiene hypothesis. This hypothesis proposes that infections or bacterial exposure in early in life help to mature the immune system to a T_H1 biased state and not a T_H2 state, the later predisposing the child to atopic disease. Endotoxin (part of the cell-wall of Gram negative bacteria) is an important microbial recognition molecule and is present in dust in the domestic environment. Endotoxin exposure is thought to play a dual role in asthma, indirectly protecting against the acquisition of atopy while directly causing bronchoconstriction and airway inflammation.

A cohort study included 881 children from Wellington and Christchurch, New Zealand. Dust samples were collected from bedroom floors of 3 month-old infants and analysed for endotoxin concentrations using a LAL assay. These were examined in relation to reported respiratory symptoms experienced at 15 months of age and also with home and social class characteristics at 3 months of age. Skin prick tests were performed at 15 months of age. Endotoxin concentration was positively associated with non-atopic wheezing. In turn endotoxin concentrations were positively associated with a mouldy smell, visible dampness and mould, pets, crowding and with smoking and being on an income benefit. These results suggest that endotoxin may be one link in the causal associations between the indoor environment and socio-economic circumstances and early childhood wheezing.

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Mercury as a Health Hazard for Children in Gold Mining Areas in Indonesia and Tanzania

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In 2002, UNIDO started the "Global Mercury Project", which includes inter alia an environmental and a medical assessment at six selected small-scale gold mining sites worldwide. Two of them are located in Indonesia: Galangan in Central Kalimantan and Manado in Northern Sulawesi. A third one is located in Rwamagaza near Lake Victoria in Tanzania. In all medical investigations at above sites, 173 of the volunteers were below 18 years. The volunteers and control groups were examined by applying a standardized questionnaire, a neurological examination and neuro-psychological tests. A medical score was used consisting of significant factors of a mercury intoxication.

Some of the exposed children and teenagers showed typical symptoms of mercury intoxication, such as movement disorders (ataxia, tremor, dysdiadochokinesia, etc.). Blood, urine and hair samples were taken from all participant and analyzed for Hg. The mercury concentration in the biomonitors was high. A high proportion of the population in both country areas are children under the age of 12. The main health problems of children are malaria and poor sanitary conditions, and, additionally, the high exposure to mercury in the areas. Children having access to fluid mercury, play sometimes bare-handed with the toxic metal. Within their houses they are highly exposed to mercury fumes, since the burning of amalgam takes place usually in the kitchen. As of 10 years, many children and teenagers have to work after school or on weekends at the mining sites. Because of the harsh labor conditions and the exposure to mercury, the involvement of children in small-scale gold mining has to be considered as one of the worst forms of child labor. Accidents related to work are frequent and, therefore, a health hazard for these children. Mercury can cause severe damage to the developing brain. Child labour with highly toxic substances must be stopped immediately.

Arsenic in Drinking Water and Children's Health in India and Bangladesh

Ondine S. von Ehrenstein & Allan H. Smith, University of California, Berkeley, USA

In West Bengal, India, and the neighboring Bangladesh large numbers of children and adults are exposed to geologically occurring arsenic in groundwater. Contaminated drinking water from tube wells that are installed in these areas to combat diarrheal diseases is the source for this new epidemic. Recently, more areas along the Ganges delta with high levels of arsenic in drinking water have been identified in Northern India and Nepal.

It has been suggested, that arsenic may have greater impact on children than on adults, because many aspects of organogenesis and organ maturity take place during childhood and arsenic is known to have antimetabolic and carcinogenic properties (AAP). Suspected child health effects include reduced birth weight, neurodevelopmental and respiratory effects. Reproductive effects such as increased spontaneous abortions have been suggested being related to women's ingestion of arsenic in drinking water. Skin lesions of keratosis and hyperpigmentation are established effects of arsenic ingestion, and these effects may occur already in childhood. Early exposure may be particularly important given the high risk of pulmonary disease and lung cancer, which we have found in adults exposed to arsenic as children. Further research is necessary to identify developmental and reproductive effects of arsenic, which may occur already at low levels of arsenic exposure during critical periods of organ development.

In our own retrospective cohort study with women and children in West Bengal, India, we assessed detailed reproductive histories, and children were tested for cognitive abilities and learning achievements. Detailed nutritional assessment was carried out, and potentially relevant factors were ascertained. Arsenic lifetime exposure histories were obtained in great detail, including arsenic measurements of all identified drinking water sources. In West Bengal, India, and Bangladesh children are particularly at risk to suffer from arsenic related health effects since in many places no arsenic free safe drinking water is available, and contamination is often not known. Inadequate nutrition may add to the risk. Collaborative efforts are necessary for an integrated water and sanitation strategy to provide safe drinking water to children particularly in disadvantaged environmental and social conditions such as in large parts of West Bengal and Bangladesh.

Emerging Scientific Evidence and Controversy about Low-level Mercury Toxicity: 14-year Follow-up of the Faroese Birth Cohort

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Background

The central nervous system is particularly vulnerable to prenatal exposure to methylmercury. Due to the widespread exposure to methylmercury from fish, several prospective environmental epidemiology studies have been initiated where the maternal exposure during the pregnancy is related to the neurobehavioural development of the children.

Study design

A prospective study of a Faroese birth cohort (N=1022) prenatally exposed to methylmercury from maternal intake of contaminated pilot whale meat were examined at ages 7 and 14 years of age. 917 (90%) and 878 (87%) participated at respectively age 7 and 14. A detailed neurobehavioural test battery was selected to include tasks that would be affected by the neuropathologic abnormalities previously described in prenatal and early postnatal mercury exposure including components of autonomic origin. As indicators of autonomic nervous system function, blood pressure and frequency of heart rate variability were also measured. Furthermore, latencies of brainstem evoked potentials peak were determined. Mercury concentrations were measured in cord blood, maternal hair at parturition, and in the child's blood and hair at ages 7 and 14 years.

Results

At 7 years of age clear dose-response relationships were observed for deficits in attention, language, and memory. An increase in blood pressure and in the latency of peak III on evoked potentials were also associated with the prenatal exposure level. These findings were replicated at age 14 years, although an effect on blood pressure was no longer observed. This study also found an effect of postnatal exposure on the peak V latency, which is not affected by prenatal exposure.

Discussion

The results from this study agree with prospective findings from New Zealand and cross-sectional studies carried out in many settings. A prospective study in the Seychelles has been reported to be 'negative', but does not significantly differ from the findings in the Faroes. The U.S. National Research Council used the Faroes data as the largest study available with the best exposure information as basis for calculating an exposure limit of 0.1 µg/kg body weight per day. Last year, JECFA proposed an exposure limit twice that magnitude based on a smaller uncertainty factor.

A Case-control Study on Cryptorchidism and Hypospadias in Newborn Boys: Are Endocrine Disrupters Involved ?

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Background

The rate of testicular cancer and poor semen quality appears to have risen, and some reports suggest an increased occurrence of cryptorchidism (testicular maldescent) and hypospadias (an abnormal ending of the urethra on the surface of the penis) over the past 30-50 years. In 1993, Sharpe and Skakkebaek postulated that exposure to xeno-oestrogens during foetal life could be a common cause for these abnormalities. This endocrine disrupter hypothesis is biologically plausible and supported by animal studies, but still only few human studies provide arguments that either support or refute the hypothesis. The aim of the study was to identify individual and work-related risk factors for cryptorchidism and hypospadias.

Methods

Subjects: Of 9,146 consecutive male births in the period October 1999 – December 2001 in Rotterdam, 8,695 (95%) were examined for cryptorchidism and hypospadias during a regular visit to Child Healthcare Centres for the national preventive child healthcare programme (e.g. vaccination). During this period, 91 cases of cryptorchidism and 67 cases of hypospadias were invited to participate in a case-control study. Per case, 3 matched controls were randomly selected, matched for age of the child. The participation rate for parents of hypospadias cases was 84% (n=56), for cryptorchidism cases 86% (n=78), and controls 68% (n=313).

Methods: During a home-visit the mother and, if possible, the father was interviewed on personal characteristics, lifestyle, occupation and nutrition. The nutrition section was specifically developed by TNO Nutrition for quantification of intake of lignans and isoflavonoids, the most potent phyto-oestrogens. Occupational exposures were assessed as self-reported to specific classes (e.g. pesticides, solvents, heavy metals) and by application of a recently developed job-exposure matrix (JEM) for occupational exposures to endocrine disrupters.

Results

Known risk factors for cryptorchidism and hypospadias were corroborated in our study, such as ethnicity, premature birth, low birthweight, and suboptimal maternal health status. Maternal exposure to endocrine disrupters through occupation and diet was not associated with the 2 urogenital abnormalities. Paternal solvent exposure (self-reported) was associated with an access risk for hypospadias and cryptorchidism, and paternal pesticide exposure (JEM-based) was associated with occurrence of cryptorchidism.

Conclusions

Our study does not provide evidence for the hypothesis that maternal exposure to endocrine disrupters contributes to the aetiology of cryptorchidism and hypospadias. Paternal pesticide and solvent exposure were significantly associated with urogenital abnormalities in male offspring. These findings suggest that exposure to solvents and pesticides may induce abnormal sperm and, as a consequence, contribute to cryptorchidism and hypospadias in the offspring, indicating a male-mediated DNA damage process rather than female-mediated endocrine disruption. The observation of paternal occupational risk factors implies that studies on these abnormalities should include both maternal and paternal factors. Further research is required to explain the mechanism behind the paternal risk factors.

Funding: The Endocrine Modulators Study Group of the European Chemical Industry Council (EMSG-CEFIC) is acknowledged for financial support.

The Effect of Maternal Exposure to Outdoor Air pollution during The First Trimester of Pregnancy on Intrauterine Growth Retardation in Taiwan

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Aim

The relationship between air pollution and reproductive health has not been consistent among studies. We investigated whether maternal exposure to air pollution during the first trimester of pregnancy is associated with intrauterine growth retardation (IUGR).

Methods

The study population consisted of 690,297 singleton newborns born to mothers who resided in the 55 towns with air monitoring stations in Taiwan between 1994 and 2002. Daily and daytime maternal exposure to sulfur dioxide (SO₂), particulate matter ≤10 μm (PM₁₀), carbon monoxide (CO), and nitrogen dioxide (NO₂) were estimated by linkage with database from Environmental Protection Administration (EPA). Birth certificate data with the information of birth outcomes and potential risk factors obtained from the Ministry of the Interior in Taiwan. Multiple logistic regressions were employed to evaluate the risk of IUGR as well as considering potential confounders.

Results: There were significant exposure-response relationships between maternal daily and daytime PM₁₀ exposure during the first trimester of pregnancy and IUGR. The adjusted ORs at high and extra high daily exposure level were 1.04 (95%CI, 1.01-1.08) and 1.05 (95%CI, 1.00-1.11), respectively. Adjusted ORs at high and extra high daytime exposure were 1.05 (95%CI, 1.01-1.09) and 1.08 (95%CI, 1.02-1.13), respectively.

Conclusions

This study suggested that the increased exposure to PM₁₀ contributes to the small but significant risk in IUGR for pregnant women. But the associations with other unmeasured risk factors deserve further exploration.

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***In Utero* Exposure to Environmental Chemicals and The Risk to The Unborn Child**

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Objectives

The unborn child represents a subpopulation that is particularly sensitive to the effects of exposure to environmental chemicals including pesticides and carcinogens in comparison to the adult population. However, the mechanisms and effects of such exposure and the long-term health effects in later life are unclear. Environmental exposure is multi-factorial in nature and an experimental approach is required that can address this and assess the combined exposure effects as well as those from individual components. The EU-funded project Plutocracy has focused on uptake of environmental chemicals by the placenta as this acts as the interface between mother and fetus and determines *in utero* fetal exposure. Whilst Plutocracy has been designed to determine outcome with respect to the development of allergy and asthma, it will also provide useful information with regard to fetal exposure to potential carcinogens and neurotoxicants.

Methods

A cohort of pregnant women has been recruited into the study from regions of varying pollution levels and biological samples collected including peripheral maternal blood, placental tissue, breast milk and cord blood. Questionnaires were administered to obtain information related to pollutant exposure and risk factors. Laboratory models have provided transfer kinetics and fetal biodistribution data for selected persistent pesticides and this will be linked with exposure data from the cohort.

Results and conclusions

The study demonstrates fetal pesticide uptake of a magnitude similar or greater than maternal uptake, with immune organs at particular risk. *In vitro* studies in progress suggest that exposure to such chemicals directly affects immune function. Results from Plutocracy indicate a variation in atopic incidence amongst the cohort according to geographical location which may relate to environmental exposure. Skewing of immune function and the likely implications with respect to health outcomes such as cancer and allergy development will be considered.

Additional information

Title of abstract: *In utero* exposure to environmental chemicals and the risk to the unborn child.
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A Study of Lead Exposure and Its Health Effects Among Female Electronic Workers and Their Children

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The electronic industry, which is one of Malaysia's main income generator, is also one of the main users of lead in the industrial sector. As lead (Pb) is neurotoxic and that the electronic industry employs mainly female workers, the main objective of this study is to assess lead exposure among female electronic workers, and to study its influence on their health and that of their children. This cross sectional study was conducted on 529 female electronic workers who were exposed to lead, 399 of their children and 190 female workers who were not exposed. Electronic factories and workers were randomly chosen from 6 industrial areas which were purposely selected, namely; the Districts of Larut, Matang and Selama in Perak; Muar in Johor; Kuantan in Pahang; Barat Daya in Pulau Pinang; Seremban in Negeri Sembilan; and Petaling Jaya in Selangor. Guided-interview questionnaires were used to obtain information on demography, physical health, workplace and environmental lead exposure. Collection of blood samples was by venous puncture and the blood lead (PbB) concentration was analyzed using a graphite furnace atomic absorption spectrophotometer, model Hitachi Z-5700. Blood serum samples were also sent to the respective district hospitals' laboratories for renal function tests. To assess the neurotoxic effects of lead on the workers, tests using the World Health Organization-Neurobehavioral Core Test Battery (WHO-NCTB) was carried out. The results of this study showed that the mean PbB concentration of the exposed workers ($6.12 \pm 4.61 \mu\text{g/dL}$) is significantly ($p = 0.001$) higher than that of the unexposed workers ($4.63 \pm 3.91 \mu\text{g/dL}$). The mean serum creatinine level of the exposed workers ($79.01 \pm 18.56 \mu\text{mol/L}$) is also significantly ($p = 0.001$) higher than that of the unexposed workers ($71.32 \pm 10.89 \mu\text{mol/L}$). The NCTB tests showed that the exposed workers have significantly ($p < 0.05$) lower mean scores than the unexposed workers for the Digit Symbol, Trail Making, Movement Time and Pursuit Aiming tests. The PbB concentration of the exposed workers' children have a mean of $5.82 \pm 3.37 \mu\text{g/dL}$ and is significantly ($r = 0.22, p < 0.001$) correlated with their mothers' PbB concentration. Children's PbB concentration has a significant ($r = -0.12, p = 0.045$) inverse correlation with their height for age but not with their weight for age. This suggests a minor stunting effect of lead. Multiple regression analysis shows that exposed workers' PbB concentration still has the main influence on their children's PbB concentration, even after controlling for confounders such as ethnicity, socioeconomic status, mother's age and child's physical development. In conclusion, exposure to lead among electronic workers not only affects their neuropsychological status, but also influences lead exposure to their children.

Key words: electronic workers, mother's blood lead, children blood lead, children's physical development and neurobehavioral effects

Canadian Regulatory Approaches to Protecting Children's Health

Nicki Sims-Jones RN, MscN, A. W. Myres, PhD, Health Canada

The physical environment, which includes the natural and built environment, is an important determinant of children's health and well-being. Children are at greater risk from some environmental hazards than adults because of their physical size, immature organs, physiology, behavior, natural curiosity and lack of knowledge. Furthermore, pregnant women are exposed to environmental hazards in their workplace, home and community which could also affect fetal and ultimately child health. Some children are more at risk than others because of where they live, what they eat and their parent's occupation. Environmental health regulations must consider the unique vulnerabilities of children and be broad enough to protect them in a wide variety of settings.

This presentation will describe Canadian environmental health regulations with a focus on the protection of children's health. The range of environmental hazards Canadian children are exposed to will be described and selected environmental health legislation identified. Examples of how the unique vulnerabilities of children are considered in the implementation of these Acts will be provided. The strengths of current regulatory approaches will be summarized. Finally, at the federal level, Canada has recently adopted the precautionary approach for decisions which relate to risk. We have identified when the precautionary approach should be used and are currently working on implementation issues.

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Environmental Health Regulation for Children – A Global Perspective

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Protecting children's environmental health is an important and necessary goal for all institutions, governments, businesses and individuals worldwide. This presentation reviews children's environmental health, with particular focus on chemicals legislation, new testing and evaluation paradigms such as the High Production Volume Challenge Program and the Voluntary Children's Chemical Evaluation Program; and shows that child-focused safety assessments and regulatory approaches must address both inherent hazard as well as use and behavior patterns that influence potential exposures.

Developing organisms can be more, less or equally sensitive to chemical exposures compared to adults, as shown by a significant body of research. Determining whether children may be disproportionately impacted and thus at greater risk compared to other age groups is the key challenge; this requires evaluating both hazard and exposure data. Current toxicity testing paradigms for drugs, food, pesticides, and industrial chemicals provide important information relevant to assessing risks to infants and children, as well as the developing fetus. The battery of tests performed includes exposure regimens and endpoints that involve the major organ systems and animals of different ages. Included is evaluation of critical windows of development of the fetus during gestation and, in the reproduction toxicity tests, postnatal development - endpoints that are particularly relevant for assessing potential hazards to children.. Integrating relevant hazard information with specifically tailored child-focused exposure assessment provides the scientific basis for child-focused safety - and regulatory risk -assessments.

Uncertainty factors (or safety factors) are used as a health-protective measure to extrapolate from laboratory animals to humans. Although the routine incorporation of additional safety factors for children has been considered by some, Dourson *et al.* (2002. *Reg Toxicol Pharm* 35: 448-467) conclude that, taking into account relative sensitivities of adults and children and the types and scope of toxicity test protocols - default additional uncertainty factors are not scientifically justified.

Regulatory Science and Reducing the Health Risk of Environmental Chemicals in Canada

A.W. Myres, PhD Environmental Contaminants Bureau, Health Canada and Shairoz Ramji, MSc Pest Management Regulatory Agency, Health Canada

The potential health effects of environmental chemicals on the developing foetus, infant and young child has become an increasing focus of concern for the public, the scientific and public health community, national governments and international agencies. The concern has arisen because exposure, patterns of metabolism and toxicological responses to chemicals may differ between children and adults potentially putting the former at greater risk of harm.

One of the most important ways governments protect public health, including vulnerable populations, is through legislation. The government of Canada is committed to an evidence based approach to assessing and managing the risks to health posed by chemicals in the environment. Science therefore plays a crucial role in identifying environmental hazards, assessing human exposure, characterising toxicological response based on animal studies and determining risks to human health.

There are 23,000 substances in Canada that need to be examined for their impact on the environment and human health. Under the Canadian Environmental Protection Act, all these 23,000 substances must be categorized by September 13, 2006, based on whether:

- they are persistent or bioaccumulative, and inherently toxic to human beings and non-human organisms (as established by laboratory or other studies); or
- they may present the greatest potential for exposure to individuals in Canada.

Based on this categorization, substances that meet specified criteria will undergo a further assessment to determine if they are “toxic” as defined by CEPA. A determination of “toxic” is the trigger which initiates the risk management process.

Drawing examples from both past and current experience under two recently renewed pieces of federal legislation, the Canadian Environmental Protection Act (2000) and the Pest Control Products Act (2002), the paper will illustrate how the vulnerability of children to chemical exposure is being addressed in the risk assessment process.

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Investigating the Barriers to Reducing the Exposure of Infants and Young Children to Environmental Tobacco Smoke (ETS) in the Home

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Objectives

To work at a household and community level to identify effective and practicable strategies for reducing children's exposure to ETS in the home

Background

The adverse effects on child health of ETS that occurs primarily in the home are well established. The most effective strategies for reducing smoking and ETS in non-domestic indoor environments have been those in which the non-smoking majority effect changes in smoking behaviours. Little research has been conducted to explore the potential for extending this process to the home and on the social, cultural and psychological influences on strategies for reducing domestic ETS exposure.

Methodology

A small pilot study is being carried out in a socio-economically deprived Sure-Start area of Leicester. Focus groups are being held with parents/carers, Sure-Start health professionals and volunteers, community development workers and teenage parents, using a semi-structured prompt guide.

Results

The focus group participants are generally aware of the effects of ETS on children's health. Steps taken in attempts to minimise ETS include restricting smoking to one room or to outside and smoking at an open door or window. Practical difficulties related to housing conditions (such as living in a high rise flat) and being a sole carer were revealed. Participants discussed the difficulties of asking both friends and relatives (particularly elderly/senior male family members) to stop smoking and the problems encountered when visiting the homes of smokers.

Conclusions

Our pilot study supports findings from studies that have found that banning smoking in the home is associated with a reduction in urinary cotinine levels in children whereas mitigation steps such as those taken by our participants are largely ineffective^{1,2}. Our study highlights important practical and sociological influences on achieving ETS reduction. A much larger study, including different socio-economic and ethnic groups is planned, which will identify and inform the future development and testing of approaches to reduction of ETS exposure in domestic environments.

¹ Blackburn C et al *Effect of strategies to reduce exposure of infants to environmental tobacco smoke in the home: Cross sectional survey* – BMJ 2003, 327, 257

² Shuker LK, Courage C, Holmes P & Harrison PTCH (2002) Mitigation strategies for reducing childhood exposure to ETS in the home. *Proceedings Indoor Air 2002*, Monterey, CA, 30 June–5 July, 2002

Post-delivery Relapse into Smoking among Women covered by Smoking Cessation Intervention during Pregnancy

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Introduction

Exposure to environmental tobacco smoke increases the risk of several diseases in infancy and childhood, including Sudden Infant Death Syndrome, respiratory system diseases, allergy and asthma. It is encouraging that approximately 30% of women tend to quit smoking during pregnancy. However, about 80-90% of them experience a smoking relapse by 12 months postpartum.

Aim

To determine whether the women who quit smoking in response to the smoking cessation program are less likely to relapse after delivery than the women who were given only standard information on health risk from maternal smoking, or those who quit spontaneously in early pregnancy.

Method

The first stage of a cluster randomised trial was conducted between 1 December 2000 and 31 December 2001 in public maternity centres in Lodz, Poland. At this stage, 202 women were covered by an antismoking intervention that consisted of four midwife visits during pregnancy. The control group included 175 pregnant women who did not take part in the intervention. The second stage was performed between 1 December, 2001 and 31 December, 2002 and consisted in the collection of data on smoking relapse after delivery among 110 intervention subjects who quitted smoking and 57 controls.

Results

Women who had quitted smoking spontaneously before taking part in the program, less frequently relapsed into smoking after delivery than women who had quitted smoking while participating in the study (32 % vs. 58.3% in the intervention group and 45.7% vs. 81.1% in the control group). No statistically significant differences were noted between the intervention subjects who had quitted smoking spontaneously and the spontaneous quitters from the control group ($p=0.2$). The proportion of women who returned to smoking after delivery was found to be lower among those who had quitted smoking as a result of the intervention than in the group who had not received this kind of support (58.3% vs. 81.1%; $p=0.05$).

Conclusions

Women who quitted smoking during the smoking cessation programme less frequently relapsed into smoking postpartum than those who quitted after receiving only a standard information about health risk due to maternal smoking. In both these groups, spontaneous quitters had lower rates of relapse compared to women who quitted smoking following the advice of medical professionals.

Assessing Children's Exposure: Methods and Data for a Tiered Approach

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Summary

The report addresses methods, examples, data sources, and experiences from the US Voluntary Children's Chemical Evaluation Program (VCCEP) for a stepwise approach to assessing children's exposure to chemicals in their environment

From a broad public health perspective, there are many opportunities to improve children's and adolescent's health, such as prenatal and childhood nutrition, immunizations, infectious disease control, and drug/alcohol/tobacco control. Thus, it is important to wisely choose initiatives that will maximize health improvements for children. One component to optimize is the worldwide initiatives to protect children from adverse health effects due to environmental factors, including chemicals.

Research Objectives

For well-studied contaminants, (e.g., lead) the health risks to children are reasonably known and risk management, in a public health context, can be undertaken. For some chemicals, hazard and exposure data are less complete, and priorities are not as clear. As part of the US VCCEP response, methods have been developed for robustly and efficiently assessing children's chemical exposures. The goal is to identify the substances and circumstances that present the highest potential risks to children, so that risk management returns are applied effectively. The methods and data sources we illustrate use an iterative approach for a) screening level and b) more detailed exposure assessments relevant to children. A health-protective screening level Margin of Exposure (MOE) calculation indicates whether or not more detailed assessments are appropriate.

Conclusions

The iterative approach considers the interplay of chemical uses, routes of exposure and behavioural aspects to target the scenarios and age brackets with the greater exposure potential. The methods discussed can also support aggregate risk decisions for multiple chemicals that have a common mode of action, which - if assessed on a one-by-one basis - may not support an appropriately integrated risk management decision.

Environmental Tobacco Smoke: Toxicological and Psycho-social Considerations

Hanns Moshhammer, Manfred Neuberger
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Passive smoking leads to the same adverse health consequences as does active smoking, although less pronounced. Since young children usually do not smoke themselves their exposure to environmental tobacco smoke (ETS) is of special interest in establishing the causal association between ETS and disease. Our studies on the lung function of young school-children indicated that living in a smokers' household has more impact on respiratory health than outdoor air pollution.

On continuing these studies into adolescent age we were no longer able to show any ETS effect because most of the children from smokers' households became active smokers. Pharmacological mechanisms (preparing addiction through prenatal exposure to nicotine) are involved in this phenomenon, but the role-models of parents are key factors.

In adolescent age other role-models and the peer-group behaviour gain more influence. Aggressive anti-smoking campaigning targeted at adolescents usually has little or even a negative impact because it conveys the impression that you must not smoke as long as you are not grown up and make youngsters start smoking in protest.

Campaigns therefore should be placed into a wider context. "Smoke-free workplaces" and the protection of the non-smoking worker could be a means to introduce the idea of non-smoking also in workplaces where youngsters spend much time like in schools or meet their peers like in music halls. While the official and toxicologically sound reason for smoke-free music halls would be the protection of the personnel it would at the same time help to "de-normalise" smoking for the customers of all age groups.

We started monitoring nicotine in such places to support national campaigns with exposure data. First results will be presented that underline the need for reduction and/or prohibition of smoking in several public settings in Austria.

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Socioeconomic Factors in Studies of Children's Environmental Health: Examples for their Consideration and Impact in EU-funded Research and from a Systematic Literature Review

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Though it is speculated that low socioeconomic status is associated with an increased environmental burden, a comprehensive overview of the magnitude of social inequalities in exposures to environmental hazards and their impact on children's health across Europe is still missing. Socioeconomic factors may impact on children's environmental health by two ways: First, exposure to environmental contaminants may differ according to socioeconomic status. Second, given a certain level of harmful environmental exposure, socioeconomic factors may modify the health effects by influencing the susceptibility characteristics of children.

Within the framework of the Policy Interpretation Network on Children's Health and Environment (PINCHE) we aimed to identify research on social inequalities in environmental exposures and children's health within Europe using separate approaches:

(1) By using the project databases of the Community Research & Development Information Service we identified 47 studies on children's environmental health supported by the FP4 and FP5 programmes. Information on whether and how socioeconomic factors were considered in these projects was gathered by questionnaire. Up to now, data are available for 27 studies (57%). The majority of the studies collected original data and individual information on socioeconomic factors. The most common studied exposure was air pollution (N=12). Therefore, respiratory diseases (N=12) and allergic/immunologic health outcomes (N=8) were most often investigated. Whereas 20 studies out of those 22 projects considering socioeconomic factors at all analysed these factors as potential confounder, less than half analysed socioeconomic factors as influencing variable (N=10) or as effect modifier (N=9).

(2) A systematic literature review of the current evidence for the presence and impact of social inequalities in environmental exposures and children's environmental health outcomes in Europe was performed. Forty-one publications meeting the search criteria (e.g. publication year 1994-2003) were identified.

The next steps of our work will be to summarize and quantify the impact of social inequalities on children's environmental health in order to contribute within PINCHE to the development of recommendations for public health policy actions, prevention measures and further research.

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Latin American Experiences in Community Based Assessments. Joint Works with Ituzaingo Anexo Neighbors in Cordoba

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Unusual rates of morbidity and mortality (30 malignant diseases/10 years) were detected by citizens and the government at Barrio Ituzaingo Anexo, Cordoba (Argentina). Population: 5,000. Working with the neighbors our study detected: (a) Six main sources of hazards: close agriculture practices, naturally polluted groundwater and soil, sediments of domestic water reservoirs, electric transformers, electricity wires (13,2 kV + 220 V), and inner home activities (burning of waste, smoking, domestic pesticides, polluted food). (b) Nine critic pollutants: three insecticides (endosulfan, DDT, heptaclor), one herbicide (glyphosate), three main natural pollutants (arsenic, chromium, lead), PCBs, and magnetic fields. (c) Seven pollution routes with two short pathways (PCBs, magnetic fields) and five long pathways (pesticides, arsenic, metals). Pesticides, arsenic and metals were founded in sediments of domestic 200-300 liters water reservoirs. Such devices are located at the top of each house's roof. Their cocktails included low doses of persistent organic pesticides (endosulfan, until 1.09×10^{-3} ppm; heptaclor, until $2,3 \times 10^{-3}$ ppm), and high doses of arsenic (until 44 ppm), chromium (until 27 ppm) and lead (until 74 ppm). At home, the practice of water heating and cooking could increase the concentration of non volatile pollutants like arsenic, metals and chlorinated pesticides. According ATSDR "cooking food in fluoridated water results in increased dietary fluoride levels" (ATSDR, 1993; Connett & Connett, 2001). Nevertheless, the role of heating in increasing the concentration of pollutants is often neglected. The feeding of babies with prepared milk (powder milk + boiled water containing pollutants) could augment the risk of hazardous intakes if such water is boiled several times. The main source of PCBs was an electric transformer containing 281 ppm. The higher measured value of magnetic field was $0,8 \mu\text{T}$. Concerning ionizing radiation, a "normal" background of Gamma rays was founded (until $0.17 \pm 0,03 \mu\text{Gy}$). Some industrial deposits are under investigation.

The obtaining of results and the mobilization of citizens produced several positive results. E.g.: (a) The provision of polluted groundwater was replaced by a drinking water system. (b) More than 400 domestic water reservoirs have been cleaned for extracting polluted sediments. (c) Pesticide spread was reduced, and the local government banned the use of agricultural pesticides within 2,500 meters from the neighborhood. (d) The electric transformer containing PCBs was extracted.

Casa de Salud: A Model for Engaging Community

Lawrence, Massachusetts, USA

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Background

Lawrence, Massachusetts is the oldest planned industrial community in the United States, drawing a large immigrant population that is now more than 70% Latino. Poverty is widespread and severe, ranking the city among the twenty-five poorest in the United States with an average per capita income of less than \$10,000. Environmental health threats are significant. Lead levels in children are nearly three times the state rate and pediatric asthma rates are the highest in Massachusetts.

Objectives Research Objectives and Content

Casa de Salud (Health House) is a community-based participatory research and education effort designed to engage residents of highly stressed neighborhoods in activities to mitigate the health impacts of environmental exposures. Using a culturally integrated community education and organizing model, project partners developed educational materials written and translated for a lay audience, trained residents to become neighborhood leaders and educators, and conducted mutual education and intervention planning among residents, health care providers, and environmental health scientists. *Casa Leaders* open their homes for monthly *charlas* (meetings) that serve as the primary sites for interaction in a highly accessible setting where residents outnumber “experts” and neighborhood culture is dominant.

Results

In the first three years of the program Casa Leaders held *charlas* for 628 residents. 60% reported that they had never before attended a meeting to learn about environmental health even though 77% reported concern about environmental health issues. 92% reported that they felt comfortable participating in the *charlas* and 95% reported that they gained knowledge about environmental health issues from attending. The project's success can be attributed to a mutual respect and understanding that has developed among Casa Leaders, health care providers, and environmental health scientists who focused the project on issues identified by the community that validate their concerns and respect their level of knowledge.

Poster Sessions

Thursday April 1st 13.00 - 14.30

Friday April 2nd 13.00 – 14.30

Location: The Atrium

The poster sessions are being held in a newly-built, spacious glass atrium. We hope you enjoy this new building - PINCHE is the first conference to have used it. As there are people working in the surrounding offices, and we do not wish to disturb them, we would ask everyone to keep noise to a minimum.

Immunotoxicity of lead and cadmium in Flemish adolescents

Rosette van den Heuvel, Gudrun Koppen, Greet E.R. Schoeters Belgium

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The number of immunological and hematological disorders has increased in the industrialized society. The contribution of pollution to this phenomenon is unclear.

Objective

We investigated in adolescents (17-18 years) whether changes in immune parameters were related to biomarkers of internal exposure to Pb and Cd.

Method

We obtained questionnaire data and blood and urine samples from 200 adolescents recruited from 1 rural control area and 2 neighboring suburbs located close to industry. Trained school physicians recorded medical history. Differential cell counts, lymphocyte phenotyping by using flowcytometry and immunoglobulin measurements were performed on individual blood samples. Biomarkers of internal exposure including blood Pb, blood Cd and urinary Cd were measured in the same individuals.

Results

The percentage of CD19⁺ cells was positively correlated with the Pb concentration in blood ($p=0.031$). Reported skin allergies as well as frequency of bacterial infections were positively associated with blood Pb levels, with odds ratios (95% CI) of 1.82 (0.99-3.33) ($p=0.05$) and 2.55 (1.17-5.53) ($p=0.02$), respectively.

Increased Cd in urine resulted in an increase in serum IgM levels ($p=0.024$).

Reported respiratory complaints including bronchial wheezing and dry nighttime cough showed a statistically significant confounder-adjusted positive association with blood cadmium levels, with odds ratios (95% CI) equal to 1.63(0.99-2.67) ($p=0.05$) and 1.97 (1.22-3.18) ($p=0.005$), respectively.

Conclusion

These results confirm the immune-modulating capacity of the heavy metals Pb and Cd and indicated that even low-level exposure to heavy metals may lead to immunological changes in a population of adolescent confirming the immunosuppressive activity of Pb and Cd.

Latin American Experiences in Community Bases Assessments. Joint works with the MBYA Indigenous Communities of Tekoa Yma and Tekoa Kapii Yvate in the Rainforest of Misiones

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Tekoa Yma and Tekoa Kapii Yvate are two Mbya Guarani indigenous communities that lives within UNESCO's Reserve of the Biosphere of Yaboti, in Misiones province, Argentina. The Guarani have been living in the subtropical forest during 3,200 years. Both communities are suffering the environmental damage produced by the Mocona Forest timber company, and cruel raids of foreign hunters. The Mocona Forest S.A. is extracting big trees throughout the Mbya territory, and opening and enlarging unnecessary roads.

The communities of Tekoa Yma and Tekoa Kapii Yvate are obtaining their medicinal plants, food, materials and water from 5,000 hectares of subtropical forest (the Paranaense ecosystem). For the timber company such surface belong to them, and not to the Mbya Guarani. Even having 40,000 hectares of lands, the Mocona Forest S.A. do not recognize the Mbya territory of 5,000 hectares, and is planning to push them into a 200 to 300 hectares property.

The Mbya indigenous communities of Tekoa Yma and Tekoa Kapii Yvate are asking the restitution of their lands and forests.

Nevertheless, the timber company Mocona Forestal S.A. is extracting large quantities of subtropical trees whose roots, barks and leaves are used by the Mbya as drugs for the treatment of diseases. When destroying their medicinal plants, the company destroy the Mbya health and welfare. The Mbya recognize 150 species of medicinal plants (Keller, 1996; Fontana, 2003).

The Mbya and ENDEPA asked FUNAM and the Chair of Human Evolutionary Biology for jointly evaluate the real surface they need for obtaining food, medicinal plants, building materials and rituals objects. Both communities were isolated during years, and their relationship with white people is recent.

The expert of FUNAM and his team organized and developed the community work. A member of ENDEPA acted as an accepted and permanent translator. The census of both communities and their morbidity and mortality were made. Through public hearings in the rainforest we defined their real foraging area (more than 6,000 hectares). We also obtained the lists of medicinal plants, food, building materials and ritual objects. Through an environmental impact assessment we evaluated the loss of medicinal plants and their responsible (timber companies activities) (Montenegro, 2003c).

When indigenous groups lives far from industrialized areas, and no medical services are available, the protection of their traditional sources of medicines is urgently needed. Recently, a member of our crew investigated anticonceptive plants used by the Quom indigenous group in Resistencia (Chaco, Argentina). Vinuesa identified 44 species of plants, most of them with scientifically recognized properties (Vinuesa, 2003).

Alveolar macrophage loading suggesting impaired function in women and children exposed to biomass smoke

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Background

Particulate matter (PM) from biomass smoke increases vulnerability to bacterial respiratory infections. No similar association has been reported for traffic-derived PM. Alveolar macrophages (AM) are critical to lung innate immunity. AM function is impaired when phagocytosed particles reach > 6% of cell volume. We speculated that more AM from individuals exposed to biomass PM would exhibit loading >6%, when compared with individuals exposed to traffic-PM.

Aim

To compare the proportion of AM with carbon particles forming $\geq 6\%$ of total cytoplasmic area in women and children exposed to biomass PM in Ethiopia, to those exposed to traffic PM in Leicester (UK).

Methods

Induced sputum (IS) from healthy Gondar women and children were processed using a simplified technique. IS samples were collected from Leicester adults and children and processed in an identical way. Digital images of 50 AM from each individual were obtained under oil immersion microscopy. The area of carbon particles per AM, the total AM area, and the proportion of AM with >6% carbon PM were determined using Scion image software.

Results

The median percentage of AM with > 6% loading in Gondar women (n=10) was 27%. Significantly lower levels ($p < 0.05$) were present in Gondar children (5%, 0 to 14), Leicester adults (0%, 0 to 1), and Leicester children (0%, 0 to 1). Levels in Gondar children were not different from Leicester adults or children.

Conclusions

The significantly higher proportion of AM with >6% particles in Gondar women suggests that more cells have impaired function. The lower levels of loading in children suggests that behavioural factors are an important determinant of exposure. Carbon loading of AM may explain the relationship between increased risk of infections and exposure to biomass fuel smoke.

Indoor Environment in Primary schools and pupils learning achievements

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Objectives

The investigation of the quality of the indoor environment in primary schools; the determination of a possible relationship between the quality of the indoor environment and the learning achievements of primary school children.

Method

Between November 2002 and March 2003 a classroom-specific evaluation of the indoor environment was carried out in 24 primary schools using a checklist. The quality of the indoor environment was determined using a data logger, which collected data on carbon dioxide, relative air humidity and temperature. All pupils attending the 24 classrooms (n=605, age 9-10 years) had to perform two attention tests: the Bourdon-Vos Test and the Star Counting Test. These tests were used to quantify the learning achievements.

Results

The carbon dioxide concentration is an indicative monitoring parameter. A Dutch limit value of 1200 ppm is used to qualify the ventilation conditions. Carbon dioxide levels in the 24 classrooms reached maximum levels from 2118 till 5800 ppm, which indicates insufficient ventilation circumstances. In every classroom the limit-value was exceeded during at least 40%, and at most even 95% of a teaching day. In 29% of the investigated classrooms the temperature raised up to 25°C, which exceeds the recommended value of 20°C. In 28% of the classrooms the mean relative air humidity was below the accepted lower limit of 30%. We found a significant negative association between the indoor temperature and the accuracy for the Star Counting Test ($p=0.021$). Furthermore, we found a not-significant negative association between the carbon dioxide level and learning achievements ($p = 0.3-0.9$).

Conclusions

The investigated classrooms have a poor indoor environment, resulting in carbon dioxide levels up to almost 5 times the limit-value. Furthermore, a positive association between the quality of the indoor environment and the learning achievements of primary school children has been found.

Environment and Pediatric Cancer. Spanish study

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The cancer is the final result of the combination of two determinants, the endogenous or constitutional and the exogenous or environmental. Pediatric cancer (PC) presents differential characteristics (prevalence, location, histological type, latency period, biological behaviour and therapeutic response) with regard to those developed in adults. These differences are likely due to the innate anatomical, physiologic and behavioural features of the pediatric age and to the exposure to potentially carcinogen agents or risk factors (RF) since the preconceptional period through the early years of life. Between 85 and 96% of the PC are associated with environmental RF, being unknown most of them. The spectacular progress in the survival of the PC contrasts with the ignorance of the RF implied in its etiopathogenesis. The main obstacles to the progress in the knowledge of the PC-related RF are the low prevalence of PC, the difficult and complex design and interpretation of pertinent epidemiological studies and the scarce or null economic resources dedicated to such purpose.

Pediatric Environmental Health Speciality Unit València (PEHSU-VALENCIA) seeks to design and to carry out a descriptive epidemiological study of the environmental and constitutional RF implied in the etiopathogenesis of the PC in Spain. For this purpose, a Pediatric Environmental History (PEH), since the current classic clinical histories are thought, designed and directed almost exclusively toward the diagnosis and treatment of cancer. The PEH will contain the necessary validated items to inventory the environmental and constitutional RF associated with PC described in the specific literature, as well as the main human carcinogen agents described by The International Agency for Research on Cancer and by the US National Toxicology Program. In order to comply with legal, ethical and confidential norms, to increase the reliability and accuracy of the data, to clarify doubts, alarmisms and false family fears, and to avoid interpretation biases, the PEH will be carried out by pediatricians trained in pediatric environmental health, and with basic knowledge in pediatric oncology and clinical epidemiology. Data will be collected by scheduled telephone interviews, registered, stored and analysed according to security and confidentiality standards.

PEHSU will closely collaborate with the Spanish National Pediatric Cancer Registry. This entity was created to estimate incidence and survival of pediatric cancer, and registers 625 new cases annually, which represent 71% of the PC in Spain.

Finally, we want to stand out that the project seeks to know the frequency of the environmental and constitutional RF associated with PC, in Spain. This local experience aspire to be the origin of future epidemiological case-control and cohort studies on an European level, as well as to foment the setting-up of political, educational and preventive measures in Europe.

Improvement of children environment in Crimea: strategy and actions

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The deteriorated human health is one of the biggest problems in Crimea, Ukraine. Two sets of causes are - social and environmental factors. Environmental ones are unhealthy living conditions especially for poor people (air pollution, water pollution, soil and food pollution, bad occupational conditions, sanitary conditions at homes, schools etc.). Especially the children suffer from mentioned factors. Taking into account continuing hard economical conditions and poverty we developed the strategy to improve health of children that is based on three approaches: practical changes (improvement of individual environment, preventive health care in schools and kindergartens and health status rehabilitation), education on environmental health and healthy way of living (of children, parents, teachers and broad public, promotion of the good practices replication) and elaboration of the special program to put the children environmental health to the long-term governmental agenda. As needed base for the strategy implementation we began studies related to mentioned three approaches - studies of modern situation in schools, of educational level and children morbidity. Main threats to children health in schools of Crimea are poor lighting in class-rooms, not-appropriate furniture, air pollution (indoor and outdoor), weak level of physical activity of pupils and some other. Educational level related environmental health is low. Morbidity analysis revealed the main regional tendencies and morbidity foci. Obtained data became base for the first practical efforts to improve children environment and educational level, develop draft of the children environmental health program.

Risk and Regulation of Chemical Exposures in Children Based on Comparisons of Differential Sensitivity with Adults

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The objective of this research was to investigate current use of uncertainty factors in determining safe doses for chemical exposures, since some authorities have proposed an additional 10-fold factor when estimating safe doses for children. The use of this factor, for example by the Food Quality Protection Act (FQPA) of the U.S., is meant to address uncertainties in both exposure and toxicity extrapolations from adults to children in the current method. An analysis of the existing method indicates that these uncertainties, at least for toxicity, are addressed by an uncertainty factor for database incompleteness, UF_D , or by an uncertainty factor for within-human variability in toxic response, UF_H .

Specifically, when chronic experimental animal studies are available but studies in younger animals are not, the division of the lowest chronic NOAEL by an UF_D of 3 or 10 accounts for between ~92% and 98% of the possible occurrences of lower younger-animal NOAELs. Drawing conclusions about the adequacy of UF_H is more challenging. Virtually all studies available suggest that a high percentage of the population, including children, is protected by using a 10-fold uncertainty factor for human variability or by using a 3.16-fold factor each for toxicokinetic and toxicodynamic variability. Based on specific comparisons for newborns, infants, children, adults and those with severe disease, the population protected is between 60% and 100%, with the studies in larger populations that include sensitive individuals suggesting a value closer to 100%.

We conclude that an additional factor to limit environmental chemical exposures is unlikely to provide significantly greater protection to children over 6 months of age when compared to the current method. The same conclusion might not always hold true for children younger than 6 months of age in the absence of adequate developmental or systemic toxicity testing.

The glutamate-nitric oxide cGMP pathway is a good sensor for neurotoxicants-induced alterations in glutamatergic neurotransmission in brain in vivo

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A number of environmental neurotoxicants induce their neurotoxic effects by altering glutamatergic neurotransmission, especially signal transduction pathways associated to glutamate receptors. Activation of NMDA receptors by glutamate increases intracellular calcium, which binds to calmodulin and activates nitric oxide synthase. The nitric oxide formed activates soluble guanylate cyclase and increases cGMP formation. Part of the cGMP formed is released to the extracellular space. Under appropriate conditions, the analysis of extracellular cGMP by in vivo brain microdialysis is a good measure of the activation of this Glutamate-NO-cGMP pathway in brain in vivo.

We assessed whether the analysis of this pathway function in cerebellum of rats, by in vivo brain microdialysis, could serve as a sensor for the neurotoxic effects of some neurotoxicants in brain in vivo.

We assessed the function of the pathway in rats chronically exposed to aluminium. Microdialysis probes were inserted in the cerebellum and perfused with NMDA to activate the Glu-NO-cGMP pathway. NMDA-induced increase in extracellular cGMP was reduced by ca. 50% in rats exposed to Al, indicating that the function of the Glu-NO-cGMP pathway is impaired in brain *in vivo*.

This impairment can be reproduced in primary cultures of cerebellar neurons chronically exposed to Al.

We analyzed the effects of prenatal exposure to Al on this pathway. Glutamate-induced cGMP formation was reduced by 81% in cultured neurons from rats prenatally exposed to Al, indicating that prenatal exposure to Al impairs the Glu-NO-cGMP pathway in cerebellum.

Chronic exposure to 2,5-hexanedione or ammonia also impairs the Glu-NO-cGMP pathway in brain in vivo, as assessed by microdialysis above. The steps of the pathway affected are different for different neurotoxicants and periods of exposure.

These results indicate that the Glu-NO-cGMP pathway is a target for different neurotoxic substances and a good sensor for alterations of glutamatergic neurotransmission in brain in vivo.

Influence of chemical environmental pollutant 7bmba on the cells of neuroblasts and fibroblasts and DNA repair mechanisms

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Children are the most sensitive group to the impacts of increasing (quantitatively and qualitatively) chemical genotoxic environmental pollutants. This fact is explained by the features of metabolism, particularly, ability of children's cells to more active proliferation.

Polycyclic hydrocarbons (benzo(a)pyren and etc.) are observed in the air due to the smoke and exhaust gases. It can be concluded, that they might be found in our food too.

Revelation of peculiarities for DNA repair mechanisms in the cells of various differentiation is important for better understanding of genetic principles of carcinogenesis, early aging, hereditary diseases, etc.

Objective of the research is to make a comparative study of DNA repair systems: postreplication repair (PRR) and replication "by pass" of unremoved lesions (RP).

Cell cultures of neuroblastoma (N-2a) and fibroblasts (L₉₂₉), treated by analogue of benzo(a)pyren, 7Brommethylbenz(α)anthracene (7BMBA) have been used. Earlier we showed that both cell lines are equal in their viability and there is practically no excision of 7BMBA adducts. The molecular weight of DNA was determined by the method of sedimentation in alkaline gradient of sucrose. Mathematical analysis of experimental data shows an exponential character of the PRR process. The number of gaps in newly synthesized DNA is greater in L₉₂₉ than in N-2a and the rate of PRR is higher in neuroblasts. But after a prolonged (3 hours) post-treated period fibroblasts, unlike neuroblasts, were able to synthesize DNA without gaps (PR). So equal survivability of mentioned cells is achieved via different ways. These results indicate that the mechanism of DNA RP, being present in L₉₂₉, and being absent in the cells N-2a vary principally from the mechanism of PRR. We suppose that in a long time after impact, the genes in fibroblasts (but not in neuroblasts) are being activated that is necessary for free DNA synthesis "by pass" of unremoved damages.

Nowadays carcinogenic agents are globally dangerous for the whole population and the study of above mechanisms is important for prevention of mutagenetic influence of environmental stress factors.

Risk Communication, Environmental Chemicals and Child Health: Finding the right balance

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Finding the right balance in any decision requires an understanding of the issues and concerns that interested or affected parties have on a particular subject. Risk communication is an emerging area of study that takes into consideration differing views in order to improve risk management decisions. Scientists and the public have been identified as two parties that often hold differing views on risks to children from the chemicals in the environment. The scientific perspective often interprets scientific evidence to show that children are not always at a higher risk from all chemicals in the environment than are adults. On the other hand, public opinion, based on the same evidence but interpreted differently, sees that children are more vulnerable to the effects of environmental chemicals. A corollary of this viewpoint is that current Canadian regulatory approaches to control exposure to chemicals in the environment are insufficient to protect children. The news media is one of the most relied upon (but not necessarily the most reliable) source of health risk information. Examples of the "ripple effect" which is a form of risk amplification will show how an original focus on a single specific risk can be expanded to cover many related issues. Risks always garner more attention than benefits yet benefits are real while risks are often theoretical. For example, breastfeeding benefits outweigh chemical contaminant risks, benefits of continued fishing in Northern aboriginal communities outweigh stopping it because of contaminants in fish. This does not mean complacency about dispersive emissions of chemicals or decreasing efforts in pollution prevention, both of which are fundamental to a sustainable future. What it does mean is that we must keep a perspective and not lose sight of the very real risks (injuries, obesity, illicit drug use, alcohol abuse to name but a few) that prevail today and have long term implications for their future health and wellbeing. This presentation will look at both the scientific and public perspectives on environmental contaminants and explore the role of communication in bridging the gap between them.

Pediatric Environmental Health 2nd Edition – New From the American Academy of Pediatrics

Sophie J. Balk MD and Katherine M. Shea MD, MPH.

Since publication of the 1st edition of the AAP *Handbook of Pediatric Environmental Health* in 1999, there have been many advances in the field. The newly updated 2nd edition of this Handbook is 75% longer than the 1st and provides up-to-date guidance to pediatricians and other health professionals.

Evidence-based information is presented in 5 sections and 6 appendices. Notable revisions include a large increase in the number of recent peer-reviewed references, more tables and figures for easier access to information, more references to patient education materials available on Web sites, and sidebars highlighting key US environmental legislation. Section 1 (Introduction and Background) contains information about children's vulnerability to environmental hazards based on age and developmental stage, guidance about obtaining an environmental history and how to do a home inventory of environmental hazards. A chapter on breastfeeding emphasizes that breast milk is the best food for babies and should not be discontinued because of environmental concerns. Section 2 (Chemical and Physical Hazards) provides detailed information about 22 hazards. New chapters address arsenic, gasoline and its additives, irradiation of food and metals (including chromium, manganese and nickel). Section 3 (Environments) provides summaries of environmental hazards associated with environments such as child care settings, schools, workplaces and waste sites. A new chapter on preconception and prenatal exposures describes the spectrum of adverse outcomes associated with parental occupational and environmental exposures. Section 4 (Complex Situations) includes new chapters about chemical-biological terrorism, nontherapeutic use of antibiotics in animal agriculture and environmental threats to children's health in developing countries. Section 5 (Communicating About Environmental Health Risk) contains practical information on communication with parents. Major purposes of the handbook include providing up to date information to pediatricians and helping them become more aware of the gaps in data and scientific uncertainties in pediatric environmental health.

Exposure of children to ultrafine particles around an urban intersection

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Advances in recent research have highlighted ultrafine particles to have a higher potential to cause adverse health effects. This has important implications on the exposure of children, especially those with asthmatic symptoms and other predisposed susceptibilities.

As a part of the DAPPLE* field campaign in Spring 2003, centred around the intersection of Marylebone Road and Gloucester Place in Central London, groups of four volunteers collected data on the exposure to ultrafine particle counts (particle size range: 0.02 to > 1 μ m) at 1-second resolution using P-Traks (TSI) to obtain a better understanding of children's exposure to ultrafine particles around a street canyon intersection. Although the volunteers were adults, the equipment was held at average children's heights for 5 years and under. Measurements were made at three times of day (morning, lunchtime and early afternoon), on three modes of transport (walking; car/taxi and bus) and on two routes. The first route was circular along Marylebone Road and the second figure-of-eight route incorporated Gloucester Place and the backstreets.

Preliminary data analysis indicates the mean ultrafine particle count exposure to vary through the day. The mean ultrafine particle count exposure was higher on the Marylebone Road circuit in comparison to the back-street circuit irrespective of timing and mode of transport. Examination of the mean exposures for only the different modes of transport reveals the mean ultrafine particle count exposure to be the lowest when walking, slightly higher in the car/taxi, and highest in the bus.

In conclusion, the results indicate a variation in children's exposure within and between transport modes, timings and routes. Some of these are likely to depend more strongly than others on the traffic flow and the weather conditions. The full data set when completed will be analysed in more detail to identify the determinants of children's exposure in a street canyon intersection environment.

*DAPPLE is a 4-year UK Engineering and Physical Science Research Council funded project that brings together a multidisciplinary research group, from six universities (Bristol, Cambridge, Imperial, Leeds, Reading & Surrey), whose aim is to enhance understanding of events from emission to exposure for air pollution in the urban environment.

Urban Pollution and Health Damage: The Asthmatic Child is the Tomorrow's Disable

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Objectives of the research: The impact of urban pollution on asthmatic children: diagnosis, prevention and health promotion.

The role of environmental pollution, both indoor and outdoor, as responsible of the increased clinical occurrence of asthma and allergic sensitization in children was reported in numerous studies.

Data scarcity on the correlation between infantile asthma and the damage to respiratory function in adult life comes from the difficulty of conducting longitudinal studies for more than 30 ys, through functional and clinical evaluations in the same subjects and to relate them to concomitant monitoring for air pollution.

A qualitative assessment has showed a difference of types of pollutants and pathogenesis of respiratory diseases in Western and Eastern European Countries: ozone and SO_x, NO_x respectively.

The interaction between indoor allergens and chemicals, which allows IgE production or bronchial reactivity, was reported in the last years.

The real prevalence of asthma in children is difficult to determine. Wheezing can affect approximately 40% of under 6ys children, but only 1/3 of these will develop asthma. In children respiratory viral infections can simulate asthma.

Analysis of airways inflammation has showed an eosinophilic involvement in asthma. Spirometric reversibility isn't often measurable and the presence of atopy or elevated IgE can contribute for diagnosis. The chronic inflammation produces anatomical bronchial alterations and persistent changes of respiratory function.

Therefore socio-economical aspects of asthma refer to direct, indirect and inestimable costs: related costs are very high including also loss of productivity in adult subjects.

National Environmental Protection Agency (APAT) promotes a health programme which include not only preventive action and educational issues, but also satisfactory clinical and instrumental controls. Children represent subjects with high susceptibility to pollution.

The largely agreed relationship between air pollution – specially by urban traffic – and this chronic disease call for a consistent commitment of environmental policy makers, for the implementation of monitoring and alert systems and an effective management of urban mobility.

Impact of traffic related air pollution on children's morbidity in South Caucasian Countries.

Dr. Ketevan Samadashvili

Recent ambient air quality data for selected major cities of the South Caucasus region indicate declining or stable trends for most of the pollutants monitored. Such trends are due to the fall in industrial activities and hence, industry-related emissions. However, this is offset to some extent by increased traffic-related emissions.

At present, the traffic related air pollution is a major concern and will continue to exist as such in the future.

Monitoring of concentrations of dust, sulphur and nitrogen dioxides, carbon monoxide, formaldehyde, phenol are made irregularly. Concentrations of other special hazardous substances, such as chloroprene, chlorine, ammonia, benzene, lead, ozone are not determined at all or were measured on a case by case basis.

Was reviewed ambient air quality data of big cities of the South Caucasus and morbidity of children aged 0-14 years.

Almost all measured pollutant levels exceeded European Union maximum allowable concentrations. According to the data mean annual concentration of dust in the big cities of the South Caucasus exceeds MPC (maximum permissible concentration) 2,2-4 times; CO – 1,5-2,8 times; SO₂ – 3,4 times; NO₂ – 3.5-3,75 times, formaldehyde– 5 times; phenol – 1,6 times.

High instance of respiratory diseases in morbidity of children aged 0-14 appear to be related to high levels of air pollution. Portion of respiratory organs diseases in morbidity of children in Armenia is 50%, in Azerbaijan - 54%, in Georgia - 48%.

The implementation TRACECA project will significantly increase traffic in major highways and may highly contribute to trans-boundary air pollution as well. Whereas the co-operation at the global level is high, there is practically no co-operation at the regional level to address trans-boundary air pollution issues. Therefore, it is necessary to take all possible measures to avoid potential environmental and health impacts.

Effects of Low Lead Exposure on Cognitive and Physical Development of School Children

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The objective of this study was to determine the relationship between blood lead with cognitive and physical development among primary school children in Malaysia. One hundred and sixty nine children from urban area and 100 children from industrial area were selected for this investigation. They are Malay children with age range of 6½ to 8½ years. Blood lead concentrations were measured using Graphite Furnace Atomic Absorption Spectrophotometer and cognitive development, with the "McCarthy Scales of Children's Abilities" test. The height and weight were based on the National Center for Health Statistics whereas the left arm circumference was referred to Frisancho standard. The mean cognitive scores was significantly higher ($t=-4.404$; $p \leq 0.001$) in the industrial children (102.55) than the urban children (95.09). However, no significant difference was found in the blood lead between industrial ($3.75 \pm 1.95 \mu\text{g/dl}$) and urban children ($3.56 \pm 2.16 \mu\text{g/dl}$). There were significant inverse correlation between blood lead concentrations and cognitive scores for all studied children ($r=-0.104$; $p \leq 0.05$) and industrial children ($r=-0.197$; $p \leq 0.05$). General Linear Model also shows that the cognitive scores for all children ($F=3.936$; $p \leq 0.05$) and industrial children ($F=5.177$; $p \leq 0.05$) are influenced by blood lead, after adjusting for the confounding factors. The industrial children are also influenced by the family income. Physically, the urban children are significantly better in their Weight for Height and Left Arm Circumference. No significant correlation found between blood lead with all the anthropometric measurements. In conclusion, the cognitive development or intelligent quotient may be influenced by blood lead of below $10 \mu\text{g/dl}$, in contrast, the physical development does not appear to be affected.

Strangling Our Heritage- Children Exposure to Persistent Organic Pollutants (POPs) in the Informal sector in Uganda

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There is increasing global attention to the environmental and health problems caused by the production and use of a suite of particularly toxic and persistent organic pollutants called POPs. Nine of the twelve currently listed POPs (aldrin, endrin, dieldrin, chlordane, heptachlor, DDT, hexachlorobenzene, mirex and toxaphene) have been used for the management of pests in agriculture and in urban environments. Weight of evidence indicates that exposure to these POPs chemicals over the long term may contribute to increasing rates of birth defects, greater susceptibility to disease and some types of cancers.

In response to national and international concerns, United Nations Environment Programme (UNEP) assumed the lead in mounting the first international effort to control POPs on a global level. UNEP supported a process to negotiate a global convention to stop the production and use of POPs (PSR, 1999). The "Stockholm Convention" as it is called, will enter into force most likely in 2005 after 50 countries have deposited their instruments of ratification.

In Uganda, as in many developing countries, there exist large stocks of POPs substances imported over a long period. These stockpiles continue to pose a serious threat, either through unintended leakage as a result of poor storage or because of illicit use of these substances by farmers and local artisans in the informal sector. Many of these chemicals have found new uses within poor communities, opening a lucrative informal trade. A common case in Uganda is the use of PolyChlorinated Biphenyls (PCBS) oils stolen from old transformers in locally made welding plants by poor metal workers. This oil is used as a heat resistant between the nodes of the welding plants. The informal metal fabrication business employs a large number of children who help as " general hands". These children are exposed to PCBS on a daily basis. The presentation will discuss other examples where POPs chemicals are being informally used in other sectors like agriculture and vector control where they pose a great danger to children's health.

This paper presentation is intended to strengthen the "case" for increased action to stop use and trade in POPs substances because of known threats to children's health.

References:

Persistent Organic Pollutants: A Global Health Threat, Physicians for Social Responsibility (PSR), January 1999.

****Timothy BYAKOLA** is a Programs Coordinator with Climate and Development Initiatives (CDI). CDI is a national NGO based in Uganda. CDI is a participating organization of the International POPs Elimination Network (IPEN). Timothy is steering committee member of IPEN.CDI is a member of the international Pesticide Action Network, and for two years has been coordinating the Eastern African regional office of PAN.

Traffic density near residence and adverse respiratory effects among Italian school children: preliminary results of SIDRIA2, the Italian ISAAC-Phase III

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Objective

To investigate the role of road traffic pollution on the respiratory health in a large sample of Italian school children.

Methods-results

The survey was conducted in winter-spring 2002. The sample included 22442 children (6-7 yrs) and 16336 adolescents (13-14 yrs) living in 13 areas varying in size, latitude, climate and level of urbanisation. Standardised self administered questionnaires were used to collect information on several health outcomes and potential risk factors.

A questionnaire was available for 33632 children and adolescents (86.7%). 18% of subjects reported a high traffic density in the zone of residence; a very frequent transit of cars and lorries in the street of residence was reported by 60% and 20% of subjects, respectively. High frequency of lorry traffic in the street of residence was associated with significantly increased risks for current respiratory symptoms: persistent cough or phlegm (R.R. 1.46, 95% C.I. 1.22 to 1.75), sinusitis symptoms (R.R. 1.44, 95% C.I. 1.30 to 1.59) and rhinoconjunctivitis symptoms (R.R. 1.18, 95% C.I. 1.07 to 1.31). No clear associations were detected for current asthma and wheezing. The association between a high frequency of cars in the street of residence and the outcomes analysed were weaker or absent at all.

Conclusions

These results, confirming previous findings, show that children living near streets with intense traffic of heavy vehicles are at higher risk for adverse respiratory effects, especially for bronchitic symptoms.

Attitudes of Child Pedestrian towards Traffic Exposure and Safety

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OBJECTIVES

The study will investigate the difference in traffic exposure-where, when and for which purpose children are exposed to roads-between children from different sex, age, and physical and social environment.

SUMMARY

The health and safety impact of public roads is considerable. Traffic accidents are the leading cause of severe childhood accidents in developed countries and pedestrian accidents are the second cause of road casualties for children. There is a direct relation between accidents and exposure; risk is defined as the ratio of the number of accidents to exposure. Child pedestrian accidents are related to the exposure of children to road traffic, quantity of exposure but also quality of exposure or type of environment children are exposed to.

This study uses questionnaires sent to primary and secondary school to be completed by pupils and parents in France and Northern Ireland. Particular attention was given to minimise the extent of bias in the sampling process regarding socio-economic groups (SEG), the type and density of children population.

Results show that children play in the street more often than they walk, and have a higher exposure to roads during the spring and summer months. **Male, older, and children from lower SEGs have higher traffic exposures.** Children living in bigger cities and in suburbs areas spent more time walking and cross more roads than those living in smaller cities, villages and in the countryside.

CONCLUSION

Certain children, especially younger boys from lower SEGs living in urban or sub-urban areas, are at increased risk of pedestrian injuries because of higher quantity as well as the poorer quality of traffic exposure. There is a need for comprehensive community-based programs to reduce child pedestrian accidents. These programs should aim at improving urban and sub-urban environments and integrate educational measures targeting children at higher risks.

Children's health and social and economic factors on the khatlonskeye Region of republic Tajikistan

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Iron-deficiency disease and anemia delay in the physical and the mental development of children from the low mass body and high it evened infantile smartest. In Tadzhikistan the scarcity of Microelement is beaten A also malnutrition or hypertrophy stands the first place. The level of infantile mortality this than is simple the means of understanding and sravneiyya of health and the state of nourishment the level of mladen'cheskoy mortality is also reflected to the social and economic the situation of the countries In 2001 the ministry Zdravookhraneiyey together with national by Institute Italy (ISS) and with poderzhki UNISEF is carry oiled the study on the basic by the reasons for the infantile of Zdorov'em. Proveden survey the scenic cases of the medium o Mladentsov Of the khatlonskeye region. From 1 January 1995 through 31 December 2001 D14 a study was selected 2040 domokhoyaystv in the rural locality. This investigation was intended for the collection of Information on obrashayemosti of the parents of families after the Medical aid and other social and economic factors. Resultants a study the majority of babies was borne by dome(71%) and not in Bolides(29%). Meson of death into the majority of the cases the same it was named house (77%) and not bolides(19%). priblizitel'no 3% of Scenic cases it occurred along the road in the hospital that it Svidetel'stvuyet about mnogochislennikh prepyatstvyakh to the services Zdravookhraneiyey in the issleduyemikh groups of physical finansovikh Kul'turnikh idr. In the structure neonatal of mortality by the osnovnimi studies by the reasons for death was prezhdevremenniye the kinds low mass the body of babies (31%) of pneumonia (21%) vrozhdeniye defects development (13%) Ancestral asfiksiya (9%) meningitis the encephalitis (to 9%). V structure of post-natal mortality by vedushchimimi reason was meningitis 3nqefalit(20.1%) acute diarrhea (17.0%) heavy degree malnutrition (16.0%) pneumonia (14.4%) heavy degree anemia (12.6%). After providential of analysis of causes on the groups the disease sufficed clear that majority these cases possible of predotvratimy but social and economic factors it was osnovniy reasons in this stage. The media of the cases of neonatal mortality (49%) was connected with antenatal exodus.(28%) with infektsionymi diseases (13%) with conducting of kinds. In the structure postneanatal'nom of mortality all reasons are measured this shifty infektsionymi diseases (58%) and underfeeding by anemiya (42%). Overall social economic status of population and low potentials' of system zdravookhraneiyey had an effect on the structure of the infantile mortality. Primer of high the level infectious the disease by that leading to the mortality in the post-natal period can be attributed to the shortage of clean drinking water iotsutstviyu of sanitation low the knowledge of the medium of workers public health. Low economic status population it also leads to infantile mortality The shortage of transported

Environmental Tobacco Smoking and Skeletal Maturity of Children

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The objective of the study was to identify correlations of children skeletal maturation (SM) with harmful environmental factors. The SM is a mirror of child growth and development and it can be used as the internal standard for the assessment of physical development in children. In our research we use ultrasonic method as a substitution for X-ray estimation of the SM in children. 97 healthy children from six months to three years were inspected by complex ultrasonic investigation of 7 points in wrist, hip, shoulder, scapula and spine. All received data were standardized and treated statistically.

Our researches also have shown that 52% of children had SM conterminous with calendar age, 14% - outstrip and 34% - delayed from calendar age estimated by wrist X-ray standard for former USSR. Thus the regional standards for SM reflected peculiarities of bone maturity of Ukrainian children.

Air and soil pollution have not correlate with SM or anthropometric data. Parental tobacco consumption was found to be the strongest predictors of the SM deviation. Passive smoking correlates with acceleration in bone maturity and power of correlation arise with the age. In a multiple linear regression model gestational age, vegetable consumption, parental tobacco consumption were found to be the strongest predictors of the magnitude of the SM deviation during the first 3 years of life. In the logistic model the most important risk factors of SM acceleration was maternal tobacco consumption (OR=1.93, 95% CI = 1.40-2.66).

In conclusion, we marked that SM acceleration strongly correlate with environmental smoking. This phenomenon must be appraised as cause of narrowing period of child growth and predictor of shorter stature.

The effect of health education on male participation in family planning in Ahwaz – Iran

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Introduction:

The world population will be approximately seven milliard by 2010 with almost ninety percent of growth taking place in the developing countries. Realizing the negative effect of rapid population growth on developing countries have embarked on the family planning programs. The success of the programs in many countries such as Iran has been significant in terms of reducing the rate of population growth. But, in family planning programs in this country, we can say very oft men are forget and they are fifty per cent of population and women have had deficient education.

Researches had shown that if 120 million women in world had correct information about ways of prevention and the scrviceswere available for them, they would use the family planning programs and this is when the husband and the women's family and society would support them. However every year half million women die because of pregnancy hurts.

According to the growing of the population in the developing countries and the need of family planning, men have to partnership in the family planning as a half of the world population in these countries and they have to increase their knowledge and get a bigger part in the control and family planning. If men don't partnership in the family planing the unwashed pregnancies would increase and this would result in population increase.

Methods of study:

This research has been done semi experimentally study. The sample has been chosen as type before and after the experiment by using random sampling method. The target population for this study is the 125 male personnel of Ahwaz University of medical Sciences, which their spouses are in fertility years. (15-49). 125 men, who chosen by random and they were qualified, and 21 person had left the experiment because they didn't like to joint the study and 104 person had been chosen as sample.

The first step was measuring male participated. According to practical definition for male participation, I measured the rate of their knowledge and attitude male participants toward family planning effective male participants and men support of their spouses to select and use of contraceptives.

Also the practice including the rate of using of male contraceptives and the husbands consultation with their wives for selecting and correct using of the contraceptives had been measured.This had performed through passing questionnaires and getting self-report. Thus in accordance to the needs of training education program had been determined and performed. Education program comprises educational pamphlet, lecture, and Video presentation-after two months; a follow up measurement had been performed on the rate of male participation.

The information that were need in this research had been gathered by questionnaire that had three parts:

A demographic information about the person and his wife that been needed during the research.

B: Information about attitude.

C: information about revenue.

Result:

The Distribution of frequency factors demography such as age, age of wife, age of marriage for wife is presented in the table number 1. The distribution of education, education of wife, number of children, job of wife is to indicated in table number 3.The results of the paired -t - test before and after educational intervention for the men which have been presented in table 4 and distribution frequency of prevent model in this research before and after educational intervention is presented in table 5.

Discussion:

According to the results the rate of men knowledge and attitude had been increased and paired-t-test showed the effect of education ($P < 0.0001$), also men practice was corrected as follows: Increase in rate of using effective male contraceptives from 34.6 to 45.1 and MC neman-test showed effect of education (0.0034). Also the rate of men consultation with their spouses had been increased and paired-t-test showed effectiveness of education ($P < 0.0034$). Also the rate of men consultation with their spouses had been increased and paired-t-test showed effectiveness of education ($P < 0.035$). The results of this study proved that education had increased the participation in family planning. Also by analyzing the gathered data from this study, we can see, there is a meaning full relationship using variation analysis test, between knowledge variable from knowledge and two demographics factors including men marriage, and the level of education of their spouses, Also between variable toward family planning and number of children ($P < 0.01$).

Impact of Environmental Hazards on Children's Health in Armenia

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Children, developing fetus, and pregnant women are mostly vulnerable to environmental exposures, in particular, to the harmful effect of chemicals.

The highest concern for child health is related to such groups as:

- ↵ metals and their derivatives, including lead, mercury, arsenic, cadmium, chromium, which are widely applied in modern society;
- ↵ pesticides, the frequency of poisonings by which is significant in developing countries, including accidental exposure of children and exposure resulting from un-used obsolete pesticides;
- ↵ persistent organic pollutants (DDT, PCBs, etc.), which remain in the environment for a long time and can cause reproductive disorders;
- ↵ household products – kerosene, solvents, pharmaceuticals; children may ingest dangerous chemicals and suffer acute poisoning;
- ↵ waste sites present potential threat for health of children, especially those living and scavenging in poor regions.

Infants can be subject to pollutants via mother's breast milk, though breast milk is still considered as most nutritive and safe source of food for infants worldwide.

In order to reveal possibility of "mother-infant" transfer of chemicals, we analyzed samples of human breast milk for PCB content.

The cohort under study involved 27 mothers residing in pre-mountain region of Armenia.

Samples of breast milk were analyzed by means of gas chromatography.

PCB residues were detected in all samples at:

- Minimal level was 10.784mcg/L
- Maximum level reached 267.97mcg/L
- Average level made 65.57mcg/L.

The results of monitoring studies for PCBs revealed that the content thereof in environmental objects (water, soil) was at the levels not excluding their migration from the environment into the foodstuffs and human bio-media.

Psychological effects of Spiritual child abuse (for HIV/AIDS orphans)

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Objectives of the research:

- To find out the extent of this kind of abuse in the region
- To look at the causes of this abuse
- To look at the effects of this abuse
- To find solutions to the problem

The Copperbelt province which is the most populated region of Zambia has been infected and affected by HIV/AIDS which has resulted into more than 600,000 orphans.

These orphans have first undergone trauma by being infected or affected by losing parents to HIV/AIDS due to tender age and destitution.

Secondly these orphans are supposed to be taken care of by either church/religious organization/institutions or individual believers. These institutions or individuals impose a religion on a child without consulting him/her on what kind of religion fits him/her. A lot of children have little or no choice but to accept the 'new religion' or they risk being left destitute.

One of the causes of these impositions is the idea of dominating the world as a religion by an institution or dominating a family by an individual.

The effects on the child are deadly for a child may fall into depression, sicknesses and eventually death.

One of the solutions to the problem is to involve religious leaders in children's programs so that they learn to understand a child and respect his/her rights. Another thing is to sensitize the children about their rights so that they can learn to fight for them.

Conclusion:

A program has to be put in place at international, national, regional, local and family levels to combat this kind of abuse in order to help the children grow up in a healthy

Improving the health of children by educating women on their job

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Objective:

1. To educate the women to take good care of themselves and their children
2. To find possible means of reducing risk factors and making their product more profitable
3. To help the women to send their children to school

Introduction:

The socio-economic situation in the country has put crises in many homes. Women are mostly affected because they normally struggle to fend for the family. By so doing, the children become directly affected health wise, education wise etc. women take up to many "odd jobs"- from Agriculture to food and nutrition. Palm kernel extraction is one of them which is also our topic for discussion.

Content: The women go round many villages to buy the palm nuts, carry them to their cracking grounds, crack the nuts manually, mill them and later boil the mill nuts, and finally do the extraction. Many times the children are used on the job for lengthy hours. The children get exposed to the whether and other environmental conditions for a long time and they get sick. The production site of the kernel oil is also very unhealthy and the sort of filth and stagnant waters serve as breeding grounds for mosquitoes.

The women are educated on personal hygiene, child care, reproductive health and HIV/AIDS. GEPG collaborates with the ministry of health to do this education.

Conclusion: A good number of women in the palm kernel oil business was send their children to school. The women will yield to new measures of reducing risks in the business-innovative methods to refine their product-thus promoting better marketing options to improve upon their economic status hence reducing poverty. The women will then be able to cater for the health needs of their children to some appreciable levels.

Exposure of children to mobile phone radio-frequency radiation and effects on cognition

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Introduction

Several studies have identified neurological effects of mobile phones, both by subjective symptoms, and by physiological measurement, but only in adults. The measurable effects include reaction, attention and sleep behaviour, but the mechanisms of these are not understood, even though some effects have been identified in animal model systems. As a result the Independent Expert Group on Mobile Phones suggested that children, by virtue of physiology, physical size, and length of potential exposure should exercise caution in the use of mobile phones and limit exposure. However, children are one of most prolific users of phones, and the ownership is growing. That children should be a special case has been disputed by some government reviews. Additionally a recent adult study has not been able to replicate some of the earlier studies, but this might be a factor of marginal effect, or, problems with experimental design.

Method

Two independent studies were carried out by two groups – one a study of 36 children aged 10 – 14 in Finland and the other of 18 children aged 10 – 12 on the Isle of Man, using standard Nokia mobile phones and different computerised cognitive tests whilst the children were being exposed to phone radiation. Both were double blind, randomised, repeated measure, and balanced order studies carried out on computer, allowing the analysis also to remain blind to the study.

Results and Discussion

Reaction times were considerably slower than in similar tests in adults, but not one single parameter showed any significant positive response to the maximum power output of the phones even without Bonferroni correction for multiple tasks and multiple analyses. There is no evidence that children are especially sensitive and show a greater response to mobile phone exposure and it may require larger exposure to demonstrate reliable changes. However the need to increase exposure to seek greater effect may have ethical constraints that would not apply to adults, and therefore further work is likely to concentrate on adults and mechanisms. Nevertheless, an excessively cautionary approach to children's use of mobile phones may be unnecessary.

Improvement of Nutrition and Health Status of Children with Body Weight Deficiency

Abstract prepared by Elena Manvelyan MD.PhD Head of NGO Armenian Women for Health & Healthy Environment (AWHHE)

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Objectives of the research:

- To improve general health and nutrition status, in particular during early childhood
- To raise awareness in families and professionals (e.g. medical staff, nutritionists) about the healthy diet and nutritional value of amaranth grain
- To introduce amaranth in the diet of the children with malnutrition

Insufficient nutrition has a negative effect on the human immune system, and particularly on developing fetus and child's immune system. The decreased immunity of children causes severe diarrhea, which promotes the deterioration of the children's health.

Starting from 1990 Armenia has encountered a problem of starving children. Till the last decade there was no problem of toxic dystrophy among the infants. This appeared as a consequence of malnutrition due to worsening of socio-economic conditions. The starvation and malnutrition has mainly affected the children from vulnerable families, whose parents are unemployed for a prolonged period of time. According to some mothers, they fed their children who had diarrhea only with tea and rice for weeks and as a consequence the children developed edemas and drew back in weight by more than 50% percent and sometimes more.

We had often seen images of such children from drought stricken regions in Africa, but we did not believe this could happen in Armenia.

On average, annually there are 70-90 patients from the age of 0-2, accepted to the hospital with the above –mentioned diagnosis. This shocking statistic does not reflect the reality, it only shows the existence of the problem. This is the tip of the iceberg. The main problem and the real number of children in need is hidden, as so many of them do not have the access to doctors, health facilities, financial resources, transportation, and finally necessary information on opportunities to be treated.

In the frame of carried out project totally 50 children with body weight deficiency more then 30% were fed with amaranth flour products during 6 months after discharge from the hospital. The continuous assessment of children's health status showed that their general condition became satisfactory, protein-free edemas disappeared and all children permanently gained weight.

Conclusions: Worsening of socio-economic conditions and insufficient nutrition bring to increase of morbidity rates of various diseases such as severe diarrhea with toxic dystrophy due to malnutrition.

Malnutrition is stipulated by the lack of knowledge of parents on healthy diet especially on the background of protein containing food dearth.

The health status of children with malnutrition after using the amaranth products during 6 months had been improved.

Amaranth flour is strongly recommended for introducing in the diet for children with malnutrition.

The project **Improvement of Nutrition and Health status of children in Armenia** was supported by Women of Europe for Common Future (WECF) and funded by private funds from the Netherlands.

Outdoor/indoor exposures and hospitalization for respiratory infections in children: a five-year follow-up study in Rome, Italy

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Rationale

Indoor and outdoor exposures have been studied in relation to the occurrence of respiratory diseases. However, differentials in hospitalization rates among children have not been well evaluated, especially in longitudinal studies. We examined a cohort of children and adolescents enrolled within the International Study of Asthma and Allergies in Childhood (ISAAC), in Rome, Italy (1994-1995). We evaluated whether the cumulative risk of hospitalization for respiratory conditions over five years is associated with outdoor and indoor exposures.

Methods.

Baseline data of the cohort members (6-7 years, n=4027; 12-14 years, n=3140), including environmental risk factors, were provided by parents through a self-administered questionnaire. A five-year follow-up for hospital admissions (1995-1999) was conducted through record-linkage with the regional file of Hospital Discharges.

Results

A total of 1863 hospitalizations occurred (1281 subjects), corresponding to a 19.6% five-year risk of hospitalization. The percentage of children hospitalized for conditions of the upper respiratory tract (ICD9=460-465 and 380.1-380.2,381-382) (excluding tonsillectomy) was 0.70%, and those admitted for acute conditions of the lower respiratory tract (ICD9=466, 480-487) were 0.66%. A total of 0.21% were admitted for asthma (ICD9=493). After adjusting for father's education, age and sex, we found an association between living along busy streets with heavy truck traffic and hospitalization for diseases of the upper respiratory tract (OR=3.28, 95% CI=1.61-6.72), and an association between living in a street with two or more bus routes and lower respiratory tract hospitalizations (OR=2.49, 95% CI=1.01-6.13). Asthma hospitalization was not associated with traffic exposure, but indoor factors, such as presence of mold in the child's bedroom (OR=9.13, 95% CI=1.93-43.1) were more relevant.

Conclusions

Exposure to air pollutants derived from truck traffic, especially diesel exhaust, are associated with diseases of the upper and lower respiratory tract. Hospitalization for asthma was strongly related to indoor mold.

Immunotoxicity assessment of lead and cadmium in Flemish (Belgium) adolescents

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The number of immunological and hematological disorders has increased in the industrialized society. The contribution of pollution to this phenomenon is unclear.

Objective

We investigated in adolescents (17-18 years) whether changes in immune parameters were related to biomarkers of internal exposure to Pb and Cd.

Method

We obtained questionnaire data and blood and urine samples from 200 adolescents recruited from 1 rural control area and 2 neighboring suburbs located close to industry. Trained school physicians recorded medical history. Differential cell counts, lymphocyte phenotyping by using flowcytometry and immunoglobulin measurements were performed on individual blood samples. Biomarkers of internal exposure including blood Pb, blood Cd and urinary Cd were measured in the same individuals.

Results

The percentage of CD19⁺ cells was positively correlated with the Pb concentration in blood ($p=0.031$). Reported skin allergies as well as frequency of bacterial infections were positively associated with blood Pb levels, with odds ratios (95% CI) of 1.82 (0.99-3.33) ($p=0.05$) and 2.55 (1.17-5.53) ($p=0.02$), respectively.

Increased Cd in urine resulted in an increase in serum IgM levels ($p=0.024$).

Reported respiratory complaints including bronchial wheezing and dry nighttime cough showed a statistically significant confounder-adjusted positive association with blood cadmium levels, with odds ratios (95% CI) equal to 1.63(0.99-2.67) ($p=0.05$) and 1.97 (1.22-3.18) ($p=0.005$), respectively.

Conclusion

These results confirm the immune-modulating capacity of the heavy metals Pb and Cd and indicated that even low-level exposure to heavy metals may lead to immunological changes in a population of adolescent confirming the immunosuppressive activity of Pb and Cd.

Tool for the Pediatricians : Pediatric Environmental History

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The pediatricians complete a very special paper, since they are who they diagnose and they treat the illnesses in the childhood, they foment the conscience regarding the health and the well-being and they work as professionals of trust with the scientific back to defend and to support with success changes in the politicians. Their knowledge on the special vulnerability of the children and adolescents, their abilities, their actions and capacities are essential in the protection, diagnostic and children's treatment with caused illnesses or made worse by the environmental conditions.

The pediatrician that participates so much of the environmental field as of that of the health has work of "investigator, educator and defender," and it is a direct source of information for the parents, the families and the communities. To increase the level of knowledge and the pediatrician´s capacities is, therefore, a vehicle of first importance for for the communication, education, prevention and remedy of the environmental dangers for the childhood. He has a durable effect in the professional, same community that can lead to the prevention of the illnesses related with the environment and, ultimately, to the well-being of the childhood. The biggest competitions in infantile health and environment are a current necessity for the current and future generations of pediatricians.

Regrettably most of the sanitary professionals lack the training and formation in Pediatric Environmental Health to detect the environmental risks, being omitted in the histories and clinical documents.

The Pediatric Environment History (PEH) understands a series of basic and concise questions that allows the pediatricians to identify the environmental risk factors, also including genealogical and constitutional aspects. From the year 2001 work in PEHSU-Valencia in the formation and new pediatrician´s instrumentation for the development of the PEH.

Conclusions. PEH constitutes a fundamental pillar of the Pediatric Environmental Health Speciality Unit (PEHSU´s) and it should be considered as a tool of extraordinary value with certain instructive and preventive ends, guaranteeing their registration and incorporation to the clinical histories of our children. It is necessary the development and the pediatrician´s formation in this field.

The effect of road traffic and aircraft noise exposure on cognitive outcomes in primary schoolchildren around Schiphol Amsterdam Airport

A comparison between two cognitive test batteries.

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In the framework of the European Commission project 'Road Traffic and Aircraft noise Exposure and Children's cognition and Health' (RANCH) the influence of community noise exposure on children's cognitive performance around Amsterdam Schiphol Airport was studied, by means of a paper-and-pencil test battery and the Neurobehavioural Evaluation system (NES) which is a computerised test battery. The paper-and-pencil test battery was based on previous studies investigating the effects of noise on children's cognition. The NES is relatively new in this field of research. Its' feasibility in relation to noise was piloted in 1997. The aim of this paper is to assess the association between noise exposure and the separate test outcome and to investigate to what extent these batteries complement each other.

The study involved children attending primary schools with different levels of road traffic and air traffic noise ($L_{Aeq, 7-23 \text{ hr}}$ in dB(A)) around Schiphol Amsterdam Airport. Schools were chosen according to the noise exposure of the school area and such that children were matched on SES and ethnicity. Participants were 416 children attending 22 primary schools. By means of the paper-and-pencil test battery and the NES a range of cognitive aspects were measured: attention, psychomotor performance, perceptual coding, memory and reading comprehension. Additionally, the parents of the children completed a questionnaire on social support, environmental attitudes and socio-economic status.

The comparison between the two cognitive test batteries resulted in a number of components that were theoretically interpretable. In a subsequent analysis these components will be investigated in relation to different RANCH outcomes.

Key words: cognitive performance, air and road traffic noise, children

Toxic threats to the developing nervous system: *in vivo* and *in vitro* studies on the effects of mixture of neurotoxic substances potentially contaminating food (DEVNERTO)

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The aim of this European project, financed under the 6th Framework Programme (FOOD-CT-2003-506143), is to develop experimental models to investigate the effects of mixtures of persistent pollutants present in food, such as PCBs and methylmercury, on the developing nervous system.

Major objectives are to:

1. Develop standardised testing protocols based on the use of multiple *in vitro* experimental models.
2. Identify specific biochemical, molecular and functional end-points based on the mechanism of action of specific neurotoxicants, both alone and in combination.
3. Evaluate the neurotoxic effects of the selected substances during development and the long-term consequences, with special attention to gender-related aspects.
4. Define quantitative measures of observed effects for risk-assessment purposes, and incorporate currently available human and animal data to derive guidelines and exposure limits as gold standards.

The complexity of the topic and its aims require the use of relevant experimental approaches and the evaluation of a wide range of mechanism-based parameters on a panel of selected experimental models representing possible targets for the selected toxicants. The project uses a multidisciplinary approach, combining *in vitro* and *in vivo* experimental strategies, stretching from single-cell analyses to the analysis of behaviour. The dose-dependent effects of PCBs and methylmercury (alone and in combination) on the developing nervous system and the long-term consequences will be evaluated. All these chemicals are well-known neurotoxicants, targeting different cell populations via mechanisms of action that are not fully understood.

The results of this work will generate novel information about the interactions of the selected neurotoxicants, as well as relevant experimental approaches to investigate the effects of other types of neurotoxic mixtures. In addition, the project is expected to make an important contribution to the EU objectives regarding the quality and safety of food, especially in relation to the most sensitive group; subjects under development.

<http://www.imm.ki.se/DEVNERTO>

Influence of socio-economic factors on children's health on radioactive-polluted territory of the Bryansk region, Russia

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At the United Nations conference (Rio-de-Janeiro, 1992) Russia and countries of the Former Soviet Union were included in group of the most polluted areas on continent. One of complex environmental problems is a radioactive pollution on territory of Russia which is defined by consequences of large radioactive. So in some districts of the Bryansk region, which is most polluted after Chernobyl accident, concentration of Cs-137 exceed average radioactive pollution of the country in 360 times.

Radionuclides Cs-137 and St-90 play the main role in negative influence of radioactive pollution on children's health. Through food, water, air they get in inside of children's body and they cause internal radiation, which is reason of weakening children's immunity and of many diseases.

Within the framework of the scientific Germany program in the Bryansk region three groups of the population have been defined in depending accumulation of Cs-137 in the body:

1 group – the persons having radioactivity of radionuclides less 189 nKu for adults, less 108 nKu for children;

2 group – adults – 189-675 nKu, children – 108-405 nKu;

3 group – adults – more 675 nKu, children – above 405 nKu.

People from groups 2 and 3 have high risk of pathology. In 1996 6,6% examined people was included in the second group and 1,0% was included in the third group. But in 1998 the second group was 25,7% and the third was 2,6 %. It is possible to explain by bad social-economic conditions in the Bryansk region in this year. Local population used in the diet local food. Thus, we can observe obvious dependence children's health from social-economic factors. We have revealed that accumulation of radionuclides occurs more in a children's body in poor families. Main reasons of this process are socio-economic factors.

Serotonin Level and Indices of General Oxidative and Anti-oxidative Activities in Adolescents working on Personal Computers without Observance of Hygienic Requirements

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Background.

Personal computers (PC) are becoming the integral part of everyday life. The increasing number of children, especially adolescents spend a lot of time working and/or playing on PC without any regard to hygienic rules and requirements. Thus it is a new environmental hazard which could cause different behavioral patterns, e.g. sleep disorders, anxiety, unmotivated mood changes etc. The aim of the study was to elucidate the disturbances in serotonin metabolism and general oxidative and anti-oxidative activities (GOA and GAOA) in adolescents working protractedly on personal computers disregarding hygienic norms.

Material and methods.

Venous blood for determination of free serotonin and GOA and GAOA was obtained from 15 practically healthy adolescents aged 15-19 (average $17,8 \pm 2,6$). Basing on self-reported questionnaires they were divided into two groups. 8 of them (who worked on PC more than 5 hours daily almost without rest during at least last 6 months) constituted the basic group, another 7 (they were exposed to PC much less intensively) made the control one. Serotonin was measured by microfluorimetric method [Rabinovich NL et al., 1985], GOA and GAOA - by chemiluminiscent method [Galaktionova LP et al., 1998]. GAOA/GOA proportion was calculated as well.

Results and discussion.

In the basic group there was revealed GOA upward trend (21.3 ± 3.1 and $18.1 \pm 3.5\%$ accordingly), GAOA (35.7 ± 3.1 and $39.3 \pm 4.0\%$) and GAOA/GOA proportion downward trends (1.71 ± 0.22 and 2.15 ± 0.25), at the same time difference in serotonin concentration has reached the formal level of statistical significance (0.056 ± 0.006 in basic group and 0.133 ± 0.009 $\mu\text{mol/l}$ in the control one). Low levels of serotonin in basic group, which have been associated with decrease of exercise tolerance, depression and sleep disorders could be considered as a result of an adaptive increase of the level of melatonin in response to the oxidative disorders.

Conclusion.

The essential decrease of serotonin level in blood of adolescents working in unsafe manner on PC can explain informational stress-like behavioral changes in them.

To assess Differences in Susceptibilities between Different Diabetic Populations using the Comet Assay

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The use of molecular epidemiology is valuable in assessing susceptibilities in different populations. This study is the start of a project aiming to assess differences in susceptibilities between different diabetic populations using the Comet assay.

Numerous factors may influence the incidence of diabetes in the population. In an ecological epidemiological analysis [1], the relationship between the incidence of childhood diabetes mellitus in Yorkshire (UK) has been found to be associated with nitrate in drinking water. This is not explained by the ethnic composition or population diversity; or socio-economic status of the population. Nitrate/nitrite may be a precursor of chemicals that are toxic to the pancreas. Alongside water supply, foods such as cured meats and root vegetables account for the highest proportion of nitrite in the diet. Nitrite, which is converted to nitrate, is used in this study. Also, because of the involvement of reactive oxygen species in diabetes [2,3], the effects of different levels of nitrite in the presence of the oxygen radical generator, hydrogen peroxide (H₂O₂), have been examined.

The role of diet continues to be important when assessing susceptibilities in different populations. 2-amino-3,8-dimethylimidazo[4,5-f]quinoxaline (MeIQx) is one of the most abundant heterocyclic amines in cooked food [4], and has also been examined in the current study.

In a diabetic and non-diabetic Asian and Caucasian population (n=63), the analysis of sodium nitrite showed a consistent dose-dependent increase in DNA damage, but only in the presence of H₂O₂. Investigation of the food mutagen MeIQx also showed a dose-dependent increase but with a lower index of DNA damage than the previous combined compounds. These results are contributing to the investigation of susceptibility between mothers and their children, where the work is still ongoing.

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Exposure of Pregnant Women to Tap Water Related Activities in London and Validation of a Questionnaire

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Evidence for an association between exposure of pregnant women to chlorination disinfection by-products and adverse birth outcomes is inconclusive largely due to limited exposure assessments. A study was conducted to examine the validity of a questionnaire using a 7-day diary as means to assess the exposure of pregnant women to water and to obtain a better understanding of the exposure of pregnant women to water in Central London.

Pregnant women, recruited in 2002 at the Chelsea & Westminster Hospital antenatal clinic, were asked to complete a questionnaire at the hospital. This requested information on their exposure to water from cooking and washing up, showering and bathing, food and drink, and swimming. Demographic and socio-economic information, which may influence exposure to water, were also recorded. For validation purposes, women were asked to complete a 7-day diary at home, which recorded similar exposure information to the questionnaire.

Generally, the participants returning the questionnaire and 7-day diary were highly educated, employed and with a high household income. The average exposure duration for cooking and washing up was 338.5 min/week, 172.2 min/week for bathing and showering, and 67.9 min/month for swimming. The total fluid ingestion was 18.9 L/week. The correlation between the questionnaire and diary data was generally good, although women tended to overestimate their exposure in the questionnaire.

In conclusion, the study provided a better understanding of the daily exposure of pregnant women in Central London to chlorinated water. It highlighted considerable variation in the exposure to water amongst pregnant women, and comparisons of the estimates obtained in this study to those in other studies indicated that the exposure of pregnant women to chlorinated water needs to be characterised for different geographical locations. In addition, the questionnaire was found to be a valid method to assess the exposure of pregnant women to water.

Effects of Hearing Thresholds on Academic Performance of Children in Kuala Lumpur

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This study was done to determine the effects of hearing thresholds on academic performance of primary school children. A total of 110 Standard One children aged from 6 ½ to 7 ½ years of Malay ethnic at a National Primary School in Kuala Lumpur were selected. A personal questionnaire interview was conducted on all the children. Audiometric test and personal noise exposure measurement were also carried out. The child's academic performance was determined by his latest examination result in the school. The indoor and outdoor LEQ during school days are 73.5 dB (A) and 70.8 dB (A) respectively which are above the WHO Guideline of 55 dB (A). The children were exposed to a personal average sound level of 85.6 dB (A), a personal maximum level of 109.6 dB (A) and a minimum level of 51.7 dB (A) for 5 hours everyday. Audiometric test results shows that 45.2% children experience high frequency hearing loss (HFHL) and 61.5% has low frequency hearing loss (LFHL). Children with LFHL performed significantly poorer than their normal hearing peers in Malay and English Language but not in Mathematics. In contrast, children with HFHL had slightly better achievement but not statistically significant. Personal maximum level (LMAX), fathers' education and hearing category at HPTA have significant influence on academic performance. In conclusion, exposure to noise of over the WHO Guidelines affects the hearing thresholds which is critical to academic achievement especially in language development and acquisition of these young children.

Facing The Wind of Change. Children's views on Urban Public Utilities in Asaba.

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The wind of change in Asaba, the state capital of Delta State Nigeria, began with the 1991 state creations.¹ State creation in Nigeria, apart from the increase in size and number of urban settlements also involves mandatory and hasty urban-urban population displacements with the attendant infrastructural crisis. Nigerians, more than anybody according to the World Bank, suffer from the breakdown in urban infrastructure and most of the burden falls on women and children.²

A pilot study focusing on public utilities provision in Asaba, as viewed with the eyes of children children's, was conducted between December 2001 and January 2002. The general aims and objectives were:

- To explore the cognitive ability of children to participate in focus³ and concepts mapping⁴ group sessions.
- To explore children's views on urban public utilities provision and related health impacts.

The group sessions, which were conducted and completed in two months, involved teenagers between the ages of 13-17 years and the discussions covered selected public utilities.⁵ The preliminary conclusions from the study were:

- That the participant's enthusiasm and active participation during the group discussions provides evidence that focus group and concept mapping, as data collection techniques are appropriate for working with children.
- That the participants understand and have independent views on the issues that are pertinent to their communities.

The study also revealed that the recurring issues in most of the group discussions converged on the participants health and safety concerns with regard to their activities in domestic water provision, which from their viewpoint, has been habitually overlooked or ignored by most adults. This is the focus of my current research at the London School of Hygiene and Tropical Medicine under the supervision of Dr Carolyn Stephens.

¹ Asaba, as with the other new state capitals, were literally transformed into state capitals 'overnight' by military decrees, as opposed to those that developed into state capitals over a period of time either in the pre or colonial era, for reasons of commerce and/or colonial administrative convenience.

² The World Bank Group (1996). Findings: Restoring Urban Infrastructure and Services in Nigeria. Africa Region, Number 62. <http://www.worldbank.org/afr/findings/english/find62.htm>, The World Bank Group.

³ The focus group, as a way of listening to people and learning from them, gathers together people from similar backgrounds or experiences to discuss a specific topic of interest to the researcher. It allows access to participants who may find one-on-one, face-to-face interaction scary or intimidating, thus making it appropriate for children

⁴ Concept mapping is a method that may be used to clarify and describe people's ideas about any topic in a graphical or pictorial form and have proved very useful when there are vocabulary problems. The conceptual framework is expressed in the language of the participants and with its pictorial representation and participant-oriented features, can be a powerful method for young people to organise their ideas.

⁵ Selected urban public utilities such as water and sanitation; waste disposal, electricity; communication and transport were presented to the students and street children in the focus group and concept mapping sessions. The health impacts of these selected urban public utilities as perceived by children were discussed at length.

Chronic lead intoxication in children from Polish Copper Basin (LGOM) and successful health curative – prophylactic activity 1970-2000

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The monitoring of Pb concentration in blood (Pb-B) in children living on industrial risk regions in Poland (Higher Silesia and Copper Basin of Legnica – Głogów (LGOM) was initiated 1970.

At this time the Pb-B concentration was below acceptable 10µg/dl only in 20% of schoolchildren on LGOM.

The average of Pb-B concentration in some selected risk localities was augmented up to 36 – 52µg/dl. In years 1974-1994 a 4-6 -fold decrease of Pb-B concentration was noted particularly since 1980^{ties} when the atmospheric Pb dust emission from smelting work has been significantly reduced. Then the average Pb-B concentration in children decreased to 10-28µg/dl dependently on selected areas.

1991 The Foundation for the Children of Copper Basin was established with an aim of Pb-B mass monitoring, treatment and prophylactic action and environmental health education.

Independently a modernization of smelting process intensified resulting in significant reduction of heavy metal pollution of LGOM environment.

In years 1991-1995 Pb-B examination with ASA method among 25 657 schoolchildren from LGOM were performed, the average Pb-B dropped to 6,95µg/dl. In years 1996-2002 11 588 children were examined and the Pb-B concentration lowered to average 4,6 µg/dl. Nevertheless in about 20% of children the Pb-B level still remained above 6 µg/dl (a newly suggested acceptable limit).

The children with elevated Pb-B concentration suffered more frequently on headaches and abdominal pain. 14500 children with augmented Pb-B concentration were directed to spa cure (Mg & Ca mineral water, honey-cure, physical activity, natural non polluted environment) a hygienic lifestyle education was constantly propagated and collaboration with environmental health care local authorities continued .

Conclusion:

During 30 years of prophylactic activity conducted together by industrial and non-governmental organizations the important about 10 fold reduction of lead burden in children is achieved.

Association between Ambient Gaseous Pollutants and Adverse Fetal Development

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The association between ambient air pollution and adverse health effects such as emergency room visits, hospitalizations, and mortality from respiratory and cardiovascular diseases has been extensively studied in many countries. Recently, studies conducted in the Czech Republic, the United States, and Vancouver, Canada have related ambient air pollution to adverse pregnancy outcomes. In this study, we examined association between intrauterine growth retardation (IUGR) among singleton term live births and ambient concentrations of sulfur dioxide (SO₂), nitrogen dioxide (NO₂), carbon monoxide (CO) and ozone (O₃) in Edmonton, Calgary and Montreal, Canada for the period 1986-2000. An IUGR birth is defined as an infant whose birth weight falls below the 10th percentile, by sex and gestational week, of all singleton live births in Canada between 1986 and 2000. Multiple logistic regression was used to estimate odds ratios (ORs) and 95% confidence intervals (CIs) for this effect after adjustment for maternal age, parity, infant gender and month of births. Results show that IUGR was associated with exposure to SO₂ during the first month (OR =1.03, 95% CI: 1.00-1.05, for a 5.0 ppb increase) and during the last month of pregnancy (OR =1.03, 95% CI: 1.01-1.05, for a 5.0 ppb increase), to NO₂ during the first month (OR =1.02, 95% CI: 1.00-1.03, for a 10.0 ppb increase) and during the last month of pregnancy (OR =1.03, 95% CI: 1.02-1.05, for a 10.0 ppb increase), and to CO during the first month (OR =1.04, 95% CI: 1.02-1.06, for a 1.0 ppm increase) and during the last month of pregnancy (OR =1.05, 95% CI: 1.01-1.10, for a 1.0 ppm increase). In conclusion, relatively low concentrations of gaseous air pollutants are associated with adverse effects on fetal growth in populations experiencing diverse air pollution profiles.

Air pollution in Dhaka who suffer the most?

Abu Mokeram Khondaker, Executive Director, AFEAHRD & EC Member, Bangladesh Environment Movement (BAPA)

Objective: Through our recently concluded Study Circle, it has been found that children of the marginalized community suffers the most owing to degrading quality of air in Dhaka.

Brief Summery: Respiratory problem is now the leading cause of death of children worldwide and air pollution in the developing world is responsible for at least 50 million cases of chronic cough. Children living in the cities of developing countries face double jeopardy from both living in poverty and from exposure to degraded environment. Many children in Dhaka already suffer from hunger, malnutrition and infections and do not have access to basic health care. Air pollution only worsens their burden by aggravating diseases like bronchiolits, asthma, and other lung diseases.

Dhaka city is approximately 400 years old and now the capital of Bangladesh. Estimated Nine million people live in an area of 1353 Sq. km. (BBS. 1998) where every day 1300 migrants join to swell the population in the city. Fifty five percent of the inhabitants live under absolute poverty line and standard of living of about 2.5 million slum dwellers in precariously low.

No wonder available healthcare facilities are no-match to the rapidly increasing urbanites and people suffer a lot owing to the lack of basic sense on healthcare and cleanliness practices.

In light of what has been stated earlier, we decided to go ahead with "Environment and Health". We tried to make the Study Circle group participants talk and express themselves on the cause and consequences of some common environmental pollution and its impact on health of individuals.

The objectives of the implemented 'Study Circle' on 'Environment and Health' in Dhaka city are to identify the sources of environmental pollution, discuss the health issues people face as result of such pollution, increase associated health problems faced by the people and finally discuss action and remedies to eliminate or reduce some of these problems.

To sum up the outcome of the Study Circle process, the response and participation has been simply tremendous. We were able to come out successfully with a handful of worthwhile recommendation which we hope the National policy makers would incorporate in their future policy implementation & decision making.

Children's health: decrease of risk through simulation games

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Poster or oral presentation

Objective: Search of effective and low-cost methods in decrease of risk to children's health

Nowadays, the ongoing development of science, engineering and information technologies shapes stringent requirements to education. Modern education, both in its form and substance, should teach how to think, find nontrivial decisions in different situations and take a strong stand. We live in a constantly changing world and education may not be just informative. Today education becomes one of the basic means of ensuring personal safety.

Simulation games are the effective and low-cost method in decrease of risk to children's health in such areas as home environment, indoor air pollution, drinking water quality, food and health (tobacco smoke).

Educational systems in most countries do not go beyond the level of «knowledge» reproduction. Due to the aim of mechanical reproduction of knowledge at schools pupils tend to quickly and easily forget the acquired information, because it hasn't become helpful and practical for them.

Modern textbooks do not provide answers to children's practical questions related to his/her daily life, his home and observed side of environment.

Knowledge does not change people's behaviour. But simulation games prove to be almost the only tested method of communication, teaching and individual development, working out common decisions during teamwork. The interactive methods help to achieve a unique effect: lifting to new meanings, understanding the relationships of phenomena and providing a complete coverage of problems of Man's existence.

Educational materials as CD "Help Smirnov's family", "Green Bag", "Ph in nature and at home" ect. can be really very helpful in education linking with health.

Conclusions:

1. Through interactive methods of teaching and learning children can decrease risk for their health.
2. Simulation games are the effective and low-cost method for students in health questions.

Noise affects all aspects of children health

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The health of children as a particularly vulnerable section of society is an indicator of the health and development. In recent years noise has recognized as a cause of some physical, psychological and social problems. Our Three Studies (2 Descriptive and 1 experimental) have investigated the effects of noise environment on children health. Two social questionnaires survey in three residential areas around Tehran International Airport gather teachers and parents opinion to noise effects on children at school and home. The results show that children's sleep, communication and education procedure are affected by noise and may be frightened. It causes pupils loss of concentration and makes them noisier and less inclined to work and activities. Our animal experimental study on two groups (control & experimental) of rats show a significant relation ship between noise exposure and pupsó weight and mothersó fertility outcomes. The over all conclusions prompted by these studies is that noise is a significant environmental factor, which has negative effects threatening children health. More human based studies are needed on vegetative effects of noise. Noise control should be considered for the policies and environmental planning.

The effect of the gulf war II on The Environment and human & water quality In The Persian gulf

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Due to the gulf war II activities in the Persian Gulf the environment and the ecological system of the Gulf has been effected by severed means and the ways that causing a high level of pollution in the water, air and marine shore lines also effecting the aqua life and the human being life especially children.

In this study a different parameters of pollution were studied and measured and observed on the environment from gulf war II.

The study objective

The Persian Gulf and especially the north sector of it was a big theatre of environment destruction activities due to Gulf war II which may be count them as follows:-

1. because the burning the oil wells (around 7 wells) while in Gulf war I were 732 wells especially in Al-Rumaila in the south of Iraq that causing to create a heavy black smoke plume moving toward the Persian Gulf that carrying a high concentration of incomplete burning hydrocarbons also a suspended molecules of heavy metals particles and elements such as vanadium & nickel also SO_x NO_x and VOC (volatile organic carbon). All these materials when transferred to the ground in the form of rainy drops causing a sever pollution impact especially to the quality of the Persian Gulf water quality, and in turn an increasing in the breathing problems were observed as follows:
 - a. the cases in asthma and nose bleeding were increase
 - b. create a new type of flu during winter that it virus can resist the ordinary antibiotic.
2. Increasing the rate of death a different a quality species life fishes, algaeetc also destroying the metabolism balancing system of the life in the Gulf.
3. Due to the disposal of the hot water from the recirculation of cooling processes of the war ship pieces that causing a localized heat increase and many type of water life species will leave such location and migrate to another zone of more preferable condition for containing their life cycle.
4. Many medical cases were recorded especially in the north of the Persian-Gulf (Basrah, Um-Qasir cities) such as difficulties in breathing, eye irritation ... etc for the residence and generally a respirator system affected by these pollution and plumes.
5. The use of special type of anti-armor rockets and missiles that containing DU (depleted uranium) which is a must radioactive and toxicant agent and its effect transferred to the air, ground water and surface water which may consider as a carsogenic agent and hazardous compound which causing a cancel, sterilization for men and abortion for pregnant women and a number of such cases recorded in south of Iraq and in Kuwait, and the re-cleaning of such material for water ground water and the soil will need a high budget and time.
6. The marine shore line of the south of Iraq were polluted by a heavy slick oil spills cause from the burning and spilling of the content of the oil wells to the water, in turn causing that these shore lines not to be suitable for natured human activities such as swimming, fishing and other entertainment activities.
7. The water pollution of the Persian Gulf adding an extra load and potential to all the water treatment plants and desalination plants in countries such as Kuwait, Saudi Arabia, that mean adding an extra cost to the whole costs of the desalination process.
8. due to the increasing in the rate of the cancer cases the psychological problems created between many married couple because of the sterilization and abortion problems.

Conclusions

1. All the environmental and ecological system of the Persian Gulf was affected by the Gulf water II.
2. The pollution due to different military activities impact on the people, shore lines, aqua lifeetc. were detected.
3. Many types of diseases appeared especially the respiratory systems and the effect of the pollution also on another body's organ.
4. increasing in the rate of the cancer cases in children and women.

Recommendations

1. All Persian Gulf countries must cooperate with each others to remove the influence of the previous war, by holding special meeting and conferences to exchange their thoughts and ideas about this subject.
2. Issuing more publishing papers and books that dealing with the environmental impact of this war and how can people in the Persian Gulf countries retreat and rehabilitate the environment of the Persian Gulf.
3. Announcing that the region of Persian Gulf is clear from any militaries activities and more investment must be directed to this region for constructing and building new projects that may increase the environmental investment.

Water and sanitation in rural communities: A PNG case study

Sarah Ekali, Community Health and Environment Specialist, Chevron Texaco (Nuigini)

Introduction

Prior to and during the initial operation of Chevron Nuigini Kutubu Oil in the 1990s, government workers, with Chevron's assistance, promoted water and sanitation projects to villages in Kutubu, an area in the Southern Highlands of Papua New Guinea (PNG). However, this was done without necessarily exploring or discussing how the project fitted in with the total needs of the communities. Because of this, Kutubu people often felt confused and resentful towards the government agencies and the company. They felt their own wishes and feelings were not being considered and respected. Such experiences are common throughout PNG's rural communities.

Background

Southern Highlands is a rugged, remote, heavily populated province with little economic development. Subsistence agriculture is the basic way of life. Traditions, including tribal fighting, remain strong. The population of 316,987 occupies a land area of 23,800 square kilometres. At least 12 major languages are spoken. In Kutubu itself there is a population of 20,000, with 51 villages. Southern Highlands has PNG's lowest levels of education, literacy, participation in the cash economy and wage employment. The economy depends heavily on government wages and purchases. Many men migrate to other provinces for work. Heavy rainfall and high freight costs have been the biggest barriers to development. The Kutubu oil project in Nipa district and the Hides gas field near Tari Southern Highlands, has brought jobs and community development to the area.

Real life problems

In Papua New Guinea, the Environmental Health Section of the Department of Health spent thousands of kina installing safe water systems in rural PNG villages. They later learned that villagers dug up the water pipes because the government had not obtained permission from landowners for running the pipeline and none of the local families had been consulted about where to install taps. The people resented that the government had not asked them about their preferences prior to installation. Other villages allowed their water systems to stop working and fall apart because they had never felt it was their responsibility to maintain the tanks, basements or pipes. The local people felt that maintenance was not their responsibility, but the government's.

In the Kutubu area, in early 1980s and 1990s, Chevron provided rainwater catchment tanks and WHO-approved ventilated pit latrines to all the villages, but without proper consultation with the communities as to their needs. No awareness-raising or education on the use of the latrines or their maintenance was carried out. The communities' responses were varied. Some used the iron rods from the latrines' concrete slabs for fishing and hunting, others said they could not use the latrines because of certain cultural taboos, some believed that use of the latrines could lead to a death in the family.

Changes — Increasing community knowledge and skills

Previously, there was no community participation during the oil exploration and operations period. Projects were chosen by exploration companies on the basis that these projects would be accepted by the communities. Instead, most of the projects were left unused or destroyed by villagers because of cultural beliefs or taboos. This way of doing things has changed since 2000, when Chevron outsourced its Community Affairs department to a newly formed NGO foundation to assist in sustaining community projects and programs in line with the PNG government programs. The PNG National Health Department facilitated and conducted train-the-trainer sessions and community development workshops in rural areas. In the Kutubu area, training workshops are coordinated and facilitated by the government, Chevron Community Affairs and the newly established NGO group CDI, funded by Chevron.

Results

Through many group discussions during workshops in different villages we discovered that we could learn a lot more from people if we approached them with general concern about their needs and priorities, instead of providing projects that are not identified as their priority needs. People have many needs and goals in life and they see them all as being necessary and important to living a good life. One of the important things we discovered was that these needs and desires are often connected with each other. The desire for such things as good water and sanitation, health, adequate food and better health services are usually a priority in most communities.

A most important step in community participation is to get the people in a community or village to identify their needs and priorities, rather than having government or company act on behalf of the communities. It is for the people themselves, to take the lead in decision-making and in so doing they will then feel that they own and are responsible for projects such as water supply and sanitation systems. At the end of our community group discussions, people would often express how much they appreciated that we were genuinely interested in hearing their views, and that we were not trying to promote another government or company program.

Conclusion

In order to be successful, development projects must start with full involvement of the community and this must continue through all stages of planning, implementation and maintenance. The way in which we can help people take responsibility for improving their lives is by teaching village leaders the skills they will need to help their communities become more independent and self sufficient.

Successful community participation requires that community leaders and extension workers have the opportunity to gain or further develop the following knowledge and skills.

- Awareness and understanding of the importance of integral human development in the community;
- development of participants' confidence in their own strengths and build their leadership skills so they can work more effectively within the community;
- ability identify and utilise the potential and resources of community members and to work with others to improve quality of life;
- leadership skills, enabling them to develop trust and understanding among community members; help identify community needs, goals and priorities; promote community participation in decision-making and problem solving; help settle disputes and conflicts,
- ability to organise and lead group discussions so they can conduct effective community meetings; help people identify their problems, priorities, and development goals; obtain people's ideas and participation in problem solving; obtain agreement on solutions; help develop plans for action and get commitments to use local resources; and
- effectively use local and outside resources to achieve the community's development goals, such as how to organise and work with local community support to utilise local physical and natural resources and non-government organisations for development projects if and when needed.

Armed with these skills and this knowledge, community leaders and extension workers can ensure that the community members have taken action to improve their quality of life, that they are aware of any decisions made or activities conducted to achieve their development goals; that development projects are proceeding smoothly or, if not, what resources are needed or steps should be taken to rectify the situation.

BRIDGES OF HOPE – A Study of the Impact of Socio-Economic Factors on the Health of Ghanaian Children

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1.0 INTRODUCTION

Bridges of Hope is designed to provide effective linkages in the various paediatric health and development programmes being put forth by a rural/semi-urban network of six NGOs and two FBOs in Ghana.

2.0 STUDY OBJECTIVES

- 2.1 To study the phenomenon of street children and factors affecting their health in selected urban, semi-urban and rural settings in Ghana.
- 2.1 To document the gains of Preventive AIDS Lifeline Micro-credit Strategy (PALMS), Religious-based Economic and Health Education for Overcoming People (REHEOP) and other strategies in paediatric health and development issues.
- 2.2 To identify the critical challenges to paediatric health and development research in the rural/semi urban setting of the network .

3.0 RESULTS

The interventions were targeted towards street children and paediatric health aggravated greatly by poverty resulting from unfavourable socio-economic factors. The strategies adopted enabled the partners to move beyond using IEC materials to create awareness. The credit unions and other economic groupings created through PALMS and REHEOP provided a conducive and enabling environment for alleviation of the negative effects created. Community participation in the activities were thus enhanced thereby encouraging a proper understanding of the serious situation children in Ghana are being exposed to.

4.0 CONCLUSION

The partners have recognised the benefits/synergies that could be derived from their working together. The lessons learnt would assist in the design of effective paediatric health and development research tools in Ghana especially in the difficult terrain of rural and semi-urban areas.

Children : Poverty and exposure to risks

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The developing world is experiencing the largest ever generation of children. One out of every six on the planet are between 10 and 19 years of age, 85% of them in developing countries. Because of the considerable drop in fertility rates, the children of today will constitute the largest-ever generation of active people. The "Convention of the Rights of the Child" has consolidated the position of children. It has responsabilised both the families and the states towards them. Yet, what is the reality ? Globalisation and the various Poverty Alleviation Programmes adopted by most of the poor counties are generating the opposite results. They are socially and economically excluding the majority of the people, thus fostering poverty, environmental degradation and relinquishment of environmental management. Who suffer the most in poor countries and among poor families, if not the children ?

In urban areas of underdeveloped countries, people burn their trash along streets and unofficial dumps. This trash incineration is known as a major source of dioxins and related compounds causing cancer and damaging and the immune system. These trash piles are exposing the people who live in the vicinity, and scavenging children, in particular, to serious health risks.

Chemicals and their use have no control in poor countries and among the uneducated rural communities, including children. Chemicals can move from soil to body, from the air atmosphere to the body and from direct and indirect or accidental consumption.

Tomorrow's world will be sick. Yet the situation can be reversed. Economic security, social justice and environmental respect can be developed fully for a better world to our children.

Endoecological Diagnostics of Children - the Base of Their Health

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Today the state of children health practically worldwide is ecologically determined. Essentially, the state of health of city children, living in concrete region, is the biological indicator of ecological well-being of that place, where these children live. Health of children today is affected negatively by all environmental factors.

From this point of view, the presence of an opportunity of express diagnostics of health state of children in dynamics under the action of different environmental factors is very important.

We developed one of possible variants of such procedure. The essence of this method is the measurement of acupuncture biogalvanic current flowing in an organism, at the supplying to the corresponding biologically active points of the relevant metal electrodes [V.Makacz, 1991].

In the report the procedure such endoecological diagnostics is highlighted, its practical realization and the results of carrying out such periodic observation and examination for a series of regions of city of Kiev are presented.

Proposed endoecological diagnostics allows to obtain the objective "health passport" of the child and, therefore, to carry out permanent monitoring of health state of children.

Children's Right to a health Environment: The African and Ghanaian Perspective

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Objectives:

- More environmental attention should be given more attention to the Child in Ghana and Africa.
- Sensitize the Africa Child to be environmental friendly

The perfect environment might include a library stacked with neatly packed floor-to-ceiling book shelves. It might have a backyard twenty-acres big full of garden paths, farm animals and stocked ponds. .

It must include **learning centers**. The idea is to group interesting things together in an accessible area where your child will want to spend time. You might start with a small bookshelf stocked with level-appropriate readers; or a corner for science kits and projects.

It must also include **Places to read**. Whether snuggled up on the couch or standing up at a lunch counter, providing time and space to read instill in our children not only a love of reading, but the notion that reading isn't something we do solely in a "school" setting. Children need their own special space, as well: a sleeping bag on the floor, bean bag chair, favorite rocker.

Backyard nature. Take lots of nature walks, plant gardens or if you live in an apartment, pot windowsill plants. Provide sketchbooks, color pencils. Nature is a perfect learning environment.

The value of play. Children need plenty of time and space for play. It is during their playtime that we find what interests them - what they delight in. or engage them in board or card games. Don't forget outdoor favorites: sidewalk chalk, bubbles, kites, ball games. With a bit of attention and organization you will find playtime to be one of their most enjoyable learning times!

By providing **Table space you** will encourage consistent discipline by providing one spot where a child is accustomed to sitting, writing and completing "lessons." Some families take this a step farther and have desks installed, while others will simply use the kitchen table. Just make sure there is ample room to spread out.

Conclusion:

From the writers perspective I think the child should be provided with a very neat environment full of what nature has provided and should be sensitized and educated why they themselves need to keep a clean environment.

"School Children Health and Environment in Developing Country"

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Objectives:

- To ensure a healthy environment in schools and prevent the spread of communicable diseases.
- To advice the schools administration about the school building, classroom, furniture, playgrounds, water supply and food.
- To provide emergency care for minor illness & first aid for minor injuries.
- To involve school teachers in early identification of: visual, auditory impairment, physical and mental handicap, attention deficit.
- To increase health awareness including HIV/AIDS and about immunization.
- To improve the nutrition through supplementary nutrition & mid-day meals.

Summary:

NMCTH medical students and experts conducted the school health survey in the government and private schools. The government school children health status was very unsatisfactory in comparison with private schools. The government schools don't have the standard classroom; adequate sports facility, safe drinking water, light, ventilation and trained educators. We found that 24% of school children are suffered from malnutrition. Only 57% have incomplete immunisation, 11% have other ear, eye and throat diseases, 6% have worm infections and very less children are mental ill, most are come in dirty clothes, nails and without brushing. This survey program have free check-up camp & ill children are refer to the hospital. A health education program was given to students and teachers for the better improvement in school children health and environment.

Conclusions:

we conclude that the main causes are poor socio-economic status, illiteracy of parents, negligence, hard housework for children, diseases, malnutrition, incomplete immunisation, early marriage with many children and lack of health education. Our suggestion is that government & community should take proper steps in the development and help these marginalized schools. Free health check up and regular health education is also effective for both children and teachers. Last but not the least, this type of survey programs are very helpful for poor developing country like Nepal.

